Total No. of Questions : 10]

SEAT No. :

P3616

[Total No. of Pages : 3

[4858] - 1001

T.E. (Civil) (Semester - I)

Hydrology and Water Resource Engineering

(2012 Pattern) (End-Sem.)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) How hydrology can be useful in design of water supply, agriculture water requirements, navigation, flood control and hydraulic structures? **[5]**

b) Explain isohyetel method with neat sketch. **[5]**

OR

Q2) a) The normal annual depths recorded at five rain gauge stations, A, B, C, D and E respectively are 910, 1070, 1410, 810 and 590 mm respectively. Determine the optimum number of rain gauge stations to be established in the drainage basin. If it is desired to limit the error in the mean value of rainfall to 10%. **[5]**

b) State deltas for Jowar, Bajra, Sugarcane, Rice and Wheat also explain methods to improve duty. **[5]**

Q3) a) Differentiate between flood irrigation and sprinkler irrigation system. **[5]**

b) Explain with neat sketch bubbler method to determine the stage of river and also state the advantages of this method. **[5]**

OR

P.T.O.

Q4) a) In a water table aquifer of 50 m thickness, a 20cm diameter well is pumped at uniform rate of 0.05 m^3/s. If the steady state drawdown measured in the observation wells located at 10m and 100m distance from the well are 6.5 m and 0.25 m respectively, determine the hydraulic conductivity of the aquifer. **[6]**

b) Explain various types of tube wells and explain construction of any one. **[4]**

Q5) a) What do you mean by base flow? Enlist the methods of base flow separation and explain any two in details. Explain with neat sketch. **[8]**

b) The observed annual flood peaks of a stream for a period of 40 years from 1942 to 1981 in m^3/s are given below. **[10]**

395, 619, 766, 422, 282, 990, 705, 528, 520, 436,

697, 624, 496, 589, 598, 359, 686, 726, 527, 310,

408, 721, 814, 459, 440, 632, 343, 634, 464, 373,

289, 371, 522, 342, 446, 366, 699, 560, 450, 610,

Construct the probability plot for the annual flood on ordinary graph. Determine the flood magnitude with return period of 100 years.

OR

Q6) a) What is hydrograph? Draw a single peaked hydrograph showing its all components. Also state uses of hydrograph. **[8]**

b) Find the ordinates of flood hydrograph resulting from a storm with rainfalls of 3.0, 6.5 and 4.5 cm each during successive 4-hours. The ordinates of a 4-hour unit hydrograph are given below: **[10]**

Time (hours)	0	4	8	12	16	20	24	28	32	36	40	44
UHO (m^3/s)	0	110	320	515	380	305	250	230	150	95	50	0

Q7) a) Explain how will you fix the capacity of reservoir using annual inflow and outflow. **[8]**

b) Explain fixation of reservoir capacity using elevation capacity curve and dependable yield. **[8]**

OR

Q8) a) What are various reservoir losses. What are various measures to control these losses. **[8]**

b) What is reservoir sedimentation? What is the significance of trap efficiency? Explain with neat sketch. **[8]**

Q9) a) Write a note on warabandi. **[8]**

b) Explain Participatory Irrigation Management. **[8]**

OR

Q10) a) What is water logging? What are the ill effects of water logging? How will you control it? **[10]**

b) Draw a neat section for lift irrigation scheme and state various components of lift irrigation scheme. State the authorities from whom permission for implementation of lift irrigation is required. **[6]**

Total No. of Questions : 8]

SEAT No. :

P2030

[Total No. of Pages : 3

[4858] - 1002

T.E.(Civil) (Semester - I)

STRUCTURAL ANALYSIS - II

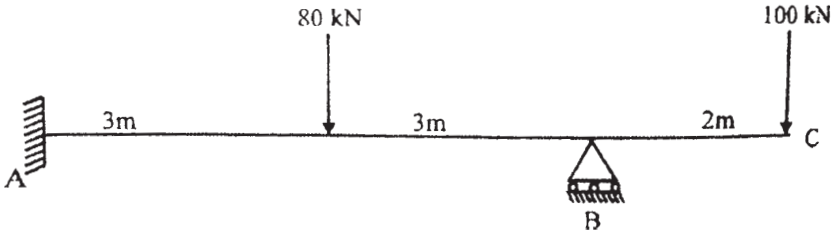
(2012 Pattern) (End - Sem)

Time : 2½ Hours] *[Max. Marks :70*

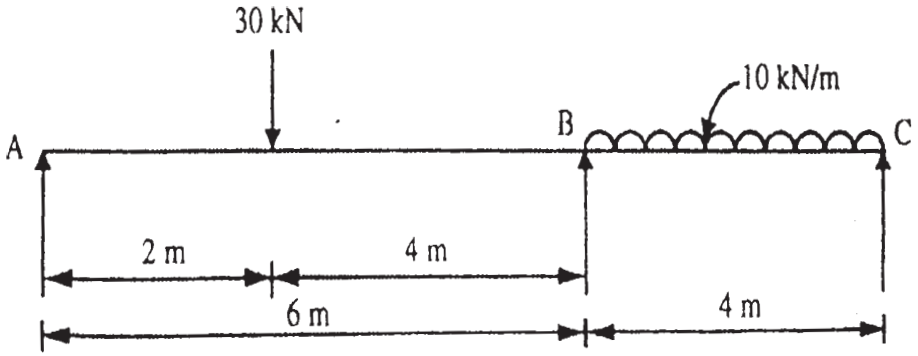
Instructions to the candidates :-

1) ***Answer questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures in bold to the right, indicate full marks.***
3) ***If necessary, assume suitable data and indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) a) Analyse the beam loaded as shown in figure below by slope deflection method and draw bending moment diagram and shear force diagram, EI is constant. **[10]**



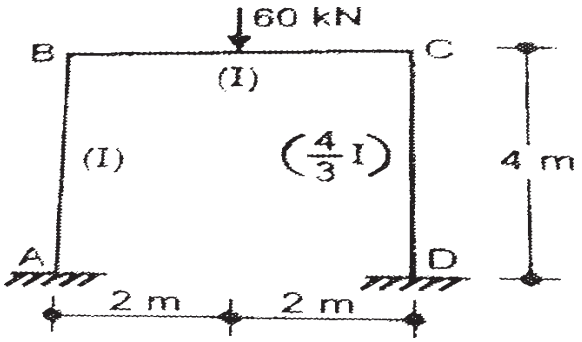
b) Analyse the continuous beam shown in figure below using the Flexibility method and draw the bending moment diagram. **[10]**



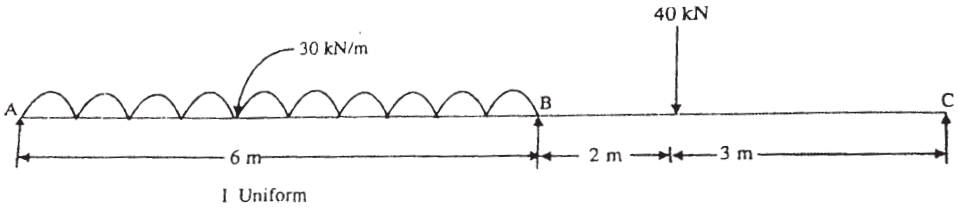
OR

P.T.O.

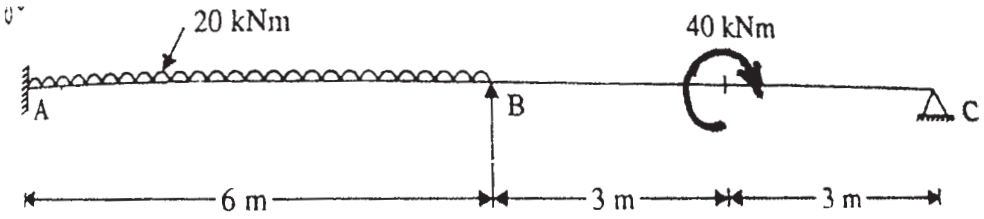
Q2) a) Analyse the frame as shown in figure below by slope deflection method. **[10]**



b) Analyse the continuous beam shown in figure below by the method of moment distribution. **[10]**

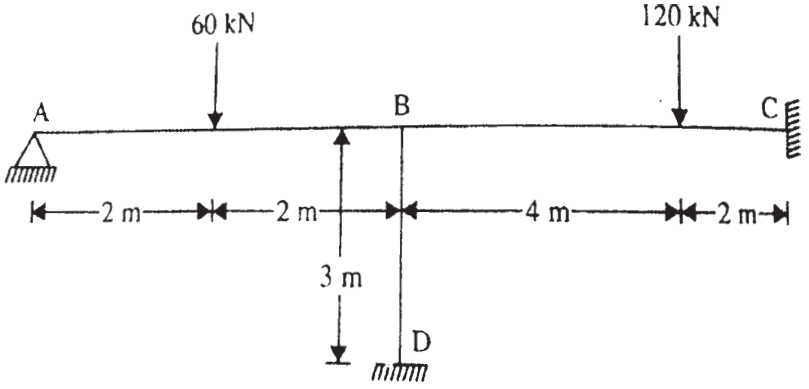


Q3) a) A two span continuous beam ABC is fixed at A and simply supported over the supports B and C. AB = 6m and BC = 6m. The moment of Inertia is constant throughout. It is loaded as shown in figure. Analyze the beam by matrix stiffness method. **[16]**

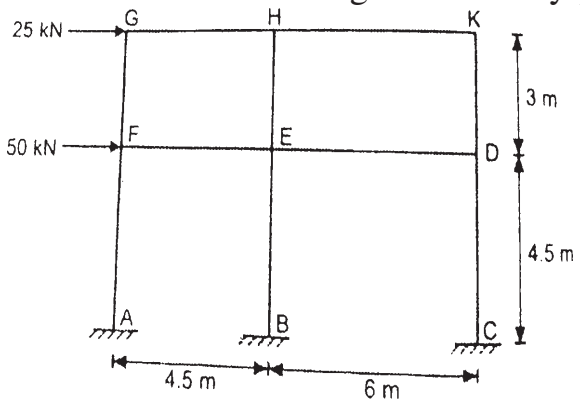


OR

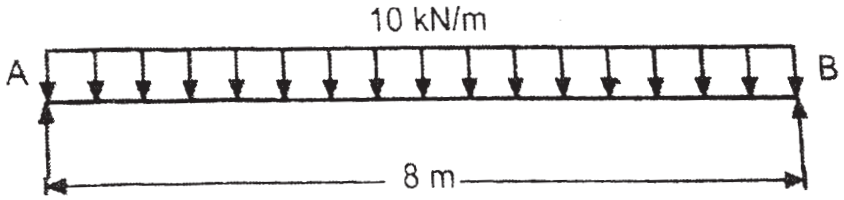
Q4) a) Analyse the frame by matrix stiffness method and sketch the Bending Moment Diagram. **[16]**



Q5) a) Analyse the frame shown in figure below by portal method. **[10]**



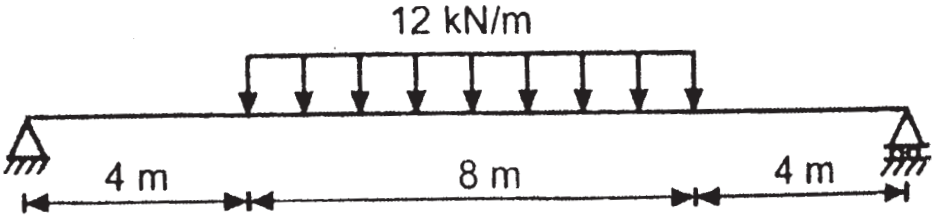
b) A simply supported beam of length 8m is loaded as shown in figure. Determine the maximum deflection. **[8]**



OR

Q6) a) Analyse the frame as shown in Q.5a) by Cantilever Method. **[10]**

b) The beam is loaded and supported as shown in figure. Determine deflection at nodal points. Take 5 nodes. **[8]**



Q7) a) Explain Convergence criteria for FEM. **[8]**

b) Explain Plain stress and plain Strain problem. **[8]**

OR

Q8) a) Explain principle of minimum potential energy. **[6]**

b) Explain Rectangular elements. **[10]**

XXXX

Total No. of Questions : 10]

SEAT No. :

P1294

[Total No. of Pages : 3

[4858] - 1003

T.E. (Civil) (End Semester) (Semester - I)

STRUCTURAL DESIGN - I

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***AnswerQ. 1 or Q. 2, Q. 3 or Q. 4, Q. 5orQ. 6, Q. 7orQ. 8and Q. 9or Q.10.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Take Fe 41 0 grade of steel.***
5) ***Take ultimate stress in bolt, f_{ub} = 400 N/mm^2.***
6) ***Assume suitable data, if necessary.***
7) ***Use of electronic pocket calculator, IS: 800-2007 and steel table allowed.***
8) ***Use of cell phone is prohibited in the examination hall.***

Q1) a) State and explain classification of cross section with bending stress distribution. **[4]**

b) Determine the design strength of tension member of roof truss consists single 1SA75 × 75 ×8 mm @ 8.9 kg/m connected to gusset plate by 6 mm fillet weld. **[6]**

OR

Q2) a) Differentiate lacing and battening in a built up column section on the basis of general and design consideration. **[4]**

b) A tension member 3.4 m long between centre to centre of intersection subjected to a factored pull of 200 kN. Design economical section using double equal angle section on either side of gusset plate. **[6]**

Q3) a) A strut consists of a double angle section ISA 70 × 70 × 8 mm @ 8.3 kg/m and 3.2 m long. The member is connected to the gusset plate by 03 numbers of 20 mm diameter bolts. Calculate the design compressive strength of the member if the angles are placed on the opposite of 10 mm thick gusset plate. **[5]**

b) Design a slab base for the column consisting of ISMB 400 @ 61.6 kg/m carrying an axial factored load of 450 kN. Use M20 grade of concrete.**[5]**

P.T.O.

OR

Q4) a) Determine the design strength of a column section ISMB 400 @ 61.6 Kg/m with an effective length of 4 m. **[4]**

b) A column section ISLB 350 @ 82.2 kg/m having effective length of 3.5 m is subjected to factored axial load of 450 kN and factored moment of 50 kNm. Check adequacy for section strength only. **[6]**

Q5) a) State and explain the terms with neat sketch: Laterally supported beam, web buckling and Web crippling **[6]**

b) A simply supported beam in a building has a span of 4 m. It carries a uniformly distributed load 60 kN/m including self weight. Design the beam if the compression flange is laterally restrained throughout the span. Apply usual checks. **[10]**

OR

Q6) A simply supported beam of effective span 5 m carries a uniformly distributed load of w KN/m throughout the span. The compression flange of beam is laterally unsupported throughout the span. Determine the intensity of uniformly distributed load of w, so that the section ISMB 400 @ 61.6 Kg/m provided for beam can carry safely Also check for serviceability. **[16]**

Q7) a) Design a welded seat connection for a factored beam end reaction 100 KN. The beam section is ISMB 250 @ 37.3 kg/m connected to the flange of column section ISHB 200 @ 37.3 kg/m. **[10]**

b) Explain types of beam to beam and beam to column connection with suitable sketches. **[6]**

OR

Q8) A simply supported welded plate girder of span 20 m is subjected to uniformly distributed load 40 kN/m on whole span excluding self weight of plate girder. Design cross section of plate girder and check for shear buckling of web and shear capacity of end panels. Assume compression flange laterally supported throughout the span and yield stress of steel is 250 MPa. **[16]**

Q9) Determine the maximum wheel load, shear force and bending moment for the gantry girder as per following data. Design the section and check for moment capacity of the section.

Weight of crane girder - 180 kN, Crane capacity - 200 kN, Weight of crab and motor - 50 kN Span of crane girder - 16 m, Minimum hook approach - 1.2 m, C/C distance between gantry column - 6 m, Weight of rail - 0.25 kN/m. **[18]**

OR

Q10) Determine the design force in the members L_0U_1, L_0L_1, and U_1L_1 of a truss as shown in Fig. 10. Assume design wind pressure is 1200 N/m^2, use G .1. sheet and the c/c spacing of truss is 4 m. Assume self weight of purlin 120 N/m, **[18]**

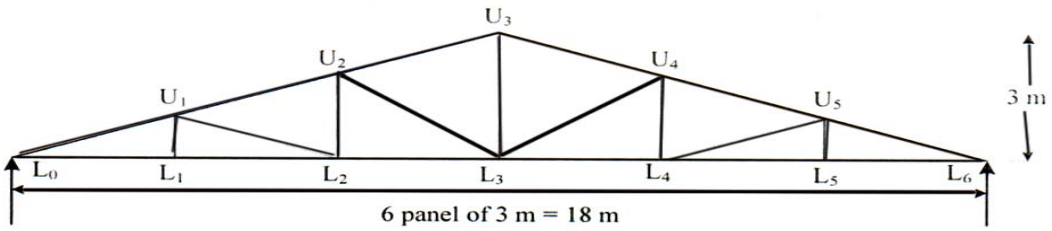


Fig. 10

Total No. of Questions : 12]

P1295

SEAT No. :

[Total No. of Pages : 4

[4858] - 1004

T.E. (Civil) (Semester - I)

FLUID MECHANICS - II

(2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8,Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Draw the neat sketch of an unsymmetrical and symmetrical Airfoil. Also explain the following things related to an Airfoil, **[4]**

i) Chord line

ii) Angle of attack

iii) Stall

iv) Camber

b) Explain "water Hammer in pipes" w.r.t. **[4]**

i) Gradual closure of valve

ii) Instantaneous closure of valve

OR

Q2) a) In a pipe 600mm diameter and 3000 m length, provided with a valve at its end, water is flowing with a velocity of 2m/s. Assuming velocity of pressure wave c = 1500m/s, find: **[4]**

i) The rise in pressure if the valve is closed in 20 seconds

ii) The rise in pressure if the volve is closed in 2.5 seconds.

Assume the pipe to be rigid one and take bulk modulus of water as 2 GN/m^2.

b) Assuming the cross-sectional area of a passenger car to be $2.7m^2$ with a drog co-efficient of 0.6, estimate the energy requirement at a speed of 60km/h. Assume the weight of car to be 30KN and co-efficient of friction 0.012. Assume ρ to be 1.208 kg/m^3. **[4]**

P.T.O.

Q3) a) Explain with neat sketch 'Geometric elements of channel: **[3]**

b) A 8m wide channel conveys $15m^3/s$ of water at a depth of 1.2m. Calculate: Critical depth, critical velocity and minimum specific energy. **[3]**

OR

Q4) a) During an experiment in a laboratory, $0.05m^3$ of water flowing over a right-angled notch was collected in one minute. If the head of the sill is 50mm, calculate the co-efficient of discharge of the notch. **[3]**

b) Explain in brief : **[3]**

i) Froude's number

ii) Section factor

iii) Hydraulic exponent

Q5) a) Differentiate between open channel (flow) and pipe flow **[3]**

b) Describe the classification of hydraulic jump. **[3]**

OR

Q6) a) Show that in case of most economical rectangular channel section: **[3]**

i) The depth of flow is equal to half the base width

ii) Hydraulic radius is equal to half the depth of flow

b) Explain "Practical uses of hydraulic jump". **[3]**

Q7) a) A jet of water of diameter 10cm strikes a flat plate normally with a velocity of 15m/s. The plate is moving with a velocity of 6m/s in the direction of the jet and away from the jet. Find: **[8]**

i) The force exerted by the jet on the plate

ii) Work done by the jet on the plate per second

iii) The power of the jet in kW

iv) Efficiency of the jet

b) A centrifugal pump delivers water against a net head of 14.5 meters and a design speed of 1000 r.p.m. The vanes are curved back to an angle of 30^o with the periphery. The impeller diameter is 300mm and outlet width is 50mm. Determine the discharge of the pump if manometric efficiency is 95%. **[8]**

OR

Q8) a) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m works against a total head of 40m. The velocity of flow through the impeller is constant and equal to 2.5 m/sThe vanes are set back at on angle of 40^{o} at outlet. If the outer diameter of the impeller is 500mm and width at outlet is 50mm, determine **[8]**

i) Vane angle at inlet,

ii) Work done by impeller on water per second and

iii) Manometric efficiency

b) Derive the expression for workdone per second by the jet on the inclined plate moving in the direction of the jet. **[8]**

Q9) a) Explain the following efficiencies of a turbine: **[8]**

i) Hydraulic efficiency (η_h)

ii) Mechanical efficiency(η_m)

iii) Volumetric efficiency (η_v)

iv) Overall efficiency (η_o)

b) What do you mean by "Unit Quantities"? Explain the following w.r.t. unit quantities **[8]**

i) Unit speed

ii) Unit discharge

iii) Unit power

OR

Q10)a) A turbine is to operate under a head of 25m at 200r.p.m. The dischange is 9 cumec. If the efficiency is 90% determine the performance of the turbine under a head of 20 meters. **[8]**

b) The penstock supplies water from a reservoir to the pelton wheel with a gross head of 500m. One third of the gross head is lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of the penstock is 2.0 m^3/s. The angle of deflection of jet is 165^{o}. Determine the power given by the water to the runner and also hydraulic efficiency of the pelton wheel, Take speed ratio = 0.45 and Cv = 1.0. **[8]**

Q11)a) Derive with usual notatations "Dynamic equation of G.V.F. in its differential form". **[10]**

Also state assumptions for it

b) What do you mean by "GVF computations"?

Enlist various methods of GVF computations and explain any one method in detail. **[8]**

OR

Q12)a) Explain with neat sketches "Classification of channel bottom slopes". **[8]**

b) Consider a trapezoidal channel of 4.0m bottom width with side slopes of 1:1. If it carries a discharge of 2.485 m^3/s with mannings 'n' of 0.02, determine the distance required to change the flow depth from 0.9m to 0.5m, using step method, classify the surface profile. **[10]**

Total No. of Questions : 10]

P1296

SEAT No. :

[Total No. of Pages : 2

[4858] - 1005

T.E. (Civil) (Semester - I)

INFRASTRUCTURE ENGINEERING

(2012 Pattern) (In Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q.5 or Q. 6, Q.7 or Q. 8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain in detail challenges faced by construction Industry. **[5]**

b) Discuss in brief requirements of good track. **[5]**

OR

Q2) a) Discuss METRO - a new approach in public transport. **[5]**

b) Discuss the role of energy and power sector in the economic development of a country. Explain the status of power sector in India. **[5]**

Q3) a) Explain in brief advantages and disadvantages of concrete sleepers. **[5]**

b) Explain the selection criteria for cranes. With a neat labeled sketch explain in brief boom placers. **[5]**

OR

Q4) a) What do you understand by welding of rails? State merits and demerits of welding of rails. **[5]**

b) Explain dewatering system in construction. **[5]**

Q5) a) Classify the tunnels on the basis of their use. Explain why they are suitable for a particular purpose. **[6]**

b) Write short note on Micro Tunneling **[6]**

c) With neat labeled sketch, explain the following terms: **[4]**

i) Shaft ii) Adit

iii) Portal iv) Pilot Tunnel

P.T.O.

OR

Q6) a) What do you understand by the term drilling pattern? Explain the need for drilling pattern. Discuss types of drilling pattern. **[6]**

b) With neat labeled sketch describe needle beam method of tunnel construction. **[6]**

c) Write short note on Trenchless Tunneling. **[4]**

Q7) a) Explain in brief classification of Harbour based upon location. **[6]**

b) Define breakwater. Enlist the types of breakwaters and explain any two types with neat labeled sketch. **[6]**

c) Write short note on wet dock. **[4]**

OR

Q8) a) Discuss site selection criteria for Harbour. **[6]**

b) With a neat labeled sketch, explain the term jetty. Discuss various factors considered in design of a jetty. **[6]**

c) Write short note on Tetrapodes. **[4]**

Q9) a) Construction machinery costs Rs. 8 crores. The salvage value of the same is 10%. Its useful like is 10 years. Estimate the depreciation of the equipment using; **[6]**

i) Straight line method

ii) Double - Decline Balance Method
Tabulate your results.

b) Discuss various factors affecting output of a shovel **[6]**

c) Write short note on following **[6]**

i) Record Keeping of Equipments

ii) Operating Cost

OR

Q10)a) With suitable examples, explain why scraper is considered as versatile earthwork equipment. **[6]**

b) What is Depreciation. Explain any one method of Depreciation. **[6]**

c) Explain any two terms from the following **[6]**

i) Repair cost

ii) Economic life

iii) Labour Cost

Total No. of Questions : 10] SEAT No. :

P3524 [Total No. of Pages : 3

[4858]-1006
T.E. (Civil)
ADVANCED SURVEYING
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No. 1 or Q. No. 2, Q.No. 3 or Q. No. 4, Q.No. 5 or Q. No. 6, Q.No. 7 or Q. No. 8, Q.No. 9 or Q. No. 10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) State the objects of Geodetic Surveying and explain Secondary Triangulation? **[5]**

b) Describe three important segments of GPS system with illustration. **[5]**

OR

Q2) a) Differentiate between plane surveying and Geodetic surveying. **[5]**

b) What are various potential errors sources that affect GPS signal or result? **[5]**

Q3) a) Explain the analytical method of solving three point problem. **[5]**

b) Write a note on correction for curvature and refraction. **[5]**

OR

Q4) a) Explain and calculate data for intersecting circle method of graphical Soluction. **[6]**

b) Describe in brief location survey of a long bridge. **[4]**

Q5) a) What do you mean by a spherical triangle and how do you find out the length of sides of a spherical triangle? **[5]**

b) Define Geodetic quadrilateral and describe methods of its adjustment. **[5]**

P.T.O.

c) Find the most probable values of the angles A,B and C of a triangle ABC from the following observations (Use method of differences). **[8]**

Angle	Weight
Angle A = 65° 15' 30"	3
Angle B = 51° 11' 25"	2
Angle C = 63° 32' 34"	4

OR

Q6) a) Define following terms **[5]**

i) True value,

ii) Most probable value,

iii) Conditioned Quantity

iv) mistakes,

v) Weight of an obeservation

b) Explain clearly what is meant by side equation. How would you adjust a geodetic quadrilateral (without central station). **[5]**

c) Four angles are measured at a station closing the horizon. The values of the angles are : **[8]**

A = 83° 42' 28.75"	weight 3
B = 102° 51' 43.26"	weight 2
C = 94° 38' 27.22"	weight 4
D = 79° 23' 23.27"	weight 2

Give the corrected values of the angles. (use Normal equation)

Q7) a) Define and explain the following terms with neat sketch : **[5]**

i) Exposure station ii) swing

iii) Azimuth iv) principal line

v) Tilt

b) What are the different types of aerial photographs? Discuss any one briefly giving their use. **[4]**

c) A section line AB appears to be 10.16 cm on photograph for which the focal length is 16 cm. The corresponding line measures 2.54 cm on a map which is to a scale 1/15000. The terrain has an average elevation of 200m above mean sea level. Calculate flying height of the aircraft, above mean sea level, when the photograph was taken. **[7]**

OR

Q8) a) Explain Relief displacement and write the conclusions that can be drawn from expression of relief displacement. **[5]**

b) What are the different stereo viewing techniques in digital photogrammetry? **[4]**

c) A line AB 2000m long, lying at an elevation of 500m measures 8.65 cm on a vertical photograph for which focal length is 20 cm. Determine the scale of the photograph in an area the average elevation of which is about 800 m. **[7]**

Q9) a) What are the functionalities of GIS? **[5]**

b) Give the application of remote sensing with respect to natural hazards and that of archaeology. **[5]**

c) Explain the advantages and disadvantages of the raster and vector data models. **[6]**

OR

Q10)a) What are the components of a GIS? **[5]**

b) Define remote sensing and enlist the advantages and limitations of remote sensing. **[5]**

c) Explain the applications of GIS in Visibility analysis and slope analysis.**[6]**

Total No. of Questions : 12]

SEAT No. :

P3525

[Total No. of Pages :3

[4858]-1007
T.E. CIVIL (SEMETER-II)
FOUNDATION ENGINEERING
(2012 Pattern)

Time : 2½ Hours] *[Maximum Marks : 70*

Instructions to the candidates:

1) ***Answer Q 1or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10 and Q11 or Q12,***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume Suitable data, if necessary and mention it clearly.***
5) ***Non programmable calculator is allowed.***

SECTION-I

Q1) Describe various types of soil samples. What is area ratio? State its significance. **[7]**

OR

Q2) Explain Electrical Resistivity Method in accordance with: **[7]**

a) Principle

b) Procedure and sketch

c) Limitation.

Q3) A rectangular footing 2m×3m rests on a c-ϕ soil, with its base at 1.5m below the ground surface. Calculate the safe bearing capacity, using factor of sefety of 3 on

a) Net bearing capacity and

b) ultimate bearing capacity. The soil has following parameters: γ=18kN/m^3, c=10kN/m^2, $\phi = 30°$. (Use Terzaghi analysis) **[6]**

OR

Q4) Explain the effect of submergence on bearing capacity for different positions of ground level. **[6]**

P.T.O.

Q5) The result of consolidation test on a clay sample conducted in the laboratory indicates time for completion of half of the ultimate compression as 9 min. The sample was having a thickness of 25mm and drained at top and bottom. Estimate the duration for same degree of consolidation for 2.5 m thick of same clay resting on impermeable rock formation with coarse sand deposit overlaying it. **[7]**

OR

Q6) a) What is immediate settlement? Explain, how, it is evaluated. **[3]**

b) In a consolidation test void ratio decreased from 0.70 to 0.65, when the load was changed from 50 kN/m^2. Compute compression index and coefficient of volume change. **[4]**

SECTION-II

Q7) a) A group of 16 piles of 50 cm diameter is arranged with a center to center spacing of 1.0m. The piles are 9m long and are embedded in soft clay with cohesion 30 kN/m^2. Bearing resistance may be neglected for the piles-Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. **[6]**

b) Explain with sketches types of pile with basis of classification. **[4]**

c) Explain the following: **[6]**

i) Negative skin friction

ii) Feld's Rule

OR

Q8) a) State the advantages and disadvantages of piers in comparison of pile foundation. **[5]**

b) Explain how you decide bearing capacity of single pile by a conventional pile load test. **[5]**

c) Explain with a neat sketch "Sand Island Method" for well sinking **[6]**

Q9) a) Write a short note on "Sheet Pile". **[4]**

b) Discuss any three types of "Cofferdams" with its importance. **[6]**

c) Explain the preloading technique with neat sketch. **[6]**

OR

Q10) a) Explain any four Engineering problems associated with black contton soil. **[6]**

b) Draw a neat sketch of Double under reamed pile founcation. Name the various component parts. **[5]**

c) Explain "Differential Free Swell Index Test". **[5]**

Q11) a) Explain the pheonomenon of Liquefaction for sandy soil and their effects. **[6]**

b) What is reinforced earth wall? Draw a neat sketch of reinforced earth wall. **[6]**

c) What are functional requirement of various types of geosynthetics **[6]**

OR

Q12) a) Write a short notes on "Types of Earthquakes" **[6]**

b) Explain the term. **[6]**

i) Magnitude of Earthquake

ii) Intensity of Earthquake

c) Explain the suitable methods for prevention of liquefaction of soil. **[6]**

////

Total No. of Questions : 12]

SEAT No. :

P3151

[Total No. of Pages : 2

[4858]-1008
T.E. (Civil) (Semester - II)
ENVIRONMENTAL ENGINEERING - I (End - Sem)
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 orQ10, Q11 or Q12***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks***
4) ***Assume suitable data, if necessary.***
5) ***Use of scientific calculator is allowed***

Q1) Discuss the sources and effects of noise pollution. **[6]**

OR

Q2) Explain the principle and working of settling chamber for removing particulate matter. **[6]**

Q3) Explain with neat sketch the working, location and function of river and canal intake. **[6]**

OR

Q4) Explain the factors affecting the rate of demand. **[6]**

Q5) Draw the flow diagram/layout of a water supply scheme using Rapid sand filter .Write clearly the purpose of each unit in the water supply scheme. **[8]**

OR

Q6) Design a tube settler module with the following data- **[8]**

a) Average output required from tube settler = 250m^3/hr.
b) Loss of water in desludging = 2% of output required.
c) Average design flow= (250x100)/(100-2)=255.1 m^3/hr.
d) Cross section of square tubes — 50mmx50mm.
e) Length of tubes = 1m.
f) Angle of inclination of tubes 60°

P.T.O.

Q7) Design a clariflocculator for desired average outflow of 250m^3/hr, water lost in desludging - 2%, design average flow = (250 ×100)/(100-2) = 255.1 .m3/hr, detention period - 20 minutes and average value of velocity gradient G = 40/ second. **[16]**

OR

Q8) a) Explain the theory of filtration. **[4]**

b) With a neat sketch explain back washing of rapid sand gravity filter. **[6]**

c) What is coagulation & flocculation? Draw a neat sketch of a flocculator. **[6]**

Q9) a) Explain break point chlorination. Define disinfection and list the different types of disinfectants used. **[8]**

b) Chlorine usage in treatment plant of 20 MLD of water is 8.5kg/day. The residual chlorine content after 10min. is 0.2mg/L calculate on dosage of chlorine in mg/L and chlorine demand of water. **[4]**

c) State the factors affecting disinfection **[4]**

OR

Q10)a) Explain demineralization of water by Reverse Osmosis method. **[6]**

b) Discuss colour&odour removal by adsorption. **[6]**

c) Explain fluoridation &deflouridation of water. **[4]**

Q11)a) Differentiate between continuous & intermittent system of water supply. **[6]**

b) Explain detection and prevention of wastage of water. **[6]**

c) With a neat sketch explain dead end & reticulated distribution system. **[6]**

OR

Q12)a) Explain the benefits of rain water harvesting and discuss the different methods of rain water harvesting. **[9]**

b) Discuss the concept of packaged WTP for townships **[9]**

Total No. of Questions : 12] **SEAT No. :**

P3533 **[Total No. of Pages : 6**

[4858]-1009
T.E. (Civil) (Semester - II)
STRUCTURAL DESIGN - II
(2012 Pattern) (End Sem.)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Figures to the right indicate full marks.***
3) ***Use I.S 456-2000 and non programmable calculator is allowed.***
4) ***Neat figures must be drawn wherever necessary.***
5) ***Mere reproduction of IS Code as answer will not be considered***
6) ***Assume suitable data if required.***

Q1) Answer the following : **[6]**

a) Why L.S.M. is more desirable than WSM

b) Explain Ultimate load theory

OR

Q2) A simply supported beam AB of span 4 with effective size 230 mm × 565 mm provided With 12 # 4 no's on tension side, Calculate its depth of neutral axis, type of section, Moment of resistance and UDL in addition to its self weight using WSM, use M20 and Fe415. **[6]**

Q3) Calculate Moment of resistance by LSM for flanged section with following details : **[8]**

a) Width of rib = 230 mm,

b) effective flange width = 1300 mm

c) flange thickness = 120 mm

d) Total depth = 575 mm

e) clear cover = 25 mm

f) Tension steel = 6 # 20 mm

g) Material = M 25 and Fe 500

P.T.O.

OR

Q4) A Doubly reinforced beam of size 230 mm × 540 mm over all reinforced with 12 # 2 No's on compression side and 20 # 4 No's on tension side if the effective cover on both sides is 40 mm by using LSM and M 20 and Fe 415 find M.R. of section. **[8]**

Q5) Design a simply supported one way slab over a room 2.8 m × 6 m effective, carrying L.L of 4 KN/m^2 and F.F. of 1.5 KN/m^2 use M 20 and Fe 500, Draw details of Reinforcement LSM is recommended. **[6]**

OR

Q6) Design a Cantilever slab for effective span of 1.3 m carrying L.L of 3KN/m^2 and F.F of 1 KN/m^2 use M20 and Fe 415 Draw details of reinforcement LSM is recommended **[6]**

Q7) Design a Continuous beam ABCD (AB = BC = CD = 3.5 m) for flexure and shear using I.S Code method for following data Use M20 and Fe415 **[16]**

a) Dead load = 12 KN/m

b) Live load = 16 KN/m

Show details of reinforcement in L-Section and cross section at continuous support and at mid span

OR

Q8) a) A R.C.C. beam of 230mm × 550mm over all with clear cover of 30mm is reinforced With 3 no's of 16 # on tension side at support section find shear strength of support section if 8 mm # 2 legged stirrups are provided at 175 mm c/c use M20 and Fe415 use LSM. **[8]**

b) A rectangular R.C.C. beam 300×700mm with effective cover 40mm is subjected to following actions. **[8]**

i) Factored B.M. = 190 KN-m

ii) Factored S.F. = 50 KN

iii) Factored Torsional moment = 20 KN-m

Design the beam for flexure and shear using M20 and Fe 415.

Q9) A R.C. Beam ABC of rectangular section is simply supported at A and C, and Continuous over support B, Span AB = BC = 3.8m the beam carries dead load (including self weight) of 20KN/m and L.L of 25 KN/m. Calculate design moments at central support B and near midspan of AB and BC after 15% redistribution of moments. Draw the design moment envelops and design the beam for flexure only Use M20 and Fe415. **[18]**

OR

Q10) Design a short RC Column by LSM using M20 and Fe 415 to carry a working load 900 KN and working moment of 100 KN-m about major axis bisecting the depth of column, assuming unsupported length of column as 4.2 m and both ends are fixed, also design the footing for this column Take SBC of soil as 210 KN/m^2 show detail design calculations and reinforcement details in plan and sectional elevation. **[18]**

Q11) Design a short column to carry working axial load of 800 KN and working moment of M_x=55 KN-m and M_Y=25KN-m acting about axis bisecting the depth and width of column respectively, the effective length about X-axis is 4.5 m and about Y-axis is 3.5 m. The unsupported length about both axis is 4.0m. use M20 and Fe415 steel show detailed design calculations and reinforcement details. **[16]**

OR

Q12) Design a short axially loaded Short column and its footing for a residential apartment G+2 with floor to floor height 3.20 m which carries working load of 800KN, Assume SBC of Soil as 200 KN/m^2 use M20 and Fe 500. **[16]**

Chart 5 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides

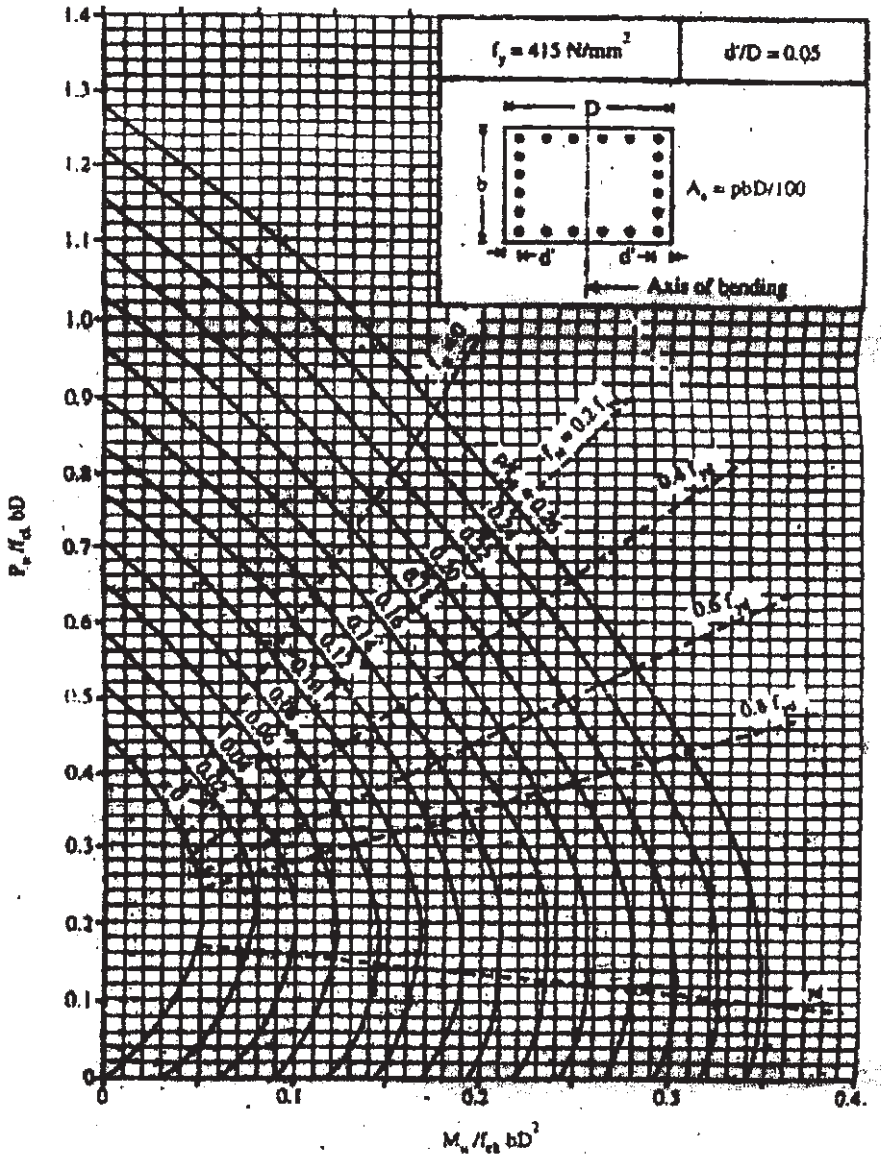


Chart 5

Chart 6 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides

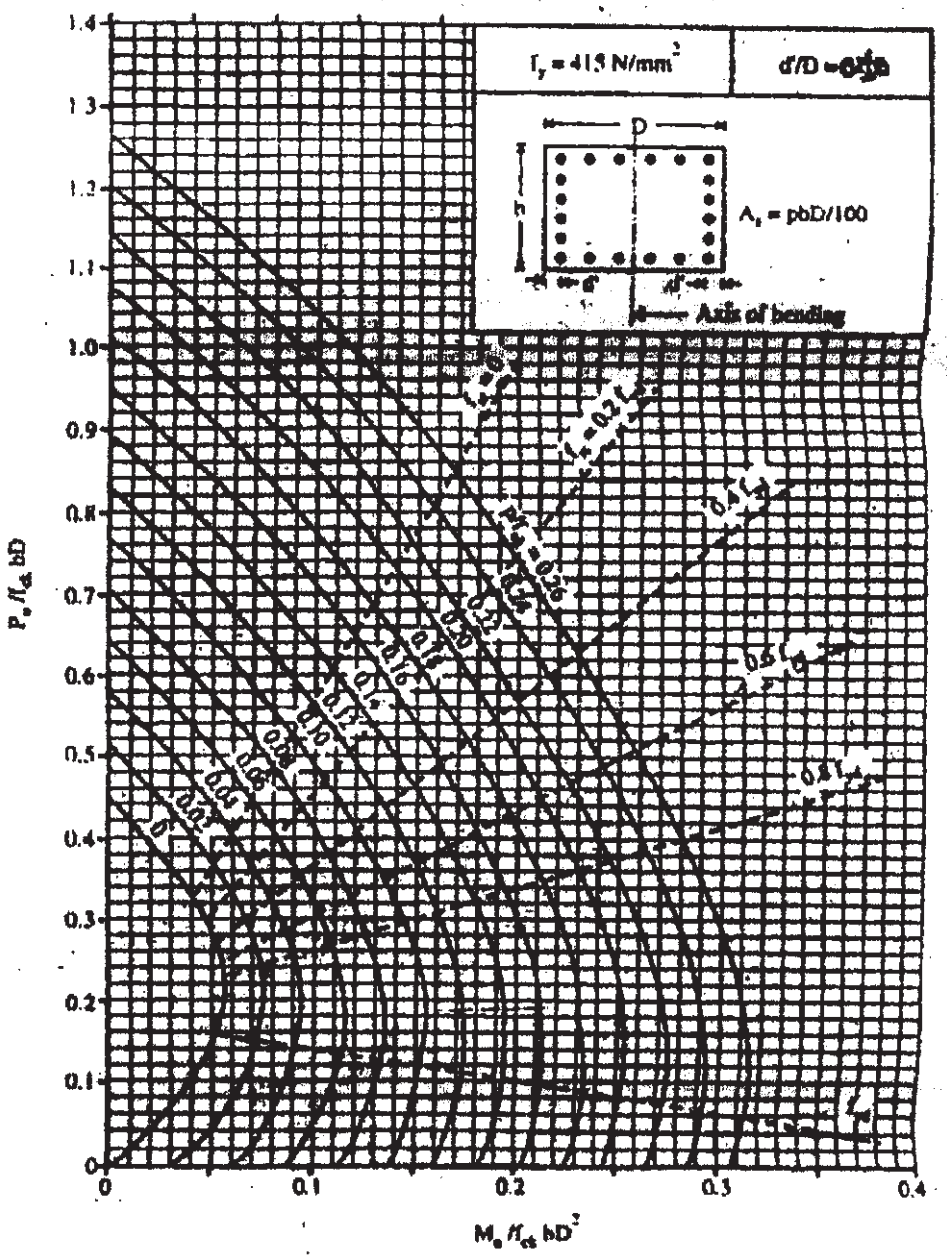
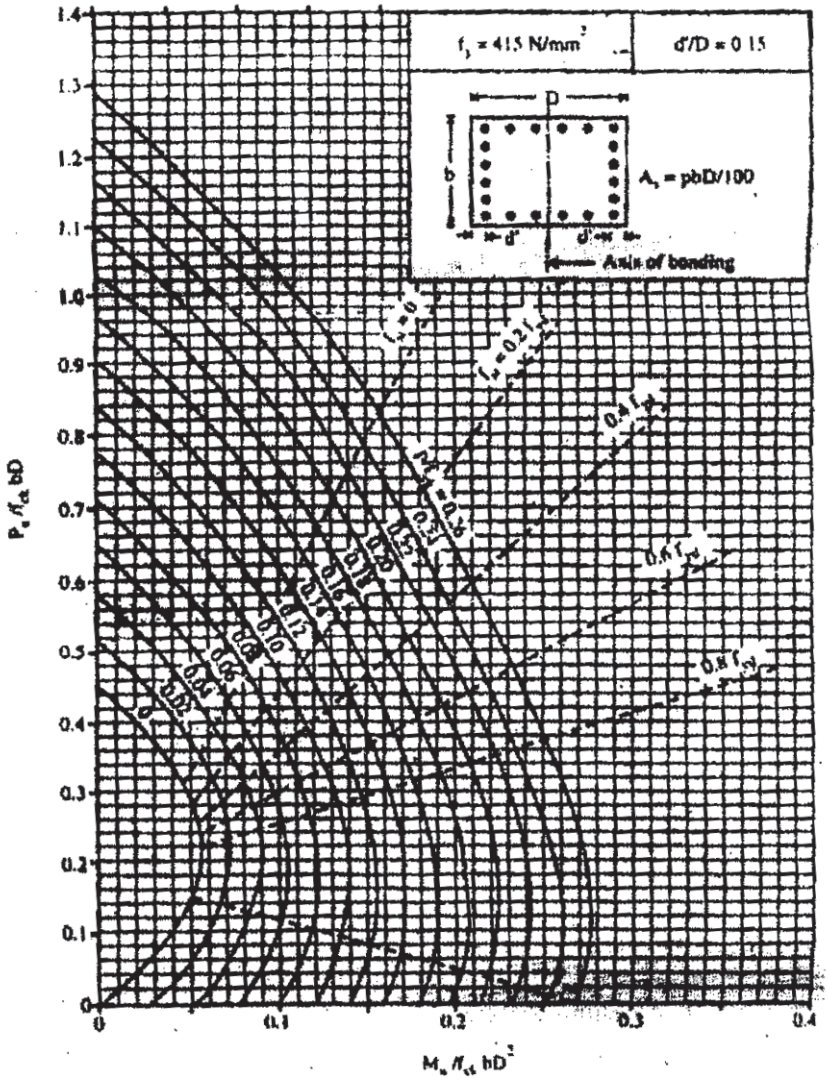


Chart 6

Chart 7 : **Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides**



Total No. of Questions : 12]

SEAT No. :

P2019

[Total No. of Pages : 4

[4858]-1010

T.E. (Civil)

PROJECT MANAGEMENT AND ENGINEERING ECONOMICS

(2012 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

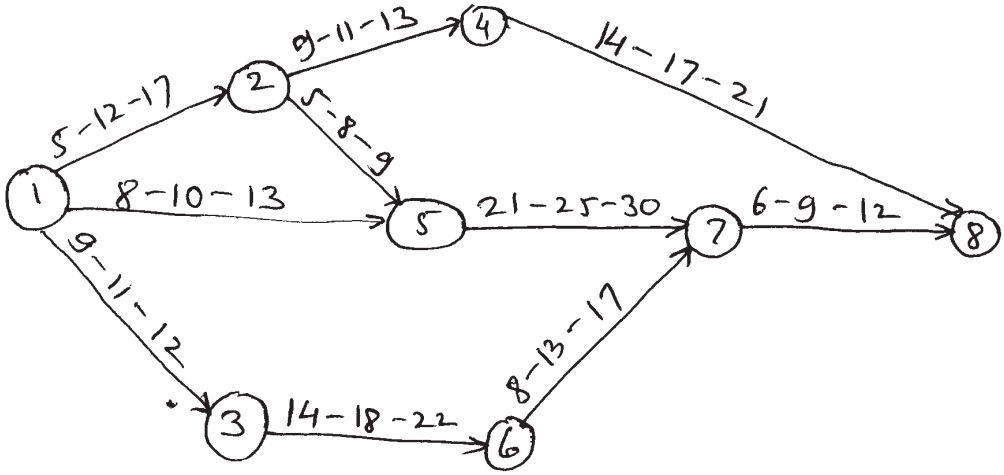
1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12*
2) *Neat diagrams must be drawn wherever required.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) Write a note on different project categories and what are the causes of project failure. **[6]**

OR

Q2) Explain matrix type of organisation and write down merits & demerits of matrix organisation. **[6]**

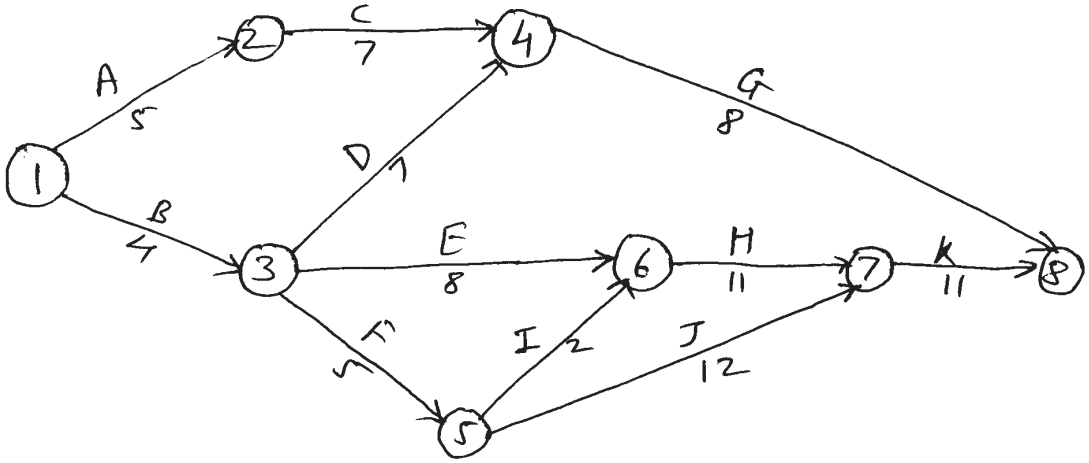
Q3) Following network diagram shows different activity. Find out total estimated time, Standard Deviation & Variance. Also draw critical path. **[8]**



OR

P.T.O.

Q4) Find out EST, EFT, LST, LFT, TF, FF, IDF & IF for following network diagram. Also draw critical path. **[8]**



Q5) Enlist different methods of EVA. Explain any one method in detail. **[6]**

OR

Q6) What is meant by Resource Smoothing. Write down steps for Resource Smoothing. Explain with example. **[6]**

Q7) a) Explain law of Diminishing Marginal utility with example. **[4]**

b) Write down different types of "Elasticity". What are the different factors to be consider for determining the price Elasticity of Demand. **[6]**

c) A financial institution introduces a plan to pay a sum of Rs. 15 lacs after 10 years at the rate of 18% compounded annually. Find annual equivalent amount that person should invest at the end of every year for the next 10 years to receive 15 lacs after 10 years from the institute. **[6]**

OR

Q8) a) Explain the concept of Debit Capital & Equity Capital with example. **[4]**

b) Give definition of following : **[6]**

i) Cost
ii) Price
iii) Value
iv) Goods
v) Wants
vi) Annuity

c) Write down short notes on : **[6]**

i) Money
ii) Working capital
iii) Fixed capital

Q9) a) If you are Safety engineer on your site, then write down how can you implement safety program on your site. Write all steps. **[6]**

b) Draw organisation of Purchase Department & what are the reasons for centralisation of Purchase Department. **[6]**

c) Yearly requirement of cement by a large firm is 300 bags. The cost of a bag of cement is Rs. 300/- lead time is one month & ordering cost per order is Rs. 200/-. Assume Annual carrying cost for inventory is 20% of Avg. Inventory management. Find EOQ & Total Inventory cost. **[6]**

OR

Q10) a) Explain different models of Inventory with figure. **[6]**

b) Perform ABC Analysis for following data : **[8]**

Sl.No.	Item	Annual Expenditure
1	Cement	4,90,000
2	Tiles	90,000
3	Bricks	95,000
4	Sand	2,60,000
5	Steel	1,20,000
6	Oil	2,000
7	Timber	30,000
8	Nails	3,000
9	Dry distamper	15,000

c) Explain any "ERP" software used in construction company. **[4]**

Q11) a) Explain "DPR" with suitable example. **[4]**

b) What is mean by "Project Fesibility Report"? Explain the important of Project Feasibility Report. **[6]**

c) The following are the details of project A & B. Suggest which one is to be accepted by using **[6]**

i) NPV

ii) BCR [i = 8%]

Year	Project "A"	Project "B"
0	4,00,000	4,50,000
1	1,20,000	1,40,000
2	1,25,000	1,45,000
3	78,000	76,000
4	80,000	65,000
5	75,000	60,000
6	–	90,000

OR

Q12) a) Write down role of "PMC". **[4]**

b) Write down Short Note on : **[6]**

i) Pay back period

ii) Break even Analysis.

c) A project cost is Rs. 1,00,000. It's estimated life is 6 years with an avg. Annual cash flow of Rs. 40,000. Calculate IRR for the same. **[6]**

Total No. of Questions : 10]

P1297

SEAT No. :

[Total No. of Pages : 4

[4858] - 1011

T.E. (Mechanical) (End Semester) (Semester - I)

DESIGN OF MACHINE ELEMENTS - I

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.1O***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic table, slide rule, electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Two rods are connected by means of a knuckle joint. The axial force 'P' acting on the rods is 25KN. The rods and the pin are made of plain carbon steel 45C8 (S_{yt} = 380N/mm^2) and factor of safety is 2.5. The yield strength in shear is 57.7% of the yield strength in tension. **[6]**

Calculate

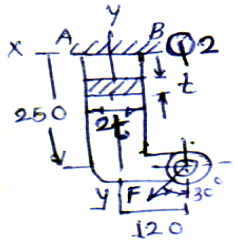
i) The dia. of rods.

ii) The diameter of the pin.

b) What is the effect of keyway cut into the shaft? How it can be compensated? **[4]**

OR

Q2) a) Fig(1) shows a hanger with rectangular c/s with the proportions indicated. The force p acting on the hanger is 6KN and acts at 30^o to the vertical as shown. The permissible stress in the hanger material is 60 MPa. Determine the size of the cross section. **[6]**



b) i) What is the purpose of rubber bush in bushed pin flexible coupling? **[6]**

ii) What is the difference between splines and keys? **[4]**

P.T.O.

Q3) a) A shaft and key are made of the same material and the key width is $\frac{1}{3}^{rd}$ of the shaft diameter **[8]**

i) considering shear only, determine the minimum length of key, in terms of the shaft diameter

ii) Determine thickness of the key, to make the key equally strong in shear and crushing, taking the shear strength of the key material as 40% of its crushing strength.

b) Prove that a square key is equally strong in shear and crushing. **[2]**

OR

Q4) a) Differentiate between torsional rigidity design and lateral rigidity design of shafts. **[4]**

b) A 40 mm diameter shaft is made of steel 50 C4 (sut = 660 N/mm^2) and has a machined surface. The expected reliability is 99%. The theoretical stress concentration factor for the shape of the shaft is 1.6 and the notch sensitivity factor is 0.9. Determine the endurance limit of the shaft $k_a = 0.76$, $k_b = 0.85$ $k_c = 0.814$. **[6]**

Q5) a) i) Discuss the salient features of ACME thread for power screws. **[3]**

ii) Why are V threads not used in power screws? **[3]**

b) Two railway coaches are coupled by means of a turn buckle using two rods. The rods are having single start square threads. The mean diameter of the rods is 40mm and pitch of the threads is 8mm. Determine the magnitude of the work to be done in bringing the coaches closer, through a distance of 240mm, against a steady load of 2KN. Take co-efficient of friction between the rod threads and nut as 0.15. **[10]**

OR

Q6) a) i) Why is the efficiency of self locking square threaded screw less than 50%. **[3]**

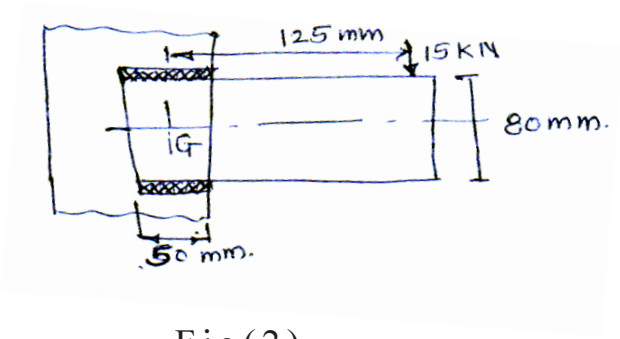
ii) What are the applications of recirculating ball screw. **[3]**

b) A power transmission screw of a screw press is required to transmit maximum load of 10 tonnes and rotates at 60 rpm. Trapezodial threads are mention in the table. The screw thread friction coefficient is 012. Torque required for collar friction and journal bearing is about 10% of the torque to drive the load considering screw friction. Determine screw dimensions and its efficiency. Also determine power required to drive the screw. Maximum permissible compressive stress in screw is 100M. **[10]**

Nominal diameter, mm	40	50	60	70
Core diameter, mm	32.5	41.5	50.5	39.5
Mean diameter. mm	36.5	46	55.5	65
Core area, cm^2	8.3	13.53	20.03	27.81
pitch mm.	7	8	9	10

Q7) a) The pull in the tie rod of an iron truss is 50KN. Design a suitable adjustable steel screwed joint. The permissible stresses are 75MPa in tension, 45MPa in shear and 90 MPa in crushing. **[8]**

b) A bracket carrying a load of 15KN is to be welded as shown in fig(2) find the size of weld required if the allowable shear stress is not to exceed 80 N/mm^2. **[10]**



Fig(2)

OR

Q8) a) A steel plate subjected to a force of 3KN and fixed to a vertical channel by means of four identical bolts as shown in fig(3) the bolts are made of plain carbon steel 45C8 (S_{yt} = 380 N/m^2) and the factor of safety is 2. Determine the diameter of the shank. **[10]**

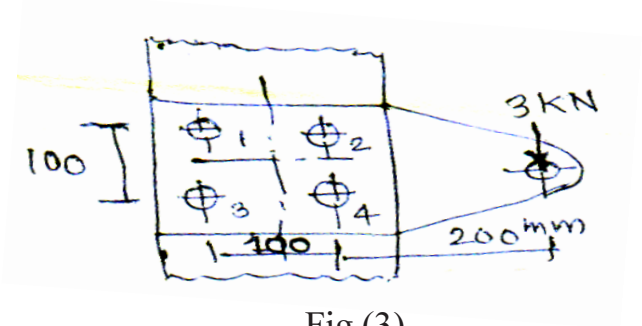


Fig.(3)

b) i) What are the advantages of welded joints compared with riveted joints? **[4]**

ii) Discuss on bolts of uniform strength. **[4]**

Q9) a) What is mean by spring surge and what is its effect. **[4]**

b) A helical spring whose mean diameter of the coils is 8 times that of wire, is to absorb 400 N.m of energy. The initial compression of the spring is 50mm and compress by additional 70mm while absorbing the shock. The maximum allowable stress is 400Mpa. and G = 84×10^{3}GPa. Determine the diameter of wire, and the number of active turns Neglect the effect of stress conectration. **[12]**

OR

Q10)a) How will you find whether the given helical spring is a compression spring or tension spring. **[4]**

b) A load of 1KN dropped axially on a closed coiled helical compression spring from a height of 250 mm. The spring has 20 active coils. Take wire diameter as 20mm. Spring index is 8. Determine the deflection and stress induced in the spring. Take $G = 0.84 \times 10^5$ MPa. **[12]**

Total No. of Questions : 10]

P1298

SEAT No. :

[Total No. of Pages : 2

[4858] - 1012

T.E. (Mech.)

METROLOGY & QUALITY CONTROL

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Define uncertainty in measurement and state repeatability and reproducibility of measurement **[6]**

b) Explain angle Dekker with ray diagram and its application. **[4]**

OR

Q2) a) Explain N.P.L. Flatness interferometer with neat sketch and write its application. **[6]**

b) Explain hole basic and shaft basic system. **[4]**

Q3) a) Explain the method of measuring effective diameter using three wires with neat sketch. **[6]**

b) State the Taylor's principal for designing the limit gauges. **[4]**

OR

Q4) a) Explain Tool maker's microscope and their application. **[6]**

b) Write the type of errors in gear metrology. **[4]**

Q5) a) What points were given by Deming to improve quality **[6]**

b) Explain juran's trilogy approach. **[6]**

c) Explain cost of quality. **[6]**

P.T.O.

OR

Q6) Explain the following **[3 × 6 = 18]**

a) Seven Quality New tools.

b) Quality circle.

c) Characteristics of quality.

Q7) a) Explain with OC curve and state producer's risk, consumer's risk, AOQL and LTPD. **[8]**

b) The following data shows number of defectives in inspection of 10 lots of 100 samples sizes each for connecting rods. Determine the control limits and the revision made in case the chart is 'out of limit'. **[8]**

Lot No.	1	2	3	4	5	6	7	8	9	10
defection	9	5	4	7	6	11	5	2	4	7

OR

Q8) a) control chart for $\bar{X}$ &R are maintained for control of an important dimension of a component the subgroup size is settled as 5, The value of $\bar{X}$ & R are computed for each subgroup and value of $\sum\bar{X}$ & $\sum R$ after 25 sub group are found to be 614.8 & 120 respectively compute the value of 3σ limit for $\bar{X}$ - chart $\bar{R} = 2.32\sigma$ **[8]**

b) Define AOQL and AOQ for the given data calculate sample size and AOQ for single sampling plan. **[8]**

i) Probability of acceptance for 0.3% defectives in a lot is 0.558

ii) Lot size N=10000 units

iii) np'=l.5

iv) Detectives found in the sample are not to be replaced.

Q9) a) Explain quality function development and its benefits.

b) Explain JIT concept in industry.

c) Explain KAIZEN and KANBAN system.

[16]

OR

Q10) Write short notes on (any three) **[16]**

a) ISO 9000

b) Quality audit

c) FMECA

d) Six sigma

e) 5s

Total No. of Questions : 10]

P1299

SEAT No. :

[Total No. of Pages : 3

[4858] - 1013

T.E. (Mechanical S/W) (Semster - I) (End Semester)

HEAT TRANSFER

(2012 Pattern)

Time : 2 Hours 30 min.] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw Neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data where ever necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain the following: **[4]**

i) Thermal diffusivity,

ii) Thermal contact resistance

b) Derive the expression for critical radius of insulation for cylinder with usual notations **[6]**

OR

Q2) a) Explain significance of Biot number and Fourier number **[4]**

b) A current of 200 amperes is made to pass through a stainless steel wire of 2 mm in diameter and 2 metre in length. The resistivity of the wire is 70×10^{-6} ohm.cm. Calculate the centre temperature of the wire if the outer surface temperature of the wire is maintained at 150 °C. The thermal conductivity may be taken as 29 W/mK. **[6]**

Q3) a) Explain temperature boundary condition. **[4]**

b) A 5cm diameter steel ball, initially at a uniform temp of 450°C is suddenly placed in an environment at 100°C with h = 10 W/m^2K. Steel properties: Cp = 460 J/kgK, density = 7800 kg/m^3, k =35 W/mK. Verify whether lumped system analysis is applicable. Calculate the time required for the ball to attain a temp of 150°C. **[6]**

P.T.O.

OR

Q4) a) A cylindrical metal rod of 5 cm diameter and 20 cm long with thermal conductivity 225 W/mK protrudes in atmosphere at 30°C. It projects from furnace wall at 300°C. A convective heat transfer coefficient of air is 10 W/m^2K. Determine temperature at the free end of the rod assuming it as a fin insulated at end. **[6]**

b) Define Fin efficiency. Identify the important parameters responsible for increase in fin efficiency **[4]**

Q5) a) Explain significance of i) Nusselt number, ii) Grashof number **[4]**

b) The heat transfer coefficient will be more in Natural or Forced convection? Justify your answer **[4]**

c) A rectangular plate of length 7cm and width 4cm is maintained at 115°C. It is exposed to still air at 25°C. Calculate convective heat transfer rate if smaller side of the plate is held vertical Use Correlation $Nu=0.59(Gr.Pr)^{0.25}$ Properties of air, k = 0.03 W/mK, Pr = 0.697, $\upsilon = 2.076 \times 10^{-6} m^2/s$ **[8]**

OR

Q6) a) Define Prandtl number and give its significance. Give its relation with thermal boundary layer and velocity boundary layer. Also give its value for liquid metals, heavy oils, water and air. **[8]**

b) Water flows at the rate of 360 kg/hr through a metallic tube of 10mm diameter and 3m length. It enters the tube at 25 °C. Outer surface of the tube is maintained at a constant temperature of 100 °C. Calculate the exit temperature of the water. Properties of water: **[8]**

$\mu = 5.62 \times 10^{-4}$ Ns/m^2; Cp = 4174 J/kgK, k = 0.664W/mK.

Use the following correlation:

$Nu = 0.023 Re^{0.8} Pr^{0.4}$ for turbulent flow

Nu = 3.66 for laminar flow

Q7) a) Explain the significance of shape factor **[2]**

b) Consider a black body at a temperature of 2000 K. Calculate its total hemispherical emissive power. Also calculate the wavelength at which the maximum emissive power is available from this body. State and explain the law of radiation which you have used to calculate the above mentioned quantities. **[8]**

c) Write a note on Radiation shield **[6]**

OR

Q8) a) Explain surface resistance and space resistance **[8]**

b) Two large parallel plates are maintained at temperatures of 600 °C and 300 °C having their emissivities of 0.9 and 0.4 respectively. A radiation shield having emissivity of 0.02 is inserted in between them. Calculate **[8]**

i) Heat transfer rate without shield,

ii) Heat transfer rate with shield and

iii) Temperature of shield.

Q9) a) Explain drop wise condensation and film wise condensation. **[6]**

b) A counter flow double pipe heat exchanger using superheated steam is used to heat water at the rate of 10500 kg/hr. The steam enters the heat exchanger at 180 °C and leaves at 130 °C. The inlet and exit temperatures of water are 30 °C and 80 °C respectively. If the overall heat transfer coefficient from steam to water is 814 $W/m^{20}C$, calculate the heat transfer area. What would be the increase in area if the fluid flows were parallel **[10]**

c) Define LMTD **[2]**

OR

Q10)a) Establish expression for LMTD for parallel flow heat exchanger **[8]**

b) Explain regimes of pool boiling. What is the significance of critical heat flux **[10]**

Total No. of Questions : 10]

P1300

SEAT No. :

[Total No. of Pages : 4

[4858] - 1014

T.E. (Mechanical/Automobile Engg./Mech.-SW)

THEORY OF MACHINES - II (End Semester)

(2012 Pattern) (Semester - I)

Time :2 ½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8,Q.9 or Q.10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Nonprogrammable Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) State the law of gearing. Derive an expression for constant angular velocity ratio between two gears. **[6]**

b) Two spiral gears in mesh have the following data. **[6]**

l) Angle of friction = 8°

2) Normal pitch = 14 mm

3) Shaft angle = 70°

4) Speed ratio = 2

5) Approximate centre distance = 150 mm

6) Spiral angle of Pinion = 60°.

Determine

i) Exact distance

ii) Number of teeth on each wheel and,

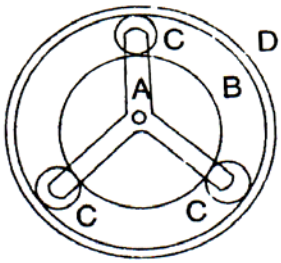
iii) Efficiency of the drive.

Q2) a) A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20°pressure angle, 10mm module and 10mm addendum.Find the length of path of contact, arc of contact, and the contact ratio. **[6]**

b) Derive an expression for efficiency of worm and worm gears when the worm is driver. **[6]**

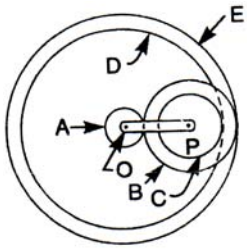
P.T.O.

Q3) In an epicyclic gear of the 'sun and planet' type shown in fig.Que.3, the pitch circle diameter of the internally toothed ring is to be 220 mm and the module 5 mm. When the ring D is stationary, the spider A, which carries three planet wheels C of equal size, is to make one revolution in the same sense as the Sun wheel B for every five revolutions of the driving spindle carrying the sun wheel B.Determine suitable numbers of teeth for all the wheels. **[8]**



Q4) Fig. shows diagrammatically a compound epicyclic gear train. Wheels A,D and E are free to rotate independently on spindle O, while B and C are compound and rotate together on spindle P,on the end of arm OP. All the teeth on different wheels have the same module. A has 12 teeth has 30 teeth and Chas 14 teeth cut externally. Find the number of teeth on wheels D and E which are cut internally. **[8]**

If the wheel A is driven clockwise at 1 r.p.s. while D is driven counterclockwise at 5 r.p.s., determine the magnitude and direction of the angular velocities of arm OP and wheel E.



Q5) a) Write short note on Spheroidal and cone variators with intermediate member. **[6]**

b) The turbine rotor of a ship has a mass of 3400 kg.lt has a radius of gyration of 0.44 m and a speed of 3200 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: **[10]**

i) When the ship is steering to the left on a curve of 90m radius at a speed of 35 km/h.

ii) When the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 35seconds and the total angular displacement between the two extreme positions of pitching is 10 degrees.

Q6) a) Explain positive infinitely variable (PIV) drive. **[6]**

b) A motor car negotiates a curve of 45m radius at a speed of 65 km/hr.Determine the magnitudes of the centrifugal and gyroscopic couples acting on the motor car, and state the effect of each of these on the road reactions on the wheels.Assume that **[10]**

i) Each road wheel has a moment of inertia of 5 kg.m^2 and an effective road radius of 0.6m,

ii) The rotating parts of the engine and transmission are equivalent to a flywheel of mass 85 kg with a radius of gyration of 0.2 m.The engine turns in a clockwise direction when viewed from the front.

iii) The back axle ratio is 4:1, the drive through the gearbox being direct.

iv) The car weighs 15 kN and has its centre of gravity at 0.6 m above the road level. The car takes a right hand turn.

Q7) a) Explain the following terms related to Synthes $\leq$ is of mechanisams:**[8]**

i) Precision positions

ii) Body Guidance

iii) Chebyshev spacing

b) Determine the Chebyshev spacing for the function $y = x^{1.4}$ for the range $1 \leq x \leq 4$ and specify three precision position using graphical approach only.Also determine the values of θ and y. Assume **[8]**

$\theta_s = 30^o$ and $\phi_s = 90^o$ and $\Delta\theta = \Delta\phi = 90^o$

Q8) a) Explain three position synthesis of single slider mechanism by using relative pole method. **[8]**

b) Design a four bar mechanism with input link l, coupler link 1_3 and output link 1_4 Angles θ and ϕ for 3 successive positions are given below: **[8]**

Position	1	2	3
θ	40^o	55^o	70^o
ϕ	50^o	60^o	75^o

If the grounded link 1_1=35 mm, using Frudenstein's equation, find out the lengths of other links to satisfy the given positional conditions. Also draw the synthesized mechanism in its first position and comment on the mechanism obtained.

Q9) a) A cam drives a flat reciprocating follower in the following manner: **[14]**

During first 110°rotation of the cam, follower moves outwards through a distance of 20 mm with simple harmonic motion. The follower dwells during next 40° of cam rotation. During next 110° of cam rotation,the follower moves inwards with simple harmonic motion.The follower dwells for next 100° of cam rotation .The minimum radius of the cam is 30 mm.Draw the cam profile.

b) Explain the displacement curve for simple harmonic motion of follower.**[4]**

Q10)a) The following data relate to a cam operating an oscillating roller follower:**[14]**

i) Follower to move outward through an angular displacement of 20° during 90° of cam rotation;

ii) Follower to dwell for 40° of cam rotation;

iii) Follower to return to its original position of zero displacement in 75^{o} of cam rotation; and

iv) Follower to dwell for the remaining period of revolution of the cam.

The distance between the pivot centre and the follower roller center is 70 mm and the roller diameter is 18 mm.The minimum radius of the cam corresponds to the starting position of the follower as given in fig. Q.10(a).The location of the pivot point is 70 mm to the left and 60mm above the axis of rotation of the cam.The motion of the follower is to take place with S.H.M.during outstroke and with uniform acceleration and retardation during return stroke.

b) Explain what do you mean by polynomial cam curves. **[4]**

Total No. of Questions : 08]

SEAT No. :

P3617

[Total No. of Pages : 4

[4858] - 1015
T.E. (Mechanical)
HYDRAULICS AND PNEUMATICS
(2012 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) State any two governing laws of fluid and explain any one in detail. **[6]**

b) Draw and explain a circuit for Accumulator as a shock absorber. **[6]**

c) A hydro static transmission operating at 70 bars has the following **[8]**

Pump	Motor
Vd = 84cm^3	Vd=?,Ta = ?
Volumetric efficiency = 82%	Volumetric efficiency = 92%
Mechanical efficiency = 88%	Mechanical efficiency = 90%
N = 600rpm	N = 500rpm

Find i) Displacement of motor,
ii) motor output torque.

OR

Q2) a) Enlist six different specific applications of pneumatic system. **[6]**

b) Draw neat sketches of three different types of seals, and state the various sealing materials? **[6]**

c) A 25000 N weight is being pushed up on an inclined surface by a cylinder, as shown in Figure 2c. The coefficient of friction between the weight and the inclined surface equals 0.16. For the pressure of 7000 kPa, determine - **[8]**

i) The required cylinder piston diameter, if the weight is being pushed at a constant speed.

ii) The required cylinder piston diameter, if the weight is to accelerate from 0 mm/s to 1500 mm/s in 0.5 s.

P.T.O.

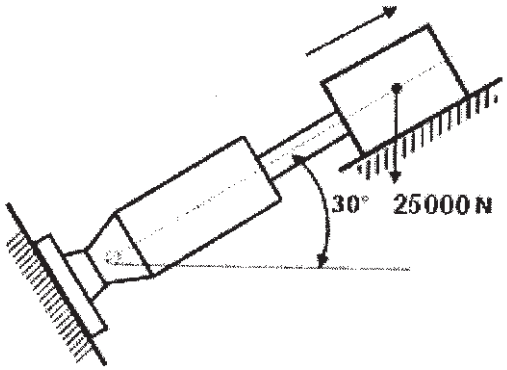


Figure 2c

Q3) a) Draw ISO symbols for any three different methods of DCV actuation, and state one application of each. **[6]**

b) Explain with neat sketch bleed off circuit. **[6]**

c) Draw a neat sketch of Pump unloading circuit and explain its working. **[6]**

OR

Q4) a) Explain with neat sketch working of pressure reducing valve. Draw an ISO symbol of it. **[6]**

b) Explain with neat sketch cylinder synchronization circuit with two cylinders connected in parallel. **[6]**

c) Draw a neat sketch of Riveting circuit and explain its working. **[6]**

Q5) a) Explain the working of Quick Exhaust Valve with a neat sketch. **[6]**

b) Draw a throttle-out circuit used in pneumatics. **[6]**

c) Differentiate between hydraulic and air motor. **[4]**

OR

Q6) a) Explain the application of AND Valve with a typical circuit. **[6]**

b) Sketch compressed air generation and distribution system. **[6]**

c) State any four applications of pneumatics in automobile industry and explain any one in detail. **[4]**

Q7) In a semi-automatic machine, a double acting hydraulic cylinder has a reciprocating motion. The forward motion is obtained using a regenerative circuit. The load during the forward stroke is 10 kN. The total stroke of 60 cm is to be completed in about 5 sec. The return speed is to be as fast as possible. Draw a hydraulic circuit to achieve the given objective. Select different components you have used in the circuit from the data given. Mention ratings of the components in case it is not available in the given data. **[16]**

OR

Q8) a) A hydraulic cylinder is used to push the object on a smooth surface. The total load on the hydraulic cylinder during forward stroke is 15.5 kN. The object has to be pushed at a distance of 500 mm in about 7 sec. The load during the retraction stroke is negligible, and it is to be retracted as fast as possible. Provision is required to hold the cylinder anywhere in between the end positions. Draw a simple hydraulic circuit, using Meter-in speed control method, to fulfill the given objective. Select different components from the data given. Specify ratings of the components in case it is not available in the given data. **[10]**

b) Analyze the circuit shown in Figure 8b. **[6]**

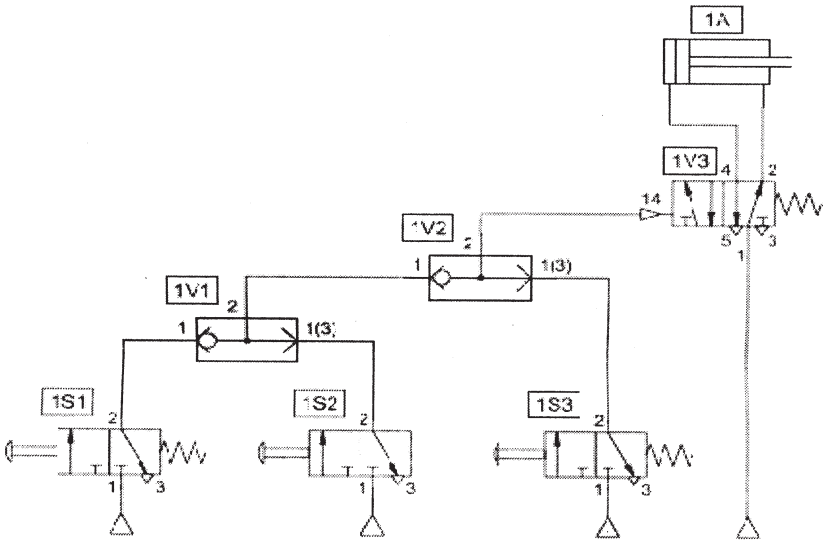


Figure 8b

DATA

1. **Suction Strainer :**

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. **Pressure Gauge :**

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

3. **Vane Pump :**

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. **Relief Valve :**

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. **Flow control Valve :**

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. **Directional Control Valve :**

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. **Check Valve :**

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. **Pilot Operated Check Valve :**

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. **Cylinder-(Max Working Pressure-210 bar)**

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. **Oil Reservoirs :**

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

❖ ❖ ❖ ❖

Total No. of Questions : 10]

P1301

SEAT No. :

[Total No. of Pages : 4

[4858] - 1016

T.E. (Mechanical)

DESIGN OF MACHINE ELEMENTS - II

(2012 Pattern) (End Semester)

Time :3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, and Q.9 or Q.10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Use of programmable calculator is not permitted.***
6) ***Assume suitable data if necessary.***

Q1) a) What is the beam strength of spur gear? Derive the expression for it **[6]**

b) What is virtual number of teeth for a helical gear? **[4]**

OR

Q2) a) A spur gear pair with 20^o full depth involute tooth profile, consist of 19 teeth pinion meshing with 40 teeth gear. The pinion is mounted on a crank shaft of 7.5 kW single cylinder diesel engine running at 1500 rpm, the driven shaft is connected to a machine. Take service factor as 1.5. The pinion & gear are made of steel with ultimate tensile strength 600 N/mm^2, the module is 4 mm while the face width is 10 x module. The gears are ordinarily cut. Take Lewis form factor as 0.314 for 19 teeth. Calculate the factor of safety based on beam strength. **[6]**

b) Explain the following terms related to helical gears. **[4]**

i) Tooth advance

ii) Leading edge

iii) Trailing edge

iv) Minimum face width

P.T.O.

Q3) a) For a bevel gear explain the force analysis by considering the total load is shared by one pair of teeth. **[4]**

b) Suggest suitable bearing for the following applications with Justification **[6]**

i) Lathe spindle

ii) Table fan shaft

iii) Wind turbine shaft

iv) Railway wheels and axle

v) Hand drill spindle

vi) Household mixer grinder

OR

Q4) a) What is addendum modification in gears? How it is done? **[4]**

b) A ball bearing, subjected to a radial load of 5000 N is expected to have a life of 8000 hours with a reliability of 99% at 1450 rpm. Calculate the dynamic load carrying capacity of the bearing, so that the bearing can be selected from the manufacturer's catalogue. Use the following relation. **[6]**

$$\frac{L}{L_{10}} = \left(\frac{ln\left(1/R\right)}{ln\left(1/R_{90}\right)} \right)^{\frac{1}{1.17}}$$

Q5) a) A Vee belt is used to connect an electric motor with an agitator. Determine the number of belts required and the pitch length of the belt using following data. **[12]**

Power capacity	20 kW
Motor speed	1440 rpm
The pitch diameter of the motor pulley	300 mm
The pitch diameter of the agitator pulley	900 mm
Coefficient of friction for the belt and pulleys as	0.2
Centre distancc of	1 m
Mass density of the belt material	0.97 g/cc
Maximum tension in the belt	850 N
Maximum width at top	22 mm
Minimum width at bottom	12 mm
Depth	14 mm
Groove angle	40^{o}

b) Explain the various methods used for the belt tensioning. **[6]**

OR

Q6) a) Derive an expression for the length of the open flat belt drive. **[6]**

b) Explain the procedure for the selection of flat belt from manufacturer's catalogue. **[6]**

c) What is polygonal action in roller chain drive? How to control it? **[6]**

Q7) a) Design a worm gear pair based on wear strength and suggest the minimum surface area to be provided for the gear box if it has to work with natural circulation. Use following data **[12]**

- Number of starts on worm — single
- Motor power — 3 kW
- Motor speed — 1500rpm
- Required reduction — 30:1
- Wear factor — 0.6 N/mm^2
- Gear tooth system — 20° full depth involute
- Service factor — 1.2
- Factor of safety — 1.4
- Permissible temperature rise — 50° C
- Coefficient of friction — 0.03
- Overall heat transfer coefficient — 18 $W/m^2\ ^\circ C$
- Standard modules: 1, 1.25, 1.5, 2, 2.5, 3,4, 6, 8, 10, 12, 16 mm

b) Why the worm gear is always weaker than the worm? **[4]**

OR

Q8) a) Compare crossed helical gear drive with worm and worm gear drive. **[4]**

b) A worm gear box with an effective surface area of 1.5 m^2 is working in still air with a heat transfer coefficient of 15 $W/m^2\ ^\circ C$. The permissible temperature rise of the lubricant is 50° C. The worm gear drive is designated as 1/30/10/8. The motor speed is 1440 rpm and the normal pressure angle is 20^o. Calculate the power rating of the motor using a coefficient of friction 0.024. Consider a wear factor of 0.6 N/mm^2 the material strength as 180 N/mm^2 and a Lewis form factor as 0.46. Take required factor of safety as 1.5 & service factor 1.2. **[12]**

Q9) a) The following data refers to a 360° hydrodynamic journal bearing. **[12]**

Radial load	10kN
Journal speed	1440 rpm
l/d	1
Unit bearing pressure	1000 kPa
Clearance ratio	800
Viscosity of the lubricant	30 MPa - S

Assuming that the total heat generated in the bearing is carried away by the total oil flow in the bearing, Determine

i) Dimensions of the bearing

ii) Coefficient of friction

iii) Power lost in friction

iv) Total oil flow

v) Side leakage

vi) Temperature rise

Refer the following table.

1/d	h_0/c	ε	S	(r/c)f	$Q/(rcn_s1$	Qs/Q	P/P_{max}
	0	1.0	0	0	0	1	0
	0.03	0.97	0.00474	0.514	4.82	0.973	0.152
	0.1	0.9	0.0188	1.05	4.74	0.919	0.247
1	0.2	0.8	0.0446	1.7	4.62	0.842	0.313
	0.4	0.6	0.121	3.22	4.33	0.68	0.415
	0.6	0.4	0.264	5.79	3.99	0.497	0.484
	0.8	0.2	0.631	12.8	3.59	0.28	0.529

b) Derive an expression for friction loss in hydrodynamic journal bearing. **[4]**

OR

Q10)a) Explain the desirable properties of the material used for the sliding contact bearings. Also suggest the suitable materials mapped with the desirable properties **[8]**

b) Write the Reynolds's equation for 2D flow and explain the significance of each term in it. **[4]**

c) Compare the sliding and rolling contact bearings. **[4]**

Total No. of Questions : 10]

SEAT No. :

P3152

[Total No. of Pages : 3

[4858]-1017
T.E. (semester - II) (Mechanical) (End Semester)
TURBO MACHINES
(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2 , Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q. 8 , Q.9 or Q. 10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume data wherever necessary and mention it.***
5) ***Draw neat and suitable figures wherever necessary.***

Q1) a) Derive an expression of maximum hydraulic efficiency of Pelton Wheel? **[6]**

b) Explain the following terms: **[4]**

i) Specific speed

ii) Run - away speed.

OR

Q2) a) The inner and outer diameters of the wheel are 1.5 m and 2 m respectively. Water flows outwards over the series of moving vanes attached to the wheel . The wheel runs at 250 rpm. Water is discharged radially at the exit with a velocity of 5 m/s. Work done per kg of water is 250 N-m. The velocity of flow through the runner is constant.

Determine: **[6]**

i) The angles of the moving vane tips

ii) Guide vane angle at inlet

b) Compare Francis Turbine and Kaplan Turbine. **[4]**

Q3) a) Explain the classification of water turbines with examples? **[4]**

b) Derive an expression for maximum utilization factor (Diagram efficiency) of Parson's reaction turbine in terms nozzle angle? **[6]**

P.T.O.

OR

Q4) a) Derive an expression of Unit Quantities. **[6]**

b) Explain with neat sketch throttle governing of steam turbines? **[4]**

Q5) a) Explain the Priming and Cavitations of Centrifugal pump? **[8]**

b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 rpm work against total head of 40 m. The velocity of flow through the runner is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at outlet. If the outer diameter of the impeller is 50 cm and width at outlet is 5 cm, Determine —

i) Vane angle at inlet

ii) Workdone by impeller on water per second

iii) Manometric efficiency **[10]**

OR

Q6) a) Derive an expression of minimum starting speed of centrifugal pump? **[8]**

b) A centrifugal pump running at 900 rpm is working against a head 20 m. The external diameter of the impeller is 460 mm and outlet width is 50 mm. If the vanes angles at outlet is 40° and manometric efficiency is 70 % determine.

i) Flow velocity at outlet

ii) Absolute velocity of water leaving the vane

iii) Angle made by the absolute at outlet with the direction of motion at outlet

iv) Rate of flow through the pump **[10]**

Q7) a) Explain the terms Surging and Choking in a rotary compressor. **[8]**

b) Represent and explain the process involved in centrifugal compressor on (T-S) diagram and derive the expression for isentropic efficiency based on total values. **[8]**

OR

Q8) a) Explain Slip coefficient and Pressure coefficient. **[4]**

b) A centrifugal compressor running at 9000 rpm delivers 600 m^3/min of free air. The air is compressed from 1 bar and 20° C to a pressure ratio of 4 with an isentropic efficiency of 82 %. Blades are radial at outlet of impeller and flow velocity of 62 m/s may be assumed throughout constant. The outer radius of impeller is twice the inner and slip factor may be assumed as 0.9. The blade area coefficient of 0.9 may be assumed at inlet.

Calculate -

i) Final temperature of air

ii) Theoretical power

iii) Impeller diameters at inlet and outlet

iv) Impeller blade angle at inlet

v) Diffuser blade angle at inlet

vi) Breadths of impeller at inlet **[12]**

Q9) a) Explain the construction and working of an axial flow compressor. **[6]**

b) An axial flow compressor is required to deliver air at the rate of 50 kg/s and provide a total pressure ratio of 5 :1 , the inlet stagnation conditions being 288 K and 1 bar. The isentropic efficiency is 86 %. The compressor shall have 10 stages with equal rise in total temperature in each stage. The axial velocity of flow is 150 m/s and the blade speed is kept at 200 m/s to minimize noise generation . The stage degree of reaction at mean blade height is 50 %. Assuming workdone factor as 0.86, calculate all the fluid angles of the first stage. Also calculate the tip and hub diameter if hub-tip diameter ratio is 0.8. Determine the speed in rpm. (R = 287 J/kg K, Cp = 1.005 kJ/kg K). **[10]**

OR

Q10)a) Explain the following terms -

i) Stalling in an axial flow compressor

ii) Losses in axial flow compressor **[8]**

b) Represent and explain the process involved in axial flow compressor on (h-s) diagram and derive an expression for isentropic efficiency and stage pressure ratio. **[8]**

Total No. of Questions : 10]

P1302

SEAT No. :

[Total No. of Pages : 5

[4858] - 1018

T.E. (Mechanical) (Semester - II)

MACHATRONICS

(2012 Pattern) (End Semester)

Time :3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Temperature of a hot plate is to be measured using Thermocouple. For this, draw the set- up and explain the principle of working. **[06]**

b) From the block diagram in Figure 1, determine the transfer function: C/R. **[4]**

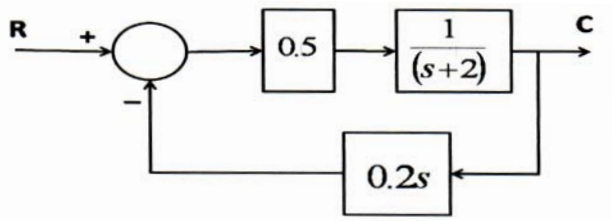


Figure 1

OR

Q2) a) A capacitive type proximity sensor is to be used for displacement measurement. Discuss the criterion for selection of this sensor. **[6]**

b) Discuss the role played by following four elements in a Mechatronic system: **[4]**

i) Actuator

ii) Sensor

iii) Signal Conditioner

iv) Digital Architecture.

P.T.O.

Q3) a) For a DAC that is converting a voltage level ranging 0 -12 V into a single byte of 6 bits, determine the equivalent decimal as well as analog values and complete Table 1 below. **[8]**

Table - 1

Digital	Decimal	Analog
010000	?	?
111110	?	?

b) Draw a suitable block diagram to depict the principle of operation of open loop control. **[2]**

OR

Q4) a) In the process of sampling, define as well as discuss the importance of: **[8]**

i) Sampling Theorem

ii) Aliasing

b) Write two distinct points of comparison between open loop and closed loop control system. **[2]**

Q5) a) Using suitable example, draw a ladder diagram and explain how Latching is implemented. **[8]**

b) Write ladder logic for a simple traffic light controller for the following sequence of operations as below: **[8]**

Step 1: Turn Green ON for 35 seconds.

Step 2: Turn Yellow ON for 5 seconds,

Step 3: Turn Red ON for 40 seconds,

Step 4: Repeat the sequence i.e. Step 1-Step 2-Step 3.

OR

Q6) a) Using suitable example, draw a ladder diagram and explain how timer is implemented **[8]**

b) Discuss the role played by following four elements in a PLC: **[8]**

i) Input Module

ii) Memory

iii) CPU

iv) Bus.

Q7) a) For the system in Figure 2, assume m=mass=lkg. k=spring stiffness=2 N/m and b=damping=0.5 Ns/m. Also. x is the system output and y is the system input, Which is motion of the base on which the system rests. **[10]**

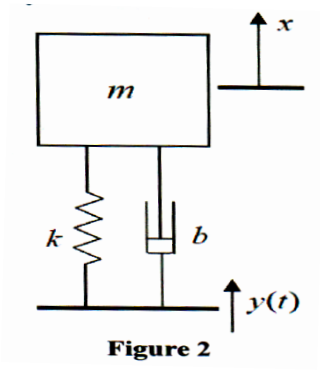


Figure 2

For this system:

i) Determine the transfer function: x(s)/y(s)

ii) Identify the location of the Poles and zeros.

iii) Comment on the stability of the system

b) Draw suitable sketch to depict the unit step response of a second order system when: **[6]**

i) System poles are negative and real

ii) System poles are complex conjugate pair with negative real part

iii) System poles are a imaginary pair with no real part

OR

Q8) a) Define the following terms: **[6]**

i) Steady State Error

ii) Gain Margin

iii) Phase Margin

iv) Rise Time

v) Damping Frequency

vi) % Overshoot

b) **[10]**

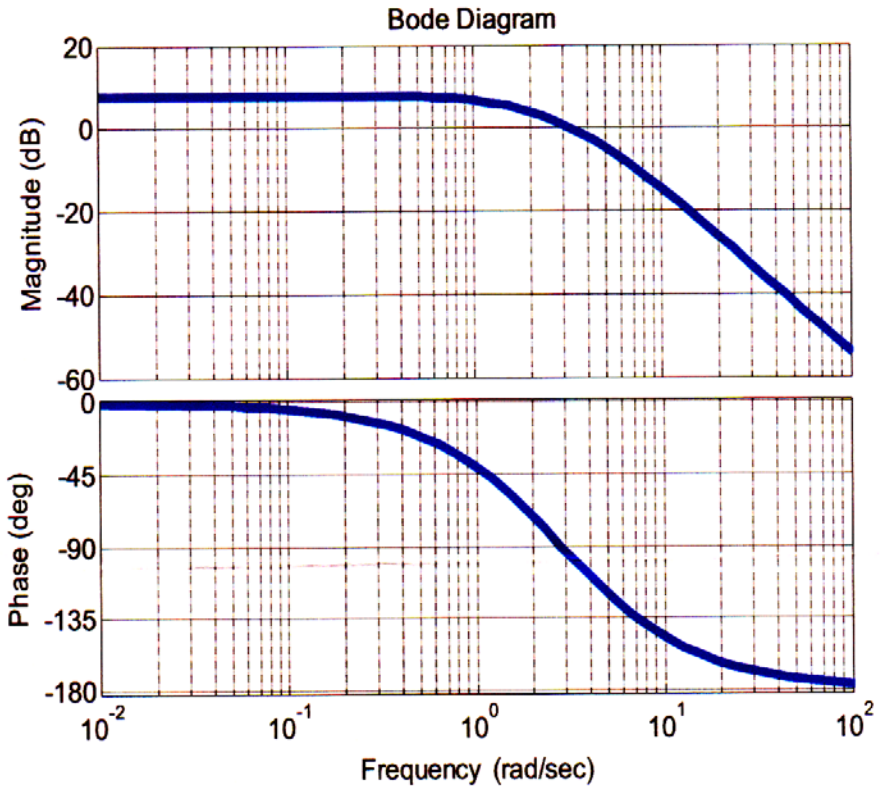


Figure 3

Estimate the approximate transfer function of a system. of which the bode plot is shown in Figure 3.

Q9) a) Figure 4 shows an error time graph. Sketch the PID controller (parallel form) output w.r.t time. Assume $K_p = 10$, $K_I = 2$, $K_d = 0.5$ and $P_o = 0$ i.e the controller output is zero when the error is zero. **[10]**

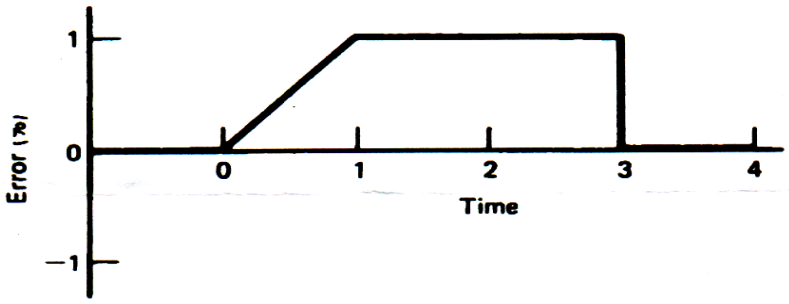


Figure 4

b) A second order system is under damped. inherently. Discuss the step by step procedure for manual tuning of a PID controller so that the behavior of the system becomes that of a critically damped one. **[8]**

OR

Q10)a) **[10]**

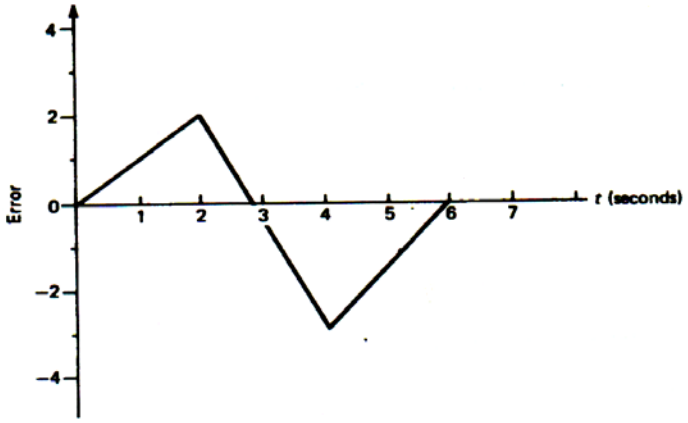


Figure 5

Figure 5 shows an error time graph. Sketch the PID controller (series form) output w.r.t time. Assume $K_p = 10$, $K_I = 2$, $K_D = 0.5$ and $P_0 = 0$ i.e the controller output is zero when the error is zero.

b) Using a suitable block diagram explain the working of PID control in Parallel form. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2031

[Total No. of Pages : 4

[4858]-1019

T.E.(Common-Mechanical / Auto)

NUMERICAL METHODS AND OPTIMIZATION

(2012 Pattern) (End-Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates :-

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necesssary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What do you mean by convergence? Explain importance in brief. **[2]**

b) Solve the following set of linear simultaneous equation using Gauss elimination method. **[8]**

$$x+3y+z=10$$
$$x+2y+5z=12$$
$$4x+y+2z=16$$

OR

Q2) a) Find the root of $log_{10} x - x^2 + 2 = 0$ upto accuracy 0.01. Use false position method. **[6]**

b) Write short note on Genetic Algorithm. **[4]**

Q3) a) Write a flow chart for Bisection method for root finding. **[4]**

b) Using Gauss Seidal iteration method solve the following equation. **[6]**

$$x+20y+9z=-23$$
$$2x-7y-20z=-57$$
$$20x+2y+6z=28$$

P.T.O.

OR

Q4) a) Write short note on Simulated Annealing. **[4]**

b) Write a flow chart for Thomas algorithm for tri-diagonal matrix solution. **[6]**

Q5) a) The value of x and y obtained in an experiment are as follows, the law controlling them is $y = ax^b$, **[8]**

x	1	2	3	4	5
y	0.5	2.0	4.5	8	12.5

Find the best value of the constant a and b.

b) From the tabulated values of x and y given below prepare forward difference table. Find the polynomial passing through the points and estimate the value of y when $x = 1.5$. **[8]**

x	0	2	4	6	8
y	5	29	125	341	725

Also find the slope of curve at $x = 1.5$.

OR

Q6) a) Fit the exponential curve $y = ae^{bx}$ to the following data. **[8]**

x	2	4	6	8
y	25	38	56	84

b) The velocity distribution of a fluid near a flat surface is given below.**[8]**

x	0.1	0.3	0.6	0.8
V = y	0.72	1.81	2.73	3.47

Where x is the distance from the surface (mm) and V is the velocity (mm/sec). Use Lagrange's interpolation polynomial to obtain the velocity at $x = 0.4$.

Q7) a) Draw flow chart for Simpson's 3/8th rule. **[8]**

b) Find double integration of $f(x) = x^2 + y^2 + 5$ for $x = 0$ to 2 and $y = 0$ to 2 taking increment in both x and y as 0.5. Use Trapezoidal rule. **[8]**

OR

Q8) a) Find the area under the curve on X axis. The curve passes through the following points (1.00,2.00), (1.50,2.40), (2.00,2.70), (2.50,2.80), (3.00,3.00), (3.50,2.60), (4.00,2.10). **[8]**

b) The velocity of car running on a straight road at the interval of 2 minutes is given below: **[8]**

Time (min)	0	2	4	6	8	10	12
Velocity (Km/hr)	0	22	30	27	18	7	0

Find the distance covered by the car using Simpson's 1/3rd rule.

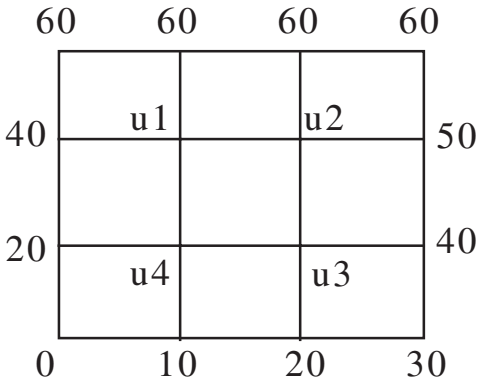
Q9) a) A second order ODE is transformed into first order ODE as, $\frac{dy}{dx} = z,\ y(0) = 2$ and $\frac{dz}{dx} = 0.5x - y,\ z(0) = 0.$ Estimate the value of y and z at $x = 0.2$ take $h = 0.1$. **[10]**

b) Explain the step by step solution procedure for solving parabolic equations. **[8]**

OR

Q10)a) The relationship between x and y is given by $\frac{dy}{dx} + xy = 2.$ Estimate y at $x = 5.1$ using 2nd order Runge Kutta method. Assume $y = 2$ at $x = 5.0$. Take step size of 0.02. **[8]**

b) Solve the Laplace's equation $\frac{\partial^2}{\partial^{x^2}}+\frac{\partial^2}{\partial^{y^2}}=0$ for the square mesh shown below. **[10]**



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Total No. of Questions : 10]

P1303

SEAT No. :

[Total No. of Pages : 3

[4858] - 1020

T.E. (Mechanical) (Semester - II)

MANUFACTURING PROCESS - II (End Sem.)

(2012 Pattern)

Time :2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q. 8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Differentiate between Honing and Lapping process. **[6]**

b) Calculate the Index Crank movement for 69 divisions by compound indexing methods. **[6]**

Hole circles are,

Plate I : 15, 16, 17, 18, 19, 20

Plate II : 21, 23, 27, 29, 31, 33

Plate III : 37, 39, 41, 43, 47, 49

OR

Q2) a) Sketch and Explain following drilling operations: **[6]**

i) Countersinking

ii) Trepanning

iii) Spot facing

b) Explain the meaning of each letter mentioned on the following grinding wheel. **[6]**

"W-C-10-E-5-V-17"

P.T.O.

Q3) a) Draw the Merchant's circle of forces and explain the different quantities involved. **[4]**

b) A tool life of 60 minute is obtained at a speed of 25 m/min and 6 minute at 50 m/min. Calculate the following **[4]**

i) Tool life equation.

ii) Cutting speed for 4 minute tool life.

OR

Q4) a) Draw neat sketch of single point cutting tool geometry. **[4]**

b) Explain different types of chips. **[4]**

Q5) a) Explain ECM process with its adv., limitations and applications. **[8]**

b) Explain AJM process with its adv., limitations and applications. **[8]**

OR

Q6) a) Draw a Schematic diagram of 'Electro-discharge Machining' and Explain its working principle and process parameters. **[8]**

b) Explain USM process with its advantages, limitations and applications. **[8]**

Q7) a) Explain CNC machines with neat sketch. State its advantages and limitations. **[6]**

b) Explain meaning of 2 axis, 3axis, 5 axis CNC machines. **[3]**

c) Write a part program for component shown in fig. Assume that spindle speed of 400 rpm and feed is 0.3mm/rev. **[7]**

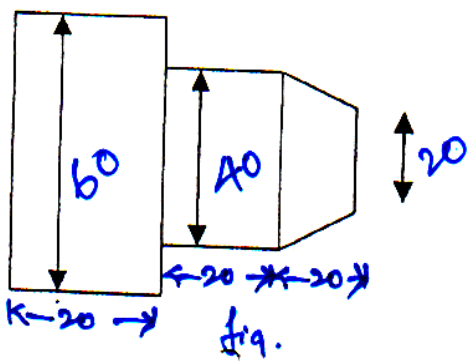


fig.

OR

Q8) a) Draw block diagram of DNC system and compare DNC and CNC system. **[8]**

b) Differentiate between open loop and close loop system. **[4]**

c) Explain the following codes **[4]**
G03, M30, G90, M08

Q9) a) Define Jig and Fixture. Differentiate between them with suitable examples. **[5]**

b) Write short notes on modular fixture. **[5]**

c) Design and draw drilling jig for drilling the ϕ10 mm holes in the component shown in fig. (a) **[8]**

OR

Q10)a) List various types of locating devices used in jig and fixtures. Explain any one in detail **[6]**

b) Draw and Explain Diamond pin locators. **[4]**

c) Design and draw milling fixture for milling slot of 10 mm wide, 10 mm deep and 20 mm in length for the component shown in fig. (a) **[8]**

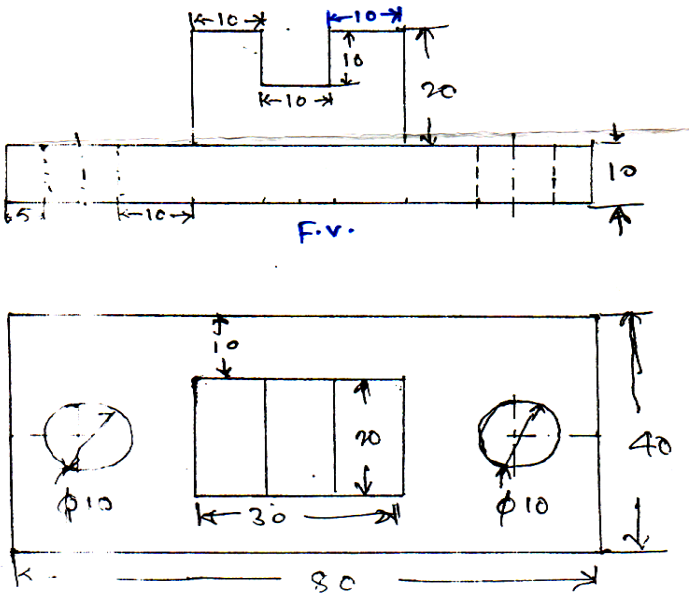


fig. (a) T.V.

Total No. of Questions : 10]

SEAT No. :

P3153

[Total No. of Pages : 5

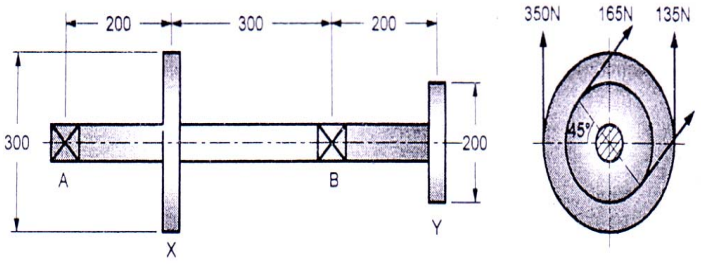
[4858] - 1021
T.E. (Mechanical S/W) (Semester - I)
Machine Design
(2012 Pattern) (End Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***A figure to the right indicates full marks.***
4) ***Use of logarithmic tables & electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) A steel shaft made of40C8 is used to drive a machine. The pulleys X,Y and bearing A,B are located as shown in fig. Determine shaft diameter using ASME code. Yield strength of shaft material is 330N/mm^2 and ultimate tensile strength is 600 N/mm^2. TakeK_b=1.5 and K_t=1.2. **[7]**



b) Show that efficiency of power screw is less than 50 %. **[3]**

OR

Q2) a) A cantilever beam of circular cross-section, made of Alloy steel (S_{ut} = 1500N/mm^2) is fixed at one end and subjected to completely reversed force of 1000N at free end. The force is perpendicular to axis of beam. The length of beam is 0.4m. The theoretical stress concentration and notch sensitivity factor are 1.33 and 0.85 resp. The surface finish and size factor are 0.79 and 0.85 resp. The temperature and reliability factor are 0.975 and 0.868 resp. The desired life of the beam is 50 × 10^3

P.T.O.

cycles. If required factor of safety is 1.5, determine the diameter of beam. **[7]**

b) What is preferred series. State advantages of it. **[3]**

Q3) a) A square threaded , triple start power screw, used in a screw jack, has a nominal diameter of 50mm and pitch of 8mm.The screw jack is used to lift the load of 7.5 KN. The coefficient of thread friction is 0.12 and collar friction is negligible. If length of nut is 48mm,calculate. **[6]**

i) the maximum shear stress in the screw body;

ii) the direct shear stress in screw and nut;

iii) the bearing pressure. State weather screw is self-locking.

b) Prove that stress induced in annular fillet weld subjected to bending stress is given by. **[4]**

$(\tau) = 5.66M/\pi hd^2$

OR

Q4) a) A concentric spring consists of two helical compression springs having the same free length. The composite spring is subjected to a maximum force of 2000N. The wire and mean coil diameter of the outer spring are 10 and 80mm resp. The numbers of active coils in inner and outer springs are 12 and 9 respectively with G = 81370 N/mm^2. **[6]**

Calculate:

i) the force transmitted by each spring;

ii) the maximum deflection of the spring;

iii) the maximum torsional shear stress induced in each spring.

b) Explain why Goodman's diagram is necessary to modify. **[4]**

Q5) a) The P.C.D of spur pinion and gear are 100mm and 300mm respectively. The pinion is made of plain carbon steel 40C8(S_{ut} = 600N/mm^2) while gear is made of Gr. C.I FG300.The pinion receives 5Kw power at 500 rpm through its shaft. The service factor and factor of safety is 1.5 each. The face width of gear is ten times of module. If velocity factor accounts the dynamic load, calculate the module and the number of teeth on pinion and gear. Specify the surface hardness for a gear pair. **[12]**

b) Explain different causes of gear tooth failure with remedial action. **[4]**

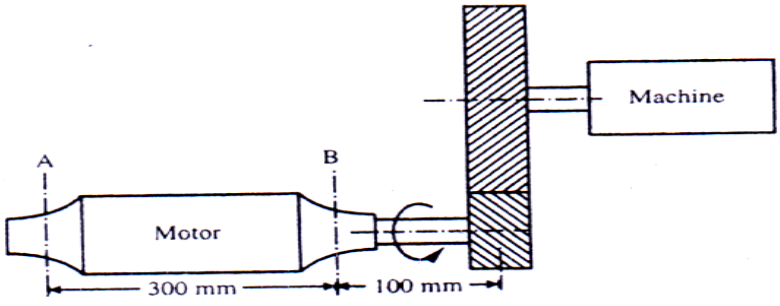
OR

Q6) A right hand 18 teeth helical pinion is to mesh with left hand 40teeth helical gear mounted on parallel shaft. The pinion and gear are to be made of plain carbon steel having permissible bending stress of 105 N/mm^2. The pinion is to be driven by 22Kw, 1440 rpm; three phase induction motor. The gear pair is to be heat treated to a surface hardness of 250 BHN. The starting torque of the motor is 25% more than rated torque. The factor of safety is 1.5. The tooth system is 20° full depth involute while helix angle is 23°. **[16]**

i) Assuming the velocity factor accounts for dynamic load, design the gear pair.

ii) For shown arrangement determine magnitude and direction of forces acting on meshing gears.

iii) Also calculate reactions at motor bearings A and B. The thrust is taken by bearing at B.



Q7) a) Explain failure in rolling contact bearing with causes and remedial action.**[4]**

b) A ball bearing operates on work cycle consisting of three parts: a radial load of 3000N at 720 rpm for 30 % of the cycle, a radial load of 7000N at 1440pm for 40% of the cycle and radial load of 5000N at 900rpm for remaining part of the cycle. The dynamic capacity of the bearing is 30700N. Calculate: **[12]**

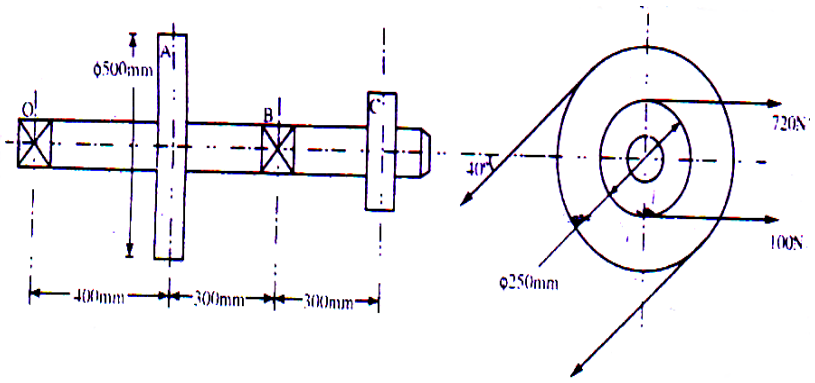
i) The rating life of bearing in hours.

ii) The average speed of rotation;

iii) The life of bearing with 95 % reliability.

OR

Q8) a) The overhung countershaft as shown in fig. is supported at O and B by two identical deep groove ball bearing. The angle of lap of pulley A as well as pulley C is 180°. The slack side tension on pulley A is 20% of its tight-side tension. The shaft rotates at 720 rpm.The adjustment factor s for operating conditions and material of the bearings are 0.9 and 0.85 resp. The F.O.S is 1.5.The expected life of bearing is 24000hrs with reliability of 99%. Determine the dynamic capacity of the bearing so that they can be selected from manufacturers catalogue based on 90% reliability. **[12]**



b) Explain different methods of mounting of rolling contact bearing. **[4]**

Q9) a) Derive an expression for maximum power condition in belt. **[5]**

b) The following data is given for an open flat belt drive used to transmit 22 Kw power from an electric motor to an exhaust fan. The permissible tensile stress for the belt material is $2N/mm^2$. and density of the belt material is 0.97gm/c.c. The belt is 6mm thick. **[13]**

Determine which pulley governs the drive design and why? What width of belt should be used.

	Motor Pulley	Fan Pulley
Diameter	300mm	1200mm
Angle of contact	2.5rad	3078rad
Coefficient of friction	0.3	0.25
speed	900 rpm	

OR

Q10)a) Explain selection procedure of wire ropes. **[5]**

b) A wire rope of 6×19 class is to be used in the mine hoist to raise the load of 500kg. The maximum acceleration of the load is lm/s^2. The allowable bearing pressure between the rope and sheave is 2 N/mm^2 The modulus of elasticity of rope is 83000 N/mm^2. If factor of safety required against static failure is 5. Select size of the wire rope and the sheave.

Take: D=45d , breaking strength = 510 d^2, d_w = 0.063d and A = 0.38d^2. **[13]**

Total No. of Questions : 12]

P1304

SEAT No. :

[Total No. of Pages : 3

[4858] - 1022

T.E. (Mechanical S/W) (Semester - I) (End Semester)

NUMERICAL METHODS & COMPUTATIONAL TECHNIQUES

(2012 Pattern)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Find root of $f(x) = x^4 + 2x = 0$ using Newton Raphson method upto three decimal places. Use guess xO = -1.0. **[4]**

b) Draw the flowchart to find integral using Trapezoidal rule. **[4]**

OR

Q2) The temperature of the rectangular heated plate is described by the following function **[8]**

$$T(x, y) = 2xy + 2x - x^2 - 2y^2 + 72$$

If the plate is 8 m long (x-dimension) and 6 m wide (y-dimension). Determine the average temperature of the plate using Trapezoidal rule. Assume suitable h and k.

Q3) Find f(5) using cubic spline to fit the following data. **[6]**

x	3.0	4.5	7.0	9.0
f(x)	2.5	1.0	2.5	0.5

P.T.O.

OR

Q4) Dynamic viscosity of water μ (10^{-3} N.s/m^2) is relate to temperature T (°C) in the following manner. **[6]**

T	0	5	10	20
μ	1.787	1.519	1.307	1.002

Use Lagrange's interpolation to predict μ at T = 7.5°C.

Q5) Use Gauss elimination to solve upto three decimal accuracy. If required use partial pivoting. **[6]**

$10x_1 + 2x_2 - x_3 = 27$; $-3x_1 - 6x_2 + 2x_3 = -61.5$; $x_1 + x_2 + 5x_3 = -21.5$

OR

Q6) Use Gauss Seidal method to solve the following system untill percent relative error falls below 5%. **[6]**

$10x_1 + 2x_2 - x_3 = 27$; $-3x_1 - 6x_2 + 2x_3 = -61.5$; $x_1 + x_2 + 5x_3 = -21.5$

Q7) a) Use least square regression to fit the straight line to the data. **[8]**

x	0.4	0.8	1.2	1.6	2.0	2.4
y	75	100	140	200	270	375

b) Derive the normal equations to fit second order polynomial. **[8]**

OR

Q8) a) Draw the flowchart to fit the straight line. **[6]**

b) Determine the constants a and b by the least square method such that $y = ae^{bx}$, fits the following data. **[10]**

x	1.0	1.2	1.4	1.6
y	40.170	73.196	133.372	243.02

Q9) a) Use modified Euler's method to solve **[8]**

$$\frac{dy}{dx} = \frac{x^2 + y^2}{2},$$ for y(2) with y (1) = 2 using h = 1.

b) Use Euler's method with h = 0.5 to solve the initial value problem over the interval x = 0 to 2. **[8]**

$$\frac{dy}{dx} = yx^2 - 1.1y$$ where y(0) = 1

OR

Q10)a) Use Runge Kutta method to solve **[8]**

$$\frac{dy}{dx} = x^2 + y^2, \quad \text{with y(0) = 2 at x = 0.4 using h = 0.2.}$$

b) Draw the flowchart to solve ODE using predictor corrector method. **[8]**

Q11)a) Draw the flowchart for solving Laplace equation **[8]**

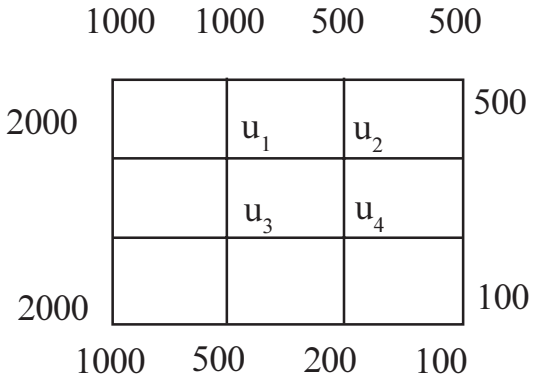
b) Solve **[10]**

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial t^2}$$

for the following conditions by using Cranck-Nicolson method.
At x = 0 and x = 3, u = 0 for all t's.
At t = 0, $u = x^2$ for $0 < x < 3$.
Assume h = 1, k = 0.01. Find u at t = 0.03.

OR

Q12)a) Solve the Laplace equation, $u_{xx} + u_{yy} = 0$ for the following square mesh. **[10]**



b) Classify PDEs. Discuss the engineering applications of elliptic, hyperbolic and parabolic equations. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3618

[Total No. of Pages : 3

[4858] - 1023

T.E. (Mechanical) (S/W)

MECHATRONICS

(2012 Pattern) (Semester - I)

Time : 3 Hours] *[Max. Marks :70*

Instructions to the candidates:

1) *Answers Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 Q9 or Q10.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume Suitable data if necessary.*

Q1) a) List and define any six static measurement characteristics. **[6]**

b) From the block diagram in Figure 1, determine the transfer function: Y/X. **[4]**

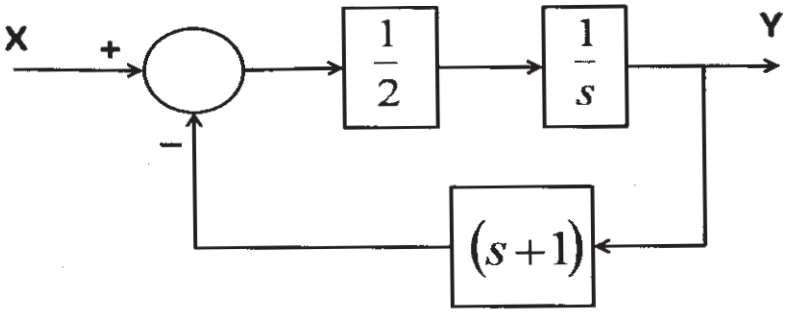


Figure 1

OR

Q2) a) Speed of a dc motor is to be measured using an optical encoder. Draw a suitable schematic and explain the working of the said sensor. **[6]**

b) Draw a suitable block diagram displaying the key elements of a generic mechatronic system and explain the significance of the actuator element. **[4]**

Q3) a) Draw a suitable flowchart and explain the working of a 4-bit R-2R DAC. **[8]**

b) Draw a block diagram of open loop control system and define its operating principle. **[2]**

OR

P.T.O.

Q4) a) Draw suitable diagrams and explain the significance of Sample and Hold Circuit and Aliasing in an Analog to Digital Convertor. **[8]**

b) Draw a block diagram of closed loop control system and define its operating principle. **[2]**

Q5) a) List and discuss 5 exclusive criterions for selection of a PLC. **[10]**

b) Draw ladder diagram for a simple traffic light controller for the following sequence of operations as below: **[8]**

Step 1: Turn Green ON for 35 seconds,
Step 2: Turn Yellow ON for 5 seconds,
Step 3: Turn Red ON for 40 seconds,
Step 4: Repeat the sequence i.e. Step 1-Step 2-Step 3.

OR

Q6) a) Give suitable examples and discuss the importance of Timer and Counter in a PLC. **[10]**

b) Draw a ladder diagram to satisfy following objectives **[8]**

i) START a counter C1 (count up) when SI (push-to-on switch) is pushed. Cl is set for 10 counts.

ii) When counter Cl saturates, the RED lamp goes ON.

iii) When RED lamp is ON and S2 (push-to-ON switch) is pushed, the Cl resets and RED lamp is OFF.

Q7) a) Determine the transfer function x(s)/F(s) for the system shown in figure below. **[10]**

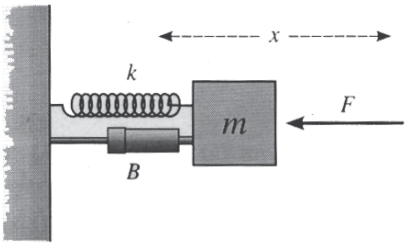


Figure 2

b) Determine the Poles and Zeros of the system whose transfer function, C(s)/R(s) is given below. In addition, comment on the stability of this system. **[6]**

$$\frac{C(s)}{R(s)} = \frac{2s+1}{s^3+3s^2+3s+1}$$

OR

Q8) a) Sketch approximate unit step response for following systems : **[10]**

System 1: Both the poles were collocated and on negative real axis.

System 2: Poles were a complex conjugate pair with negative real part.

System 3: Poles were an imaginary pair.

System 4: Both the poles were located at origin.

System 5: Poles were a complex conjugate pair with positive real part.

b) Consider a second-order unity feedback system with damping factor = 0.3 and natural frequency = 10 rad/sec. Calculate the rise time, maximum overshoot and settling time when a unit-step input is applied to the system. **[6]**

Q9) a) An integral controller is used for speed control with a setpoint of 12 rpm within a range of 10 to 15 rpm. The controller output is 22% initially: The constant K_1 = -0.15% controller output per second per percentage error. If the speed jumps to 13.5 rpm, calculate the controller output after 2 sec for a constant e_p. **[10]**

b) Define Proportional control as well as Integral control with their mathematical equations. **[6]**

OR

Q10)a) Derive the equation for the control signal, u, for the Proportional Integral Derivative (PID) controller. Discuss, in detail, the advantages of adding the Integral as well as the Derivative term to the Proportional term. **[10]**

b) Discuss the step by step procedure for the manual tuning of a PID control. **[6]**

❖ ❖ ❖ ❖

Total No. of Questions : 12]

SEAT No. :

P3154

[Total No. of Pages : 3

[4858]-1024

T.E. (Mechanical Sandwich) (Semester - II)

MATERIALS AND MANUFACTURING ENGINEERING

(2012 Pattern) (End semester) (Self Study - I)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculator is allowed.***

SECTION - I

Q1) a) Describe classification of polymers? **[6]**

b) Write shot note on cermets? **[6]**

c) Explain applications of ceramic materials. **[6]**

OR

Q2) a) Explain application of polymers? **[6]**

b) Write shot note on metal matrix composite? **[6]**

c) Explain polymerization process and its use? **[6]**

Q3) a) What is Carbon Nanotubes and explain its applications? **[8]**

b) Explain requirement of advance material with example? **[8]**

OR

Q4) a) Explain application of biomaterials? **[8]**

b) What are cryogenics materials? Explain use of modern materials for high, low temperatures and cryogenic temperatures? **[8]**

P.T.O.

Q5) a) Describe improvement in design/ changes in design to prevent or control corrosion? **[8]**

b) Explain classification of corrosion? **[8]**

OR

Q6) a) List corrosion prevention method explain any one with neat diagram? **[8]**

b) What is mechanism of corrosion? Explain Anodic and catholic process of corrosion? **[8]**

SECTION - II

Q7) a) Explain basic steps of powder metallurgy process? **[6]**

b) Write shot note on self lubricated bearing? **[6]**

c) Explain applications of powder metallurgy? **[6]**

OR

Q8) a) Explain atomization process of powder manufacturing? **[6]**

b) Write shot note on cermets? **[6]**

b) Explain advantages, limiations of powder metallurgy. **[6]**

Q9) a) What is difference between CNC, DNC machines? **[8]**

b) Explain FMS with application? **[8]**

OR

Q10)a) Explain with block diagram of Machining centers, write advantages and applications? **[8]**

b) Explain Automatic Tool Changer and Automatic pallet changer? **[8]**

Q11)a) Draw neat sketch of broach tool gemetry? **[8]**

b) Explain gear hobbing process? Explain its advantage and limitation? **[8]**

OR

Q12)a) List different Gear manufacturing methods, explain any one with diagram? **[8]**

b) What is thread rolling process? Explain its advantage and limitation? **[8]**

Total No. of Questions : 12]

P1305

SEAT No. :

[Total No. of Pages : 3

[4858]-1025

T.E. (Mechanical Sandwich)

INDUSTRIAL ENGINEERING AND PRODUCTION MANAGEMENT

(2012 Pattern) (Self Study - II)

Time :3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer three questions from Section - I and three questions from Section - II.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Discuss the scope and objectives of Industrial Engineering. **[8]**

b) Explain contribution of F.W.Taylor to the scientific management. **[8]**

OR

Q2) a) Define production and production management. **[8]**

b) Explain in brief various functions of management. **[8]**

Q3) a) Explain the significance, construction and application of following recording technique. **[8]**

i) Flow process chart

ii) Multiple activity chart

b) Define time study. Explain its objectives. **[8]**

OR

Q4) a) Explain in detail procedure of method study. **[8]**

b) Differentiate between work measurement and method study. **[4]**

c) Differentiate between work sampling and time study. **[4]**

P.T.O.

Q5) a) Explain concept of productivity and total productivity. How it co-relates with material handling? **[8]**

b) Explain procedure of selection of plant location and layout for two wheeler automobile manufacturing. **[10]**

OR

Q6) Write short note on the following: **[18]**

a) Principles of material handling

b) Facility planning

c) Qualities of production manager

SECTION - II

Q7) a) What is the need of production planning and control in the organisation? Explain functions of PPC. **[8]**

b) Explain objectives of inventory control. What are the different types of inventories of manufacturing organisation keeps? **[8]**

OR

Q8) a) Define the following: **[8]**

i) Re - order level

ii) Lead time

iii) Minimum level

iv) Maximum level

v) Average inventory

vi) Safety stock

b) "PPC contributes to effective utilisation of firms resources". Explain. **[8]**

Q9) a) The activities involved in a small project are given below construct the network and find the critical path also find floats for each activity. **[8]**

Activity	1 - 2	1 - 3	2 - 3	2 - 4	3 - 4	4 - 5
Duration	20	25	10	12	6	10

b) What is process planning? Why it is required? What does it specify? Explain. **[8]**

OR

Q10) a) What are the factors that influence process planning. Explain the steps in process planning. **[8]**

b) Explain the following. **[8]**

i) Fulkerson's rule numbering event

ii) Dummy activities

iii) Crashing the network

iv) Slack and floats

Q11) a) What is scheduling? Why it is required? What factors to be considered in scheduling? Explain. **[10]**

b) Describe concept just in time (JIT) manufacturing. What are basic elements of it? Explain. **[8]**

OR

Q12) Write short note on following: **[18]**

a) Supply chain management

b) SMED

c) Poka Yoke

Total No. of Questions : 10]

P1306

SEAT No. :

[Total No. of Pages : 3

[4858] - 1031

T.E. (Automobile) (Semester - I)

DESIGN OF MACHINE ELEMENTS

(2012 Pattern) (End. Sem)

Time :3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***A figure to the right indicates full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the general design procedure. **[6]**

b) Explain Oldham's coupling with figure. **[4]**

OR

Q2) a) The standard cross section for a flat key, which is fitted on a 50 mm diameter shaft, is 16 × 10 mm. **[6]**

The key is transmitting 475 N-m torque from the shaft to hub. The key is made of commercial steel

($S_{yt} = S_{yc} = 230 N/mm^2$). Determine the length of the key, if the factor of safety is 3.

b) Explain design procedure of flat key. **[4]**

Q3) a) Differentiate between rigid and flexible coupling. **[4]**

b) The nominal diameter of a triple threaded square screw is 50 mm, while the pitch is 8 mm. It is used with a collar having an outer diameter of 100 mm and inner diameter as 65 mm. The coefficient of friction at the treaded surface as well as at the tread surface can be taken as 0.15. The screw is used to raise a load of 15 kN. Using the uniform wear theory for collar friction, Calculate: **[6]**

i) Torque required to raise the load.

ii) Torque required to lower the load.

iii) The force required to raise the load, if applied at radius of 500 mm.

P.T.O.

OR

Q4) a) A shaft 40 mm in diameter is transmitting 35 kW power at 300 rpm by means of Kennedy keys of 10 × 10 mm cross section. The keys are made of steel 45C8 ($S_{yt} = S_{yc} = 380$ N/mm^2) and the factor of safety is 3. Determine the required length of the keys. **[6]**

b) Derive an expression for torque required to lower the load in power screws **[4]**

Q5) a) What are the causes of stress concentration and what are the methods of reducing stress concentration? **[6]**

b) A forged steel bar 50 mm in diameter, is subjected to a reversed bending stress of 250 N/mm^2. The bar is made of steel 40C8 ($S_{ut} = 600$ N/mm^2). Calculate the life of the bar for a reliability of 90%. **[10]**

OR

Q6) a) Explain modified GOODMAN diagram. **[6]**

b) A mass of 50 kg drops through 25 mm at the centre of a 250 mm long simply supported beam. The beam has a square cross-section. It is made of steel 30C8 ($S_{yt} = 400$ N/mm^2) and the factor of safety is 2. The modulus of elasticity is 207000 N/mm^2. Determine the dimensions of the cross-section of beam. **[10]**

Q7) a) Explain the hydrodynamic theory of lubrication. **[6]**

b) The following data is given for a 360 degree hydrodynamic bearings: **[10]**

radial load = 3.2 KN

journal speed= 1490 rpm

journal diameter=50 mm

bearing length=50 mm

radial clearance =0.05 mm

viscosity of lubricant= 25 cP, $\left(r/c\right) f = 3.22, \left(h_o/c\right) = 0.4, \dfrac{Q}{rcn_s l} = 4.33$

Assuming that the total load heat generated in the bearing is carried by the total oil flow in the bearing, calculate

i) Coefficient of friction

ii) Power lost in friction

iii) Minimum oil film thickness

iv) Flow requirement in 1 lit/mm

v) Temperature raise

OR

Q8) a) Derive Petroff's equation for bearing. **[6]**

b) A single-row deep groove ball bearing is subjected to a 30 second work cycle that consist of the following parts **[10]**

	Part I	Part II
Duration (s)	10	20
Radial load (kN)	45	15
Axial load (kN)	12.5	6.25
Speed(rpm)	720	1440

The static and dynamic load capacities of the ball bearing are 50 and 68kN respectively.

Calculate the expected life of the bearings in hours.

Q9) a) Derive the wear strength (Buckinghams) equation for helical gears. **[6]**

b) A spur gear pair with 20° full depth involutes teeth consists of 20 teeth pinion meshing with 41 teeth gear. The module is 3 mm while the face width is 40 mm. Material for pinion as well as gear is steel with an ultimate tensile strength 600 N/mm^2, the gears are heat treated to a surface hardness of 400 BHN. The pinion rotates at 1450 rpm and service factor 1.75. Assume velocity factor accounts for dynamic load. Determine the rated power that the gears can transmit. Assume factor of safety 1.5. Using following data: **[12]**

$Y = 0.484-(2.87/Z)$, $C_v = 3/3+v$, $K = 0.16\ (BHN/100)^2\ N/mm^2$

OR

Q10)a) Explain Herringbone helical gears, **[6]**

b) A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 100 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is 200, While the helix angle is 250. The face width is 40 mm and the normal module is 4 mm. the pinion as well as the gear is made up of steel 40C8 (Sut = 600 N/mm^2) and heat treated to the surface hardness of 300 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the Dynamic load and calculate the power transmitting capacity of gears.

Use following data: **[12]**

$Y= 0.484-(2.87/Z)$ for 20 degree FDI teeth, $C_v = 5.6/5.6+\sqrt{v}$ $K = 0.16\ (BHN/100)^2\ N/mm^2$

Total No. of Questions : 10]

P1307

SEAT No. :

[Total No. of Pages : 2

[4858] - 1032

T.E. (Automobile)

AUTOMOTIVE ELECTRICAL & ELECTRONICS

(2012 Pattern)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Explain multiplex wiring system. **[6]**

b) Explain limitation of coil ignition. **[4]**

OR

Q2) a) Which are the different methods of charging the battery. **[6]**

b) Compare lead acid batteries with alkaline batteries. **[4]**

Q3) a) Compare following systems of regulation. **[2]**
Constant current & constant voltage

b) With the help of neat sketch explain current & voltage regulator. **[8]**

OR

Q4) a) Explain selection of motors. **[2]**

b) Explain balancing coil type temperature gauge. **[8]**

Q5) a) Explain classification of manifold absolute pressure sensor. Explain construction & working of any one of them. **[10]**

b) Explain working principle of sensors which are their types. **[8]**

P.T.O.

OR

Q6) Write a short note on **[18]**

a) Temperature sensor

b) Engine control actuator

c) Throttle angle sensor

Q7) a) Explain group & sequencial injection technique. **[8]**

b) Explain cold & warm start. **[8]**

OR

Q8) a) Explain fuel system components. **[8]**

b) Explain idle speed control. **[8]**

Q9) a) Explain electronic control of suspension. **[8]**

b) Draw layout of electronic power steering & explain working. **[8]**

OR

Q10) Write a short note on : **[16]**

a) Vehicle tracking system

b) Radar warming system

c) Supplimentary restrain system of air bag

d) Crash sensor

Total No. of Questions : 10]

P1308

SEAT No. :

[Total No. of Pages : 4

[4858] - 1033

T.E. (Automobile) (Semester - II)

DESIGN OF ENGINE COMPONENTS

(2012 Pattern) (End -Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any FIVE questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Classify Radiators and explain working principle of it. **[4]**

b) The cylinder of a four stroke diesel engine has the following specifications: **[6]**
Brake Power = 3.75 kW
Speed = 1000 RPM
Indicated Mean Effective Pressure = 0.35 Mpa
Mechanical Efficiency = 80%
I/D = 1.5
Determine the bore & length of the stroke.

OR

Q2) a) Explain need of lubrication and list out the desired properties of good lubricant. **[4]**

b) Estimate- Bore diameter, stroke length, swept volume, engine speed for a diesel engine which develops 90KW power with mean effective pressure of 0.6 N/mm^2 and mean piston speed of 600 m/min. **[6]**

Q3) a) Explain the need of cooling in IC Engine & enlist the different types of cooling systems. **[4]**

b) Calculate the Head thickness of Cast-Iron piston for a four stroke engine on the basis of thermal considerations with following data: **[6]**
Cylinder bore = 300 mm
Length of stroke = 450 mm
Speed = 300 RPM
Indicated mean effective pressure = 0.85 Mpa
Max. gas pressure = 5 Mpa
Fuel Consumption = 0.30 kg per BP per Hour
HCV of fuel = 44000 kJ/Kg
Assume mechanical efficiency = 0.8, C = 0.05, K = 46.6 $W/m/^0$ C, Tc - Te = 220°C

P.T.O.

OR

Q4) a) Enlist the types of lubrication system & explain any one of it. **[4]**

b) Calculate whipping stress in the connecting rod with following data: **[6]**

Engine speed = 1800 RPM

Length of connecting rod = 350 mm

Length of stroke = 175 mm

Density of material = 7800 kg/m^3

Thickness of web or flange (t) = 8 mm

Assume cross-section with,

A = 11 t^2, I_{xx} = (419/12)t^4 and y = (5t/2)

Q5) a) What is meant by cylinder liner? Differentiate between Wet and Dry Cylinder liner. **[4]**

b) The cylinder of a four stroke diesel engine has the following specifications: **[12]**

Brake Power = 7.5 Kw

Speed = 1400 RPM

Indicated mean effective pressure = 0.35Mpa

Mechanical efficiency = 80%

Max. gas pressure = 3.5 Mpa

The cylinder head & liner are made of grey cast iron FG260 (S_{ut} = 260 N/mm^2 and μ =0.25)

Assume factor of safety = 6, constant K = 0.162, Boring Allowance C= 3.2 mm, l/D =1.5

Calculate:

i) Bore & Length of Cylinder liner.

ii) Thickness of the Cylinder liner.

iii) Thickness of the Cylinder head.

OR

Q6) a) Design an exhaust valve for a horizontal diesel engine using following data: **[8]**

Cylinder bore = 150 mm

Length of stroke = 275 mm

Engine speed = 500 RPM

Max. gas pressure = 3.5 Mpa

Seat angle = 45^{o}

Assume Vp(velocity of gas through port) = 50 m/s., K= 0.42, σ_b = 50 N/mm^2.

Calculate:

i) Diameter of valve port.

ii) Diameter of valve head.

iii) Thickness of the valve head.

iv) Max. lift of valve.

b) Design a cross-section of rocker arm for the exhaust valve of a four stroke engine using the following data: **[8]**

Effective length of each arm = 180 mm

Angle between two arms = 135^{o}

Diameter of valve head = 75 mm

Lift of valve = 25 mm

Mass of valve = 0.5 kg

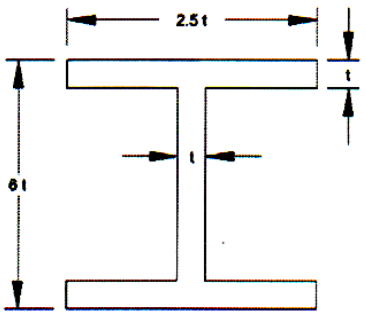
Engine speed = 600 RPM

Back pressure when the exhaust valve opens = 0.4 Mpa

Max. suction pressure = 0.02 Mpa below atmospheric., diameter of fulcrum pin = 25 mm

The valve opens 33^{o} before the outer dead center and closes 1^{o} after the inner dead center. The motion of the valve is SHM without dwell in the fully opened condition.

Assume: permissible bending stress is 70N/mm^2; I = 37 t^4 ; y = 3t



Q7) a) Explain Cylinder Compression Test procedure. **[8]**

b) Explain Cylinder Leakage Test procedure. **[8]**

OR

Q8) Write short notes on the following: **[16]**

a) Engine Vacuum Gauge Testing.

b) Engine Cylinder Power Balance Testing.

c) Ignition Timing Setting.

d) Exhaust Gas Analyzer.

Q9) a) Explain need of Variable -Valve Timing and its working principle. **[9]**

b) Explain Homogeneous Charge Compression Ignition (HCCI) Engine. **[9]**

OR

Q10)a) Explain the Variable compression Ratio (VCR) Engine. **[9]**

b) Explain the working of Wankel Engine with neat sketch. **[9]**

Total No. of Questions : 10]

P1309

SEAT No. :

[Total No. of Pages : 3

[4858] - 1034

T.E. (Automobile)

AUTOMOTIVE TRANSMISSION

(2012 Pattern)

Time :2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8,Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain construction & working of Hotchkiss drive arrengment with neat sketch. **[5]**

b) Explain Bus chassis layout with all components mounted on if. **[5]**

OR

Q2) a) Explain constant velocity joint with neat sketch. **[5]**

b) Compare front engine rear wheel drive with rear engine rear wheel drive. **[5]**

Q3) a) Explain with the help of neat sketch construction & working of single plate clutch. **[5]**

b) Explain in details clutch lining materials. **[5]**

OR

Q4) a) Explain construction, working of synchromesh gear box. With the help of neat sketch. **[5]**

b) Explain in details construction & working of centrifugal clutch. **[5]**

P.T.O.

Q5) a) Enlist the various type of final drive and discuss in brief. **[8]**

b) Explain function, construction & working of differential with the neat sketch. **[8]**

OR

Q6) a) Explain briefly with neat sketch. **[12]**

i) Semi floating rear axle

ii) Three quarter floating rear axle

iii) Fully floating rear axle

b) Discuss differential lock in details. **[4]**

Q7) a) An epicyclic gear train as shown in fig A sun wheel S - 30 teeth & two planet wheels p,p - 50 teeth each. The planet wheels mesh with internal teeth of a fixed anulas A. The driving shaft is connected to on arm which carries the planet wheels. The driving shaft carries the sun wheel transmites 4kW at 300 rpm determine speed of driven shaft & torque transmitted if overall efficiency is 95%. **[12]**

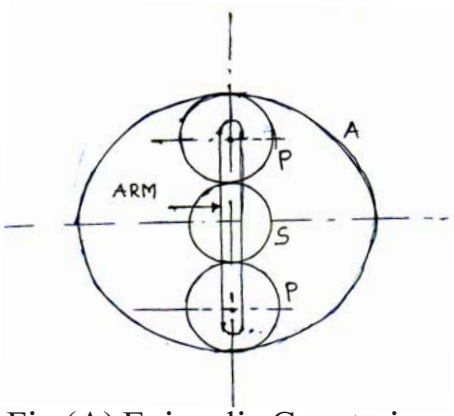


Fig (A) Epicyclic Gear train

b) Explain the torque convertor with its constructional details. **[6]**

OR

Q8) a) An epicyclic gear train consist of a sun wheel S a stationary internal gear E and three identical planet wheels P carried an a star shaped planet carrier C the size of different foothed wheels is such that the planet carrier C rotate at $\frac{1}{5}^{th}$ of speed of sun wheel S.

The minimum number of teeth on any wheels is 16 the driving torque on sun wheel is 98.1 N.M. determine refer fig. B.

i) Number of teeth on different wheels of train

ii) Torque necessary to keep the internal gear stationary.

[12]

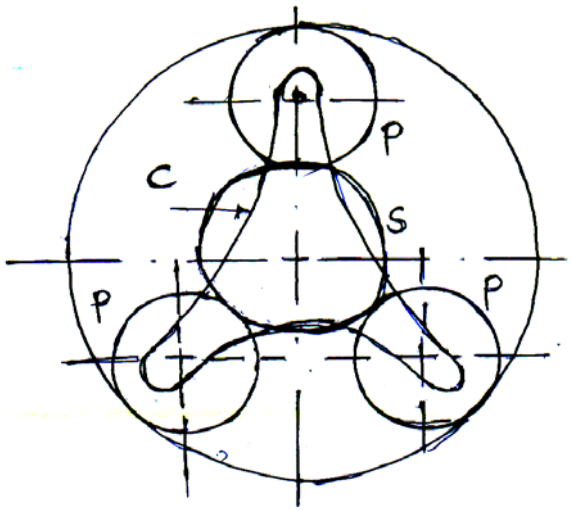


Fig (B) Epicyclic Gear train

b) Explain fluid flywheel with its constructional details. **[6]**

Q9) a) Explain with neat sketch continuous variable transmission (cvt) **[8]**

b) What do you mean by hydromatic transmission? Explain in details with a neat sketch. **[8]**

OR

Q10)a) What are the advantages & Disadvantages of cvt. **[8]**

b) Compare manual transmission with automatic transmission. **[8]**

Total No. of Questions : 12]

P1310

SEAT No. :

[Total No. of Pages : 2

[4858] - 1035

T.E. (Automobile)

AUTOMOTIVE AERODYNAMICS & BODY ENGG. (End Sem.)

(2012 Pattern)

Time :2.30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8,Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of nonprogramrable Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) Explain the various body optimization techniques to reduce drag. **[6]**

OR

Q2) Write a short note on **[6]**

a) Development of Lift on Aero foil.

b) Pitching, Rolling & yawing.

Q3) Write a short note on **[8]**

a) Climatic wind tunnel.

b) Pressure distribution around a car body

OR

Q4) a) Explain the historical development trends regarding vehicle aerodynamics. **[6]**

b) Describe drag cars as a bluft body. **[2]**

Q5) a) Explain the dirt accumulation on vehicle. **[4]**

b) How the gap in body surface affect aerodynamics. **[2]**

P.T.O.

OR

Q6) Explain with neat sketch : hatch back, fast back & square back for dust flow pattern at rear. **[6]**

Q7) a) Prepare a layout of the luxury bus having capacity of 45 seats considering any 6 features. **[12]**

b) Sketch & explain typical car body with its nomenclature. **[6]**

OR

Q8) a) Sketch five types of cars classified as per styling forms similarly write two constructional features of each **[10]**

b) Write a short note on **[8]**

i) Double skin construction

ii) Double Decker & Articulated Bus

Q9) a) Sketch the different types of commercial vehicle bodies with its brief description. **[10]**

b) Explain ladder type chassis frame with Neat sketch. **[6]**

OR

Q10)a) List six major requirements of driver cabin. What factors to be considered while designing driver cabin for truck. **[8]**

b) Write a short note related to bus **[8]**

i) Emergency door location

ii) Luggage space location

Q11)a) Explain symmetric & a symmetric loading with neat sketch. **[8]**

b) Define & explain the working & Non working joints with neat sketch.**[8]**

OR

Q12)a) Explain the ergonomics considerations in driver Seat design for bus.**[6]**

b) Explain different types of Seats & Seat belts used in Automobiles. **[10]**

Total No. of Questions : 8]

P1311

SEAT No. :

[Total No. of Pages : 2

[4858] - 1041

T.E. (E&Tc) (End Semester)

SYSTEM PROGRAMMING & OPERATING SYSTEMS

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Describe the design of Pass 1 of two pass assembler. **[7]**

b) Mention different data structures used for language processing. Explain any one data structure in detail. **[7]**

c) What do you mean by translated origin, linked origin and load origin? Explain with examples. **[6]**

OR

Q2) a) Explain the advance macro facilities **[7]**

i) Alteration of flow of control during expansion

ii) Expansion time variables

iii) Attributes of parameters

b) What are loaders? List the different type of loader schemes. Explain Compile and Go-loader scheme. **[7]**

c) Explain the different phases of language processing. **[6]**

Q3) a) What is CPU scheduling? Explain 2 different scheduling algorithms with examples. **[6]**

b) State the conditions for deadlock. **[6]**

c) Explain process and threads in detail. **[6]**

P.T.O.

OR

Q4) a) Write short notes on: **[6]**

i) System Call

ii) Inter process communication

b) Banker's algorithm is used for Deadlock avoidance. Explain. **[6]**

c) What is Real time operating system? Compare hard Real time system and Soft real time system. **[6]**

Q5) a) Explain the difference between Internal and External fragmentation. Which one occurs in paging systems? **[6]**

b) Explain in brief the memory allocation algorithms with examples. **[6]**

c) List the page replacement algorithms and explain any one. **[4]**

OR

Q6) a) Explain demand paging. Also explain hardware support required to support demand paging. **[6]**

b) Explain differents methods/ways in which memory allocation can be done. **[6]**

c) Explain the concept of segmentation. **[4]**

Q7) a) Write short notes on: **[6]**

i) Directory structure

ii) File management system

b) Explain Linux Ext 3 file system with diagram. **[6]**

c) Write short note on RAID disk. **[4]**

OR

Q8) a) Write short note on file management under UNIX. **[6]**

b) Explain file directories and directory operations. **[6]**

c) Explain various file operations. **[4]**

Total No. of Questions : 8]

P1312

SEAT No. :

[Total No. of Pages : 3

[4858] - 1042

T.E. (Electronics & Telecommunication) (Semester - I)

DIGITAL COMMUNICATION

(2012 Pattern) (End -Sem.)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain with the help of block diagram formating and transmission of baseband signal. **[8]**

b) Define mean, corrdation, standard deviation of a random process. **[6]**

c) Draw the block diagram of DM transmitter and explain its working. Comment on the drawbacks of DM. **[6]**

OR

Q2) a) Define the terms related to digital communication

i) Messages

ii) Characters

iii) Symbols **[6]**

b) Explain digital signal hierarchy using TI carrier system. **[6]**

c) The output of an oscillatus is described by $x(t) = A\cos(\pi Ft + \theta)$ **[8]**

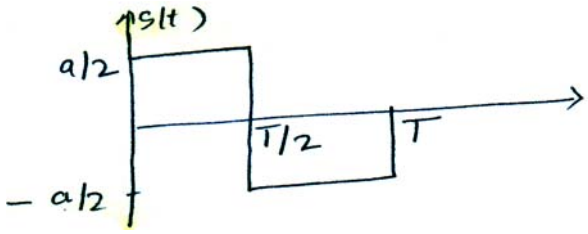
where the amplitude A is constant and F and ϕ are independent random variables. The probability density function of θ is defined by

$$f_{\phi}(\theta) = \begin{cases} \frac{1}{2\pi}, & 0 \le \theta \le 2\pi \\ 0 & \text{otherwise} \end{cases}$$

Find the power spectral density of x(t) in terms of the probability density function of the frequency F.

P.T.O.

Q3) a) Consider the signal S(t) shown in fig. **[8]**



Determine the impulse response of a filter matched to this signal and sketch it as a function of time, plot the matched filter output as a function of time.

b) Derive the expression of SNR for optimum filter. **[8]**

OR

Q4) a) Write a short note on **[8]**

i) MAP

ii) LRT

b) Draw & explain signal space representation of following signal. **[8]**

i) BPSK

ii) 8 Aray PSK

Q5) a) Explain block diagrams for generation and reception of M-ary PSK signals. With suitable mathematical expressions, signal space representation Bandwidth and PSD. **[10]**

b) Binary data is transmitted using PSK at a rate 3M bps over RF link having bandwidth 10MHz. Find signal power required at receiver input so that error probability is less than or equal to 10^{-4} Assume noise PSD to be 10^{-10} watt/Hz. [Q (3.71) = 10^{-4}] **[8]**

OR

Q6) a) Explain with block diagram QPSK recieves Write an expression for its error probability **[8]**

b) find error probability of co-herent FSK when amplitude of I/P at coherent optimal receiver is 10mv and frequency 1MHz, the signal corrupted with white noise of PSD 10^{-9} W/Hz. the data rate is 100kbps.

[erfc (1.01) = 0.1531, erfc (1.11) = 0.1164, erfc (1.22) = 0.0844 & erfc (1.33 = 0.0599)] **[10]**

Q7) a) Draw and explain 4bit P.N. sequence generator and find maximum length sequence. **[8]**

b) The signal has the following parameter number of bits per MFSK symbol K = 2 number of MFSK tone $M = 2^k = 4$ length of PN sequence per hop K = 3 total No. frequency hops $2^k = 8$ sketch the o/p transmittes freq of fast FH/MFSK signals. **[8]**

OR

Q8) a) Write a short note on personal communication system (PCS) **[8]**

b) Compare DSSS with FHSS system. **[8]**

Total No. of Questions : 8]

P1313

SEAT No. :

[Total No. of Pages : 3

[4858] - 1043

T.E. (Electronics & Telecommunication) (End Semester)

ELECTROMAGNETICS AND TRANSMISSION LINES (Semester - I)

(2012 Pattern)

Time :3 Hours] *[Max. Marks : 70*

Q1) a) Derive the expression for electric field intensity $\bar{E}$ at a point 'P' due to infinite sheet charge with charge density 'ρ_s'. **[6]**

b) Derive the expression for the capacitance of spherical plate capacitor. **[6]**

c) A current sheet $\bar{K} = 9\hat{a}y \ \ A/M$ is located at Z = 0. The region 1 which is at Z < 0 has $\mu r_1 = 4$ and region 2 which is at Z > 0 has $\mu r_2 = 3$ **[8]**

Given : $\bar{H}_2 = 14 \cdot 5\bar{a}_x + 8\hat{a}z \ \ A/M$

Find $\bar{H}_1$

OR

Q2) a) Derive the expression for the capacitance of parallel plate capacitor. **[6]**

b) Derive expression for Biot & savart law using magnetic vector potential. **[6]**

c) $\bar{D} = \frac{5x^3}{2} \ \hat{a}x \ \ {}^{c}/_{m^2} \cdot$ prove divergence theorem for a valume of cube of side 1m. Centened at origin & edges parallel to the axis. **[8]**

Q3) a) Select values of K such that each of the following pairs of fields satisfies maxwells's equation

i) $\bar{E} = (K_x - 100t)\,\bar{a}b_{\ y} \ \ v/m$

$\bar{H} = (x + 20t)\,\bar{a}_{\ z} \ A/m$

$\mu = 0.25 \ H/m \quad \in = 0.01 \ \ F/m$ **[8]**

P.T.O.

ii) $\bar{D} = 5x\,\bar{a}\,x - 2y\,\bar{a}\,y + kz\,\bar{a}\,z\ \mu c / m^2$

$\bar{B} = 2\bar{a}_y\ mT$

$\mu = \mu_0 \quad \in = \in_0$

b) Define displacement current and displacement current density & hence show that **[8]**

$$\nabla \times H = Jc + Jd$$

Where JC $\rightarrow$ conduction current density

Jd $\rightarrow$ displacement current density

OR

Q4) a) Derive maxwell's equations in differential and integral form for time varying and free space. **[8]**

b) What is mean by uniform plane wave? obtain the wave equation travelling in free space in terms of E **[8]**

Q5) a) Explain the phenomenon of reflection of transmission line and hence define reflection coefficient. **[6]**

b) A transmission line cable has the following primary constants. **[10]**

$R = 11\Omega/\text{ km} \qquad G = 0.8\ \mu mho / km$

$L = 0.00367\ H / km \quad C = 8.35\ nF / km$

At a signal of 1 KHz calculate

i) Characteristic impedance Zo

ii) Attenuation constant (α) in Np / km

iii) Phase constant (β) in radians /km

iv) Wavelength (λ) in km

v) Velocity of signal in km/sec

OR

Q6) a) A cable has an attenuation of 3.5 dB/km and a phase constant of 0.28 rad/km. If 3V is applied to the sending end then what will be the voltage at point 10km down the line when line is terminated with Zo **[8]**

b) Derive the expression for characteristic impedance (Zo) and propagation constant (r) in terms of primary constants of transmission line. **[8]**

Q7) a) Derive the expression for input impedance of a transmission line. Hence state the effect of open circuit & short circuit of line or input impedance. **[9]**

b) Explain standing wave and why they generate? Derive the relation between the SWR and magnitude of reflection coefficient. **[9]**

OR

Q8) a) What is impedance matching? Explain necessity of it, What is stub matching? Explain the single stub matching with its merits & demerits. **[8]**

b) The VSWR on a lossless line is found to be '5' and successive voltage minima are 40 cm apart. The first voltage minima is observed to be 15cm from load. The length of a line is 160 cm and characteristic impedance is 300 Ω. Using smith chart find load impedance sending end impedance. **[10]**

Total No. of Questions : 10]

SEAT No. :

P3155

[Total No. of Pages : 3

[4858] - 1044

T.E. (E & TC)

Digital Signal Processing

(2012 Pattern) (End Sem.) (Semester - I)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Right side figures indicate marks.***

Q1) a) Explain Advantages of Digital Signal Processing over Analog Signal Processing. **[5]**

b) Explain the concept of orthogonality. **[2]**

c) Check whether the functions given are orthogonal or not over an time interval [0, 1] $f(t)=1; x(t)=\sqrt{3}(1-2t)$. **[3]**

OR

Q2) a) Compute 4-point DFT of sequence $x(n)=\{1231\}$ using DIT-FFT radix-2 algorithm. What is Computational Complexity of Radix-2 FFT algorithm? **[6]**

b) Compute circular convolution of $x_1(n)=\{1,2,3,4\} \& x_2(n)=\{2,1,2,1\}$. **[4]**

Q3) a) Plot the magnitude and phase spectrum of the sampled data sequence = {2, 0, 0, 1} which was obtained using a sampling frequency of 20Hz. **[5]**

b) Explain linear filtering effect for long duration sequences. **[5]**

OR

Q4) a) State any four properties of Z-Transform. **[4]**

b) Compute Z-Transform and ROC of the following sequence

$$x(n)=\left[\frac{-1}{3}\right]^n u[n]-\left[\frac{1}{3}\right]^n u[-n-1].$$ **[6]**

P.T.O.

Q5) a) Design a Butterworth filter using impulse invariant method transformation to satisfy the following specifications. **[8]**

$$0.707 \le |H(e^{jw})| \le 1 \quad \text{for } 0 \le w \le 0.2\pi$$
$$|H(e^{jw})| \le 0.2 \quad \text{for } 0.6\pi \le w \le \pi$$

b) Explain impulse invariant method for S-plane to Z-plane mapping. Explain its limitations. **[8]**

OR

Q6) a) What is frequency warping effect? How the mapping is done in bilinear transformation method? **[7]**

b) Draw the direct form-I and II structures for the following systems. **[9]**

i) $3y(n) - 2y(n-1) + y(n-2) = 4x(n) - 3x(n-1) + 2x(n-2)$.

ii) $y(n) = 0.5[x(n) + x(n-1)]$.

Q7) a) Explain the characteristics of the FIR filters. **[8]**

b) Determine the impulse response $h(n)$ of a filter having desired frequency response.

$$H_d(e^{jw}) = \begin{cases} e^{-j(N-1)w} & \text{for } 0 \le |w| \le \dfrac{\pi}{2} \\ 0 & \text{for } \dfrac{\pi}{2} \le |w| \le \pi \end{cases}$$

N = 7, use windowing technique approach. Use hamming window. **[8]**

OR

Q8) a) Explain Gibbs phenomenon. Compare between windows available. **[8]**

b) Determine the impulse response $h(n)$ of a filter having desired frequency response,

$$H_d(e^{jw}) = \begin{cases} e^{-j(N-1)w} & \text{for } 0 \le |w| \le \dfrac{\pi}{2} \\ 0 & \text{for } \dfrac{\pi}{2} \le |w| \le \pi \end{cases}$$

N = 7, Use frequency sampling approach. **[8]**

Q9) a) What is sampling rate conversion? What is multirate DSP? Why it is required? **[6]**

b) A signal $x(n)$, at a sampling frequency of 2.048 KHz is to be decimated by a factor of 32 to yield a signal at sampling frequency 64Hz. The signal band of interest extends from 0-30 Hz. The anti-aliasing filter should satisfy the following specifications:

Pass Band deviation : 0.01dB

Stop Band deviation : 80dB

Pass Band : 0 – 30Hz

Stop Band : 32 – 64Hz

The signal components in the range from 30 to 32 Hz should be protected from aliasing. Design a suitable one-stage decimator. **[8]**

c) How the DSP processors are selected? (any four points) **[4]**

OR

Q10) a) State four important features of DSP processors. **[4]**

b) Draw the architecture of typical DSP processor TMS320C67XX and explain it in short. **[6]**

c) 5 Design a two stage decimator that down samples an audio signal by a factor of 30, satisfying the following constraints: **[8]**

Input sampling frequency : 240 KHz

Highest frequency of interest : 3.4 KHz

Passband ripple : 0.05

Stopband attenuation : 0.01

Total No. of Questions : 8]

SEAT No. :

P3619

[Total No. of Pages : 2

[4858] - 1045

T.E. (E&TC) (Semester - I)

MICRO CONTROLLER AND APPLICATIONS

(2012 Pattern) (End-Sem.)

Time : 3 Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Compare RISC and CISC Processors. **[6]**

b) Explain interrupt structure in 8051 microcontroller. **[6]**

c) Explain instruction pipeline flow in picl8F***. **[8]**

OR

a) Explain Criteria for choosing a microcontroller. **[6]**

b) Explain Structure of internal memory organization of 8051. **[6]**

c) Explain Data memory organization with details description of GPRs and SFR in PIC 18F458. **[8]**

Q3) a) Explain T1CON and T2CON Register in PIC18F***. **[8]**

b) Explain Interrupt structure of PIC18F***. **[8]**

OR

Q4) a) Draw and explain interfacing of 4*4 matrix key pad with Pic 18F*** microcontroller using interrupt. Write code in 'c'. **[8]**

b) Explain PWM Generation with Example. **[8]**

Q5) a) Draw and explain interfacing of 12C based RTC with PIC18F***. Write a code in C. **[10]**

b) Compare SPI and I2C protocol. **[8]**

OR

P.T.O.

Q6) a) Draw and Explain MSSP Structure of PIC18F**. **[8]**

b) Draw and explain interfacing of ADC for analog input 0-5V and write a C code. **[10]**

Q7) Design a DC Motor control using PWM. **[16]**

OR

Q8) Design a Digital multimeter to display values on LCD Display. **[16]**

Total No. of Questions : 8]

SEAT No. :

P1990

[Total No. of Pages : 2

[4858]-1046

T.E. (E & TC) (End - Semester) (Semester - II)

INFORMATION THEORY & LODING TECHNIQUES

(2012 Pattern)

Time : 2.½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***

Q1) a) Design a Huffman code for a source generating 4 different types of messages with probabilities 0.3, 0.2, 0.4, 0.1. Find the coding efficiency. **[7]**

b) What are Golay codes? Explain with suitable example. **[7]**

c) Write the procedure for coding of cyclic codes. **[6]**

OR

Q2) a) A 3 bit PCM system generates 1000 samples/sec. If the quantized samples are produced by the system with probabilities $\left\{\frac{1}{4}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}, \frac{1}{16}, \frac{1}{16}, \frac{1}{16}, \frac{1}{16}\right\}$ Then find the rate of information. If the samples are equiprobable, what will be rate of information? **[7]**

b) What are Hamming codes? Explain with suitable example. **[7]**

c) For a (7,4) cyclic code, with generator polynonial $g(x) = x^3 + x^2 + 1$, what will be codewords for following message words. **[6]**

i) 1011 ii) 1110

Q3) a) Find the generator polynonial for BCH code with codeword length n = 15 and error correcting capability $t_c = 2$. **[10]**

b) Explain Go-Back-N ARQ. **[6]**

P.T.O.

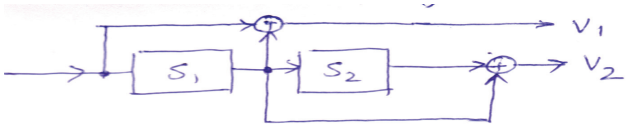
OR

Q4) a) For a (7,5) RS code, the received codeword polynomid is given as: $r(x)=x^5+\alpha^5x^4+\alpha^2x^3+x^2+\alpha^6x+\alpha^3$ where α is element of aF(2^3). Find the corrected codeword polynomial, if there is single error in the received codeword. **[8]**

b) Write features of BCH codes. **[4]**

c) What is FEC & ARQ systems? **[4]**

Q5) a) Draw the trellis diagram for following encoder **[8]**



b) Explain with example polynomial description of convolutional codes. **[8]**

c) Draw the block diagram for coding process Turbo codes. **[2]**

OR

Q6) a) Explain viterbi's algorithm for decoding of convolutional codes. **[8]**

b) Explain generating function for convolutional codes. **[8]**

c) Write any two features of LDPC codes. **[2]**

Q7) a) What are the goals of communication system designer? Explain any three of them. **[6]**

b) What is Nyquist minimum bandwidth? **[4]**

c) Explain in brief trade off between modulation and coding. **[4]**

OR

Q8) a) Explain how coding gain is improved in TCM. **[8]**

b) Write shannon-Hartley capacity theorem. What are its implications? **[8]**

Total No. of Questions : 10] SEAT No. :

P1314 [Total No. of Pages : 3

[4858] - 1047
T.E. (E&TC)
EMBEDDED PROCESSORS
(Semester - II) (2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain the following instructions with example **[6]**

i) SWP R_0, R_1

ii) MUL R_1, R_2, R_3

iii) LDR R_2 [R_3]

b) Explain with figure structure of CPSR reqistor of LPC2148 **[4]**

OR

Q2) a) Draw and explain block diagram of LPC 2148 **[6]**

b) Describe with figure interfacing diagram of T2C EPROM with LPC2148 **[4]**

Q3) a) List the features of VART0. Compare it with UART1 CPC 2148 **[4]**

b) Write embedded C program for on chip ADC for LPC 2148 **[6]**

OR

Q4) a) Write comparision of ARM7, ARM9, ARM11. **[5]**

b) Write function of barrel shifter in ARM data flow model **[2]**

c) Write significance of speicial reqistors. r_{13}, r_{14}, r_{15} in ARM7 **[3]**

P.T.O.

Q5) a) Write comparision of ARM7 with ARM conex. **[4]**

b) Describe the need of operating system in embedded system design. Explain desired features of operating system for complex embedded system. **[6]**

c) Draw and explain with algorithm interfacing diagram of RGB LED with LPC 1768 **[6]**

OR

Q6) a) Draw and explain CMSIS structure of cortex series. **[8]**

b) Draw and explain interfacing diagram of seven segment display with LPC 1768 draw flow chart for the same **[8]**

Q7) a) Explain with neat block diagram LPC 1768 **[8]**

b) Draw and explain power control block of LPC 1768. Explain power saving mode. **[8]**

OR

Q8) a) Explain the role of following reqisters in LPC 1768

i) Direction register

ii) Set register

iii) Clear register

iv) Mask register **[8]**

b) What is PWM? Write C program for PWM to drive DC motor with LPC 1768. **[8]**

Q9) a) Explain the following blocks of LPC 1768 **[9]**

i) NVIC (Nested Vector Interrupt Controller)

ii) MPV (Memory Protection Unit)

b) Draw and expalin clock control block of LPC 1768. **[9]**

OR

Q10) Write short notes on: **[18]**

a) USB - (Feature frame structure, diagram)

b) Ethernet - (Feature Block diagram, framest strucare etc.)

c) CAN Protocol. - (Feature Block diagram etc.)

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Total No. of Questions : 8] **SEAT No. :**

P3512 **[Total No. of Pages : 2**

[4858]-1048
T.E. (E & TC) (Semester - II)
POWER ELECTRONICS
(2012 Pattern) (End Sem.)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Your answers will be valued as a whole.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What are phase controlled converter? Explain with circuit diagram working of 1ϕ Half controlled converter with suitable load. Draw suitable waveforms & comment on p.f. **[7]**

b) What is inverter? Explain with diagram 3ϕ voltage controlled inverter with star load (R). Comment on waveforms & Duty cycle. **[7]**

c) What is IGBT? Explain with characteristics. **[6]**

OR

Q2) a) What is the need of dual converters in the industries? Explain with diagram & waveforms, working of 1ϕ dual converter with highly inductive load.**[7]**

b) Explain with circuit diagram & waveforms working of 1ϕ Full controlled converter with RL load? Justify what is Inversion & Rectification mode with waveforms. **[7]**

c) What is bridge Inverter? Explain with circuit diagram & waveforms. **[6]**

Q3) a) What are DC-to-DC converters? Explain with circuit diagram & waveforms working of 4 Quadrant chopper? State its applications. **[9]**

b) What is AC to AC controller? Explain with circuit diagram working of 1ϕ AC full wave AC to AC controller with balanced star Load (R) **[9]**

OR

P.T.O.

Q4) a) i) What is chopper? Explain in brief.

ii) A DC chopper has a resistance of 10Ω & input voltage is 220V. When the chopper switch remains ON its voltage drops to 2V. & chopping frequency is 1KHz. If the Duty cycle is 50% Determine,

1) Average o/p volt
2) Rms o/p voltage
3) Chopper freq
4) Input resistance of chopper **[10]**

b) Explain with circuit diagram & waveforms working of triac based AC power controller ckt. Comment on p.f. Justify why SCR based controllers are prefered over triac based controllers. **[8]**

Q5) a) Explain with block schematic working of off-line UPS. State its specifications & applications. **[8]**

b) What are speed control techniques of DC Motors? Explain with circuit diagram working of 1ϕ seperately Excited DC Motor with Inductive Load. Comment on p.f. **[8]**

OR

Q6) a) Compare ON-Line UPS with Off-Line UPS. Justify why ON-Line is better than Off-Line with technical reasons. **[8]**

b) Write short notes on : **[8]**

i) Battery charger
ii) Electronic Ballast

Q7) a) What are resonant converters? Explain with circuit diagram & waveform working of ZVS? **[8]**

b) A Snubber circuit is used in SCR circuit for protection of di/dt, dv/dt. The value of RLC being 4Ω, 6μH, & 6μF respectively & Supply being 400V. Find the maximum permissible value of dv/dt. Assume the load resistance to be 10Ω. **[8]**

OR

Q8) a) Compare Linear, switched mode & Resonant converter based power supplies. **[6]**

b) Write short notes on : **[10]**

i) HVDC
ii) Induction Heating
iii) Protection circuits

Total No. of Questions : 8] SEAT No. :

P1315 [Total No. of Pages : 2

[4858] - 1049
T.E. (E & TC)
INDUSTRIAL MANAGEMENT
(2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2. Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Define Management. What are the functions of management? **[7]**

b) Explain Ishikawa diagram and Pareto Analysis in details. **[7]**

c) Write short note on Sources of Finance. **[6]**

OR

Q2) a) What are the characteristics of Management? Distinguish between "Traditional organization" and "Modern organization". **[7]**

b) Define Quality. Explain Jurans Triology of quality with neat diagram. **[7]**

c) An ABC Company Ltd. has given following information for current year, Fixed cost is Rs. 1200000, variance cost is Rs. 50/Unit, Estimated sales for current year is Rs. 5000000 and sale price per unit is Rs. 200. Calculate **[6]**

i) Break even point

ii) Contribution and profit, if likely sales turnover in the next year is expected Rs. 4500000.

iii) Sales turnover if profit target is Rs. 1500000.

Q3) a) What is Human Resource Planning? Explain process of HRP. **[9]**

b) Compare Recruitment and Selection strategies. **[9]**

OR

Q4) a) Write strategic importance and objective of HRM. **[9]**

b) What is need of training? Write importance and investment in training programs. **[9]**

Q5) a) Define Entrepreneurship. Write need and importance of Entrepreneurship development. **[8]**

b) What are the policies and incentives given to small scale business development? **[8]**

OR

P.T.O.

Q6) a) Write types of ownership. Also write advantages and disadvantages of partnership and joint stock company. **[8]**

b) Which are the steps to start small scale industry? **[8]**

Q7) a) Explain MIS with Human resource department. **[8]**

b) Write short note on **[8]**

i) Business Process Reengineering

ii) Decision support system

OR

Q8) a) Explain characteristics of information system and its types. **[8]**

b) Write a short note on **[8]**

i) Enterprise Resource Planning

ii) E-Commerce

Total No. of Questions : 8] **SEAT No. :**

P1316 **[Total No. of Pages : 3**

[4858] - 1050
T.E. (E & TC)
ANTENNA & WAVE PROPAGATION
(2012 Pattern) (End Sem.)

)Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answers any one Questions out of Q1 & Q2, Q3 & Q4, Q5 & Q6, Q7 & Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) What is poynting vector? What is its significance? Derive an expression for poynting vector? **[6]**

b) Derive the fundamental equation for free space propagation and explain its parameter **[6]**

c) A lossless resonant $\lambda/2$ dipole antenna with input impedance of $73\,\Omega$ is to be connected to a transmission line whose characteristics impedance is $50\,\Omega$. Assuming that the pattern of the antenna is given approximately by $U=B_o\sin^3\theta$. Find the overall maximum gain of this antenna. **[8]**

OR

Q2) a) State Maxwell's field equation with their significane and derive the wave equation foe lossless dielectric medium. **[6]**

b) Derive vector potential A for an magnetic current source J. **[6]**

c) Explain the following wireless channel characteristics **[8]**

i) Coherence bandwidth

ii) Coherence time

P.T.O.

Q3) Find the following terms for half wave Dipole: **[18]**

a) Specify the current

b) Vector magnetic potential

c) Far field components of Electric & Magnetic fields

d) radiation density, radiation intensity

e) radiated power, radiation resistance

f) Directivity

g) draws the radiation pattern

OR

Q4) a) Calculate the radiation resistance of a double turn and an eight turn small circular loop when radius of loop is $\lambda/10$ and the medium is free space. Calculate its efficiency if loss resistance is $25\,\Omega$ **[6]**

b) Derive the expression for radiation resistance of Infinitesimaldipole. **[6]**

c) Derive the expression for input impedance of small dipole. **[6]**

Q5) a) Write a short notes on **[8]**

i) Pattern Multiplication

ii) Binomial Array

b) An Endfire array with element spaced at $\lambda/2$ and with axes of elements at right angles to the line of array is required to have directivity of 36. Determine - the array length and the width of major lobe. **[8]**

OR

Q6) a) Design a broad side Dolph - Tschebhysheff array of five elements with half wavelength spacing between elements and with major to minor lobe ratio to be 19dB. Find the excitation coefficients & array factor. **[6]**

b) Give the comparison of broadside and End fire antenna array. **[5]**

c) Explain planar array. State its advantages and applications. **[5]**

Q7) a) What is Microstrip patch antenna? Give structure details, radiation pattern, specification and application of such antenna. **[5]**

b) What is meant by Rhombic Antenna? How it is constructed? Explain how unidirectional pattern is obtained in properly terminated Rhombic Antenna. **[5]**

c) Write a short notes on following antennas with respect to structural details, radiation pattern, features and applications **[6]**

i) Hertz antenna

ii) Whip antenna

OR

Q8) a) Write a short notes on the following antennas **[12]**

i) Lens Antenna

ii) Resonant Antenna

iii) Super - turnstile Antenna

b) A paraboloidal reflector antenna with diameter 20m is designed to operate at frequency of 6 GHz and illumination efficiency of 0.54. Calculate the antenna gain in decibels. **[4]**

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Total No. of Questions : 8] SEAT No. :

P1317 [Total No. of Pages : 2

[4858] - 1051
T.E. (Electronics)
ELECTRICAL MACHINES & POWER DEVICES (Theory)
(2012 Pattern) (End Semester)

Time : 2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2. Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain switching characteristics of power diode. **[6]**

b) Explain the two transistor analogy for SCR and derive an expression for anode current IA. **[7]**

c) Why snubber circuits are required? Also explain the protection of power devices by snubber circuit. **[7]**

OR

Q2) a) Draw and explain switching characteristics of IGBT. **[6]**

b) Explain the need for protection of power devices and State different types of protections required to ensure safety of power devices. **[7]**

c) Write note on triggering circuit of TRIAC using DIAC. **[7]**

Q3) a) Explain the basic action of a commutator with the help of neat sketches. **[6]**

b) Write a short note on permanent magnet DC motor. State advantages, disadvantages and applications. **[6]**

c) A 25kW, 250V, d.c. generator has armature and field resistance of 0.6Ω and 100Ω respectively. Determine the total armature power developed when working as a motor taking 25 kW input. **[4]**

P.T.O.

OR

Q4) a) Why starter is necessary for a DC motor? Explain the working of three-point starter with the help of neat diagram. **[6]**

b) Distinguish between self excited and separately excited DC generator. **[6]**

c) A 4 pole, 250V, d.c. series motor has a wave connected armature with 200 conductors. The flux per pole is 25m Wb when motor is drawing 60A from the supply. Armature resistance is 0.15Ω while series field winding resistance is 0.2Ω. Calculate the speed under this condition. **[4]**

Q5) a) Explain the principle of operation of a 3-phase induction motor in detail. **[8]**

b) Explain the procedure for no load test and blocked rotor test on a three phase induction motor. How are the parameters of equivalent circuit determined from test results? **[10]**

OR

Q6) a) Explain the complete torque-slip characteristics of a three phase induction motor including motoring, generating and breaking regions. **[8]**

b) A 6 pole, 50 Hz, 3-phase induction motor running on full load develops a useful torque of 160 Nm when the rotor EMF makes 120 complete cycles per minute. Calculate the shaft power output. If the mechanical torque lost in friction and that for core loss is 10Nm. Compute (a) the copper loss in the rotor winding (b) the input to the motor (c) the efficiency. The total stator loss is given to be 800W. **[10]**

Q7) a) Compare variable reluctance motor with permanent magnet stepper motor. **[8]**

b) Explain the principle of operation of capacitor start and capacitor run single phase induction motor along with the torque slip characteristics and the applications. **[8]**

OR

Q8) a) Write a short note on: d.c. servomotor. **[8]**

b) Explain the operation of a variable reluctance motor. **[8]**

Total No. of Questions : 8]

SEAT No. :

P3620

[Total No. of Pages : 3

[4858] - 1052
T.E. (Electronics)
Data Communication
(2012 Pattern) (End Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Compare synchronous and asynchronous way of transmission. Give representative example of each. **[4]**

b) Represent a data [10111010] in **[6]**

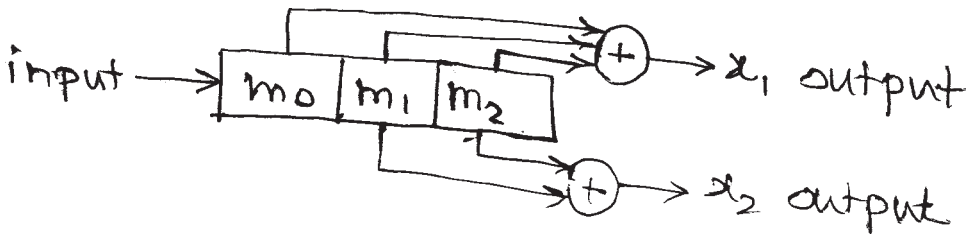
i) Unipolar RZ.

ii) Polar RZ.

iii) Bipolar RZ.

iv) AMI.

c) Draw a Trellis diagram and state transition diagram for convolution encoder shown in figure: **[8]**



(Assume suitable data if require)

OR

Q2) a) Describe the structure of simple optical fiber and explain the mechanism of light propagation in it. **[4]**

b) Write a note on DM with suitable block diagram and waveforms. **[6]**

P.T.O.

c) Consider a (7,4) block code generated by matrix **[8]**

$$G = \left[\begin{array}{cccc:ccc} 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 \end{array}\right]$$

Obtain:

i) All code vectors of this code.

ii) Parity Check Matrix.

iii) Syndrome vector, if received data vector is [1111010]

Q3) a) Define Entropy. Show that the entropy is maximum when binary message has 50% probability of occurrence. **[9]**

b) What steps are involved in Huffman coding procedure? Evaluate the performance of Huffman code over Shannon - Fano code for large message ensemble with equal probabilities. **[9]**

OR

Q4) a) A binary symmetric channel is characterised by channel matrix **[9]**

$$\begin{bmatrix} P & 1-P \\ 1-P & P \end{bmatrix}$$

Obtain channel capacity for

i) P = 0.2.

ii) P = 0.5.

iii) P = 0.9.

Also comment on obtained results.

b) Encode given message ensemble with Shannon-Fano encoding scheme. **[9]**

Message $X = [x_1\ x_2\ x_3\ x_4\ x_5\ x_6\ x_7\ x_8]$

Probability $P = \left[\frac{1}{4}\ \frac{1}{4}\ \frac{1}{8}\ \frac{1}{8}\ \frac{1}{16}\ \frac{1}{16}\ \frac{1}{16}\ \frac{1}{16}\right]$

Also, calculate the average length of this code.

Q5) a) What is spread spectrum mechanism? Compare DS-CDMA with TDMA. **[8]**

b) A communication channel has been identified as frequency selective. DS-SS and FH-SS are the schemes available. Which of the SS technique is to be selected for better performance? Justify. Define slow and fast FH-SS. **[8]**

OR

Q6) a) Define: **[8]**

i) Chip period.

ii) Process gain.

Determine the processing gain and jamming margin for DS-SS system with T_b = 1m sec and $T_C = 1\,\mu$ sec.

b) Write note on: **[8]**

i) Properties of PN sequence.

ii) CSMA.

Q7) a) For following modulation schemes plot spectral response and draw signal space diagrams. Assume that $T_b = 1/f_c$ carrier signal has peak amplitude of 1v. **[8]**

i) Binary ASK.

ii) Binary PSK.

b) What is OQPSK? **[6]**

c) Enlist advantages and limitations of M-ary modulation technique. **[4]**

OR

Q8) a) Describe QAM system in detail. Compare it's performance with that of QPSK. **[8]**

b) For a given data [101101], draw the modulated output waveforms for

i) BPSK.

ii) DPSK.

iii) QPSK.

[6]

c) Briefly describe the factors involved in defining the probability of error of digital carrier modulation scheme. **[4]**

Total No. of Questions : 8] **SEAT No. :**

P1318 **[Total No. of Pages : 4**

[4858] - 1053
T.E. (Electronics) (Semester - I)
NETWORK SYNTHESIS
(2012 Pattern)

)Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) What is positive real function? Give necessary and sufficient condition for a function to be positive real. **[6]**

b) Synthesize the following network function using foster - I and cauer - I form;

$$Z(s)=\frac{(s+1)(s+4)}{s(s+2)}$$ **[6]**

c) Synthesize the following transfer function

$$Z_{21}(s)=\frac{s^3}{s^3+3s^2+4s+2}$$ **[8]**

OR

Q2) a) Test whether $F(s)=\frac{s^2+6s+5}{s^2+9s+14}$ is positive real function. **[6]**

b) State the properties of LC driving point immitance function and also explain the reactance curve for LC Driving point immittance function.**[6]**

P.T.O.

c) What is constant resistance network? And also synthesize th following voltage transfer function

$$\frac{V_2}{V_1}=\frac{S^2+2}{S^2+3S+2}$$ **[8]**

Q3) a) State the properties of Butterworth Approximation. **[4]**

b) Write a short note on: Frequency and Impedance scaling **[4]**

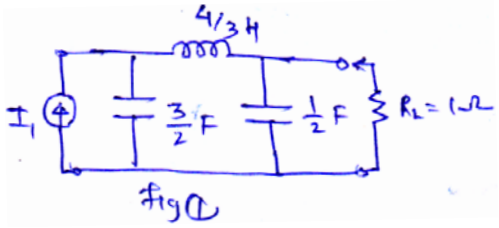
c) Obtain a system function H(s) that exhibits a Chebyshev characteristics with not more than 1dB ripple in passband and attenuation of 20dB at W = 2 rad/sec. **[8]**

OR

Q4) a) State the properties of Chebyshev Approximation. **[4]**

b) Determine the order of low pass butterworth filter that is to provide 40dB attenuation at a frequency which is twise of cut-off frequency. **[6]**

c) Normalized third order low pass filter is shown in fig(1). Design the corresponding high pass filter with cut-off frequency WC=10^6rad/sec and the impedance level of 500Ω **[6]**



fig(1)

Q5) a) Write a short note on RC - CR Transformation. **[4]**

b) Design sallen and key 2nd order butterworth low pass filter having upper cut-off frequency 1kHz. **[6]**

c) Explain the different biquad feedback topologies used in active filter designing and list the important observation. **[6]**

OR

Q6) a) Synthesize a second order Low pass filter to have a pole frequency of 2kHz and a pole Q of 10. Use sallen and key circuit based on positive feedback topology. **[8]**

b) Synthesize the following high pass filter function using RC-CR transformation

$$H(s)=\frac{k.s^2}{s^2+s+16}$$ **[8]**

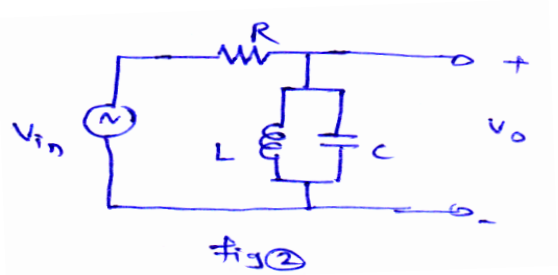
Q7) a) Prove the following sensitivity relationships **[6]**

i) $S_{\sqrt{x}}^{p} = 2S_x^{\,p}$

ii) $S_x^{y+a} = \frac{y}{s+a} s_x^{\,y}$

iii) $S_x^{\sqrt{p}} = \frac{1}{2} S_x^{\,p}$

b) For the parallel LC network shown in Fig(2) find the transfer function $\frac{V_o}{I_{in}}$ and compute the sensitivities of K, Wp and Q with respect to the passive element R, L and C **[6]**



c) Explain the effect of the following op-amp characteristics on the active filter **[6]**

i) Slew rate

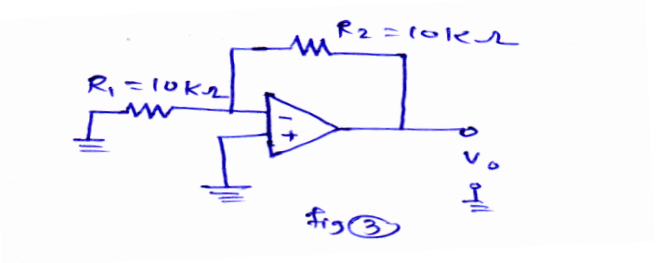
ii) CMRR

iii) Dynamic range

OR

Q8) a) What is gain sensitivity? Explain various factor affecting gain sensitivity? **[6]**

b) The op-amp used in the inverter of fig(3) has an input bias current of 500nA and input offset current that can range between $\pm$ 100nA. Find the resulting maximum output offset voltage **[6]**



c) Write a short note on multi element deviations. **[6]**

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Total No. of Questions : 8] SEAT No. :

P1319 [Total No. of Pages : 2

[4858] - 1054
T.E. (Electronics Engineering)
MICRO CONTROLLER AND APPLICATIONS
(Semester - II)(End Sem.)

)Time : 2:30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer the Q.1 or Q2. & Q3 or Q4, & Q5 or Q6, & Q7 or Q8.***
2) ***Answer any four questions.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of calculator is allowed.***
6) ***Assume Suitable data if necessary.***

Q1) a) What is RISC Microcontroller, how it is different than CISC Microcontroller. **[4]**

b) Explain the operation of I2C protocal with timing diagram. **[8]**

c) Explain data and program memory of PIC Microcontroller. **[8]**

OR

Q2) a) How the priorities of Interrupts can be changed in 8051 Microcontroller? **[4]**

b) Describe in detail status register of PIC Microcontroller. **[8]**

c) Describe in detail Assembler, compiler, simulator and Emulator. **[8]**

Q3) a) Draw an interfacing diagram and write an Embedded C program to interface 16×2 LCD with PIC 18 FXXX Microcontroller to display the "SPPU PUNE" message **[8]**

b) What do you mean by prescaling of timer in PIC Microcontroller? Explain timer o control register of PIC18 FXXX **[8]**

OR

P.T.O.

Q4) a) Write an embedded C program to toggle all bits of port B, port C, port D contineously with a delay of 250 ms. **[8]**

b) Draw and explain interrupt structure of PIC18 FXXX Microcontroller. **[8]**

Q5) a) Write a Embedded c program for reading single analog input (range 0 to 5V) and display it on LCD. **[8]**

b) Explain the MSSP with SPI mode. **[8]**

OR

Q6) a) What are the advantages of SPI bus over I2C bus? Draw the RTC interfacing with PIC 18 FXXX **[8]**

b) Compare I2C and SPI protocol with diagram. **[8]**

Q7) a) Draw and explain data acquisition system in detail. **[8]**

b) Draw the interfacing of DC motor to PIC18 fxxx using PWM and write ac code for 50% duty cycle if switch is open, 25% duty cycle if switch is closed. **[10]**

OR

Q8) Design a PIC18 FXXX based voltmeter for 0-20V measurement. Write corresponding algorithm to display voltage on LCD **[18]**

Total No. of Questions : 10] SEAT No. :

P1320 [Total No. of Pages : 3

[4858] - 1055
T.E. (Electronics)
ELECTROMAGNETICS & WAVE PROPOGATION
(Semester - I) (2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.No. 1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8. and Q.No.9 or Q.No.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagram must be drawn wherever required.***
4) ***Use of electronic pocket calculater and smith chart is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Derive expression for electric field intensity due line charge using Gauss law **[6]**

b) Derive expression for capacitance of parallel plate capacitance. **[4]**

OR

Q2) a) Derive Boundary condition for electric field at interface between conductor and free space. **[6]**

b) A dipole having moment $\bar{P} = 3a\bar{x} - 5a\bar{y} + 10a\bar{z}$ nCm is located at Q(1,2,-4) in free space find potential (V) at point P(2,3,4) **[4]**

Q3) a) Explain the continuity equation. **[4]**

b) Plane Z = 0 and Z = 4 carry a current $\bar{K} = -10a\bar{x}$ A/m and $\bar{K} = 10a\bar{x}$ A/m respectively. Find $\bar{H}$ at P(1,1,1) and Q(0,-3,10) **[6]**

OR

Q4) a) Define conduction current and conduction current density **[4]**

b) Derive boundary condition at an interface between two magnetic media. **[6]**

P.T.O.

Q5) a) State and Prove Poynting theorem. Interpret each term **[8]**

b) A lossy dielectric has $\mu r = 1\ \varepsilon r = 1,\ \sigma = 2 \times 10^{-8}$ mho/m an electric field $\bar{E} = 200 \sin \omega t\ a\bar{z}$ V/*m* exist at a certain point in the dielectric

i) At what frequency the conduction current and displacement current densities be equal.

ii) At this frequency calculate the instantaneous displacement current density. **[8]**

OR

Q6) a) Write Maxwell's equations for static and time varying fields in point and integral forms. **[8]**

b) Determine value of K such that the following pairs of fields satisfy Maxwell's equation in the region where $\sigma = 0, pr = 0$

i) $\bar{E} = [Kx - 100t]a\bar{y}\ V/m,\ \bar{H} = [x + 20t]a\bar{z}\ A/m$ and $\mu = 0.25, \varepsilon = 0.01$

ii) $\bar{D} = [5xa\bar{x} - 2ya\bar{y} + Kz\ a\bar{z}\ \mu C/m^2, \bar{B} = 2a\bar{y}mT$ and $\mu = \mu_0, \varepsilon = \varepsilon_0$ **[8]**

Q7) a) What is polarization Explain linear, Circular & Elliptical polarization **[8]**

b) A plane electromagenetic wave having frequency of 10MHz has an average Poynting vector of 1W/m^2. The medium is lossless with relative permeability 2 and relative permittivity 3, find

i) Velocity of propagation

ii) Wavelength

iii) Impedance of the medium

iv) r.m.s electric field E **[8]**

OR

Q8) a) Formulate wave equations from Maxwell's equation solve it for perfectly conducting media **[8]**

b) An $\bar{E}$ field in free space is given as

$\bar{E} = 800 \cos(10^8 t - \beta y) a\bar{z}\ V/m,$ find $\beta, \lambda, \bar{H}$ at P(0.1, 1.5, 0.4) **[8]**

Q9) a) Explain the following terms **[10]**

i) Skip distance

ii) Virtual height

iii) Critical frequency

iv) MUF

b) List out different modes of propagation. A 2 MHz circuit consist of transmitting antenna with 20 db gain and receiving antenna with 25db gain with respect to isotropic antennas. The input power to transmitting antenna is 200W. What is the maximum power received at a distance of 200km over a free space. **[8]**

OR

Q10) a) Derive fundamental equation for free space propagation and also obtain expression for electric field **[10]**

b) Calculate the skip distance for flat earth with MUF of 10 MHz. If wave is reflected from height of 300 km where maximum value of reflective index (η) is 0.9 **[8]**

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Total No. of Questions : 8] **SEAT No. :**

P1321 **[Total No. of Pages : 3**

[4858] - 1056
T.E. (Electronics)
INSTRUMENTATION SYSTEMS
(Semester - II) (End Sem.) (2012 Pattern)

)Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Differentiate between active and passive transducers. **[4]**

b) Explain bourdon tube pressure transducer. Explain the technique to obtain electrical output from a bourdon tube. **[6]**

c) An RTD has $\alpha = 0.004/^{o}C$. If R = 106 Ω at 20°C, find the resistance at 25°C and 100°C. **[4]**

d) Explain advantages and Limitations of LVDT. **[6]**

OR

Q2) a) Define the following terms:

i) Repeatability

ii) Linearity

iii) Hysteresis

iv) Drift **[6]**

b) Explain the different fundamental standards and units for common physical parameters. **[7]**

c) Explain doppler effect type of ultrasonic flow meter. **[7]**

P.T.O.

Q3) a) Explain generic architecture of SMART sensors. **[6]**

b) Explain the steps involved in surface micromachining of MEMS accelerometer. Draw a neat sketch of MEMS accelerometer. **[6]**

c) Explain MEMS magnetic field sensors. **[4]**

OR

Q4) a) Explain with neat diagram surface micro machined hot wire anemometer. **[6]**

b) Explain the steps involved in bulk micromachining of MEMS pressure sensor. Draw a neat sketch of MEMS pressure sensor. **[6]**

c) Draw LM 75 block diagram and give its specification. **[4]**

Q5) a) State the specifications of Profibus network. Explain Profibus architecture. **[6]**

b) Explain the working of I to P converter. **[6]**

c) Write a short note on RS 232 standards. **[6]**

OR

Q6) a) Explain HART communication protocol. **[6]**

b) Explain with neat block diagram Data Acquisition system. **[6]**

c) Write a short note on IEEE488 standard Bus. **[6]**

Q7) a) What are actuators? Give their classification and explain piston actuator in detail. **[6]**

b) Explain principle of operation of Stepper motor. State important selection criterion of stepper motor. **[6]**

c) Draw neat diagram of:

i) Spool valve

ii) Poppet valve **[4]**

OR

Q8) a) Explain how a single acting cylinder can be actuated by a solenoid operated directional control valve. **[6]**

b) Explain the role of relays and solenoid valves with any one application. **[6]**

c) Draw control valve characteristics and state the meaning of the terms - linear, equal percentage and quick opening characteristics. **[4]**

////

Total No. of Questions : 10] SEAT No. :

P1322 [Total No. of Pages : 3

[4858] - 1057
TE (Electronics)
EMBEDDED PROCESSORS
(2012 Pattern) (Semester - II)(End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Black figures to the right indicate full marks.***
3) ***Use of logarithmic tables slide rule, mollier charts electronic pocket calculator and steam table is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain following registers

i) PINSEL 0

ii) PINSEL 1

iii) PINSEL 2

iv) IODIR **[4]**

b) Explain detailed memory map of LPC 2148 **[4]**

c) Explain following instructions (any two)

i) MLA R1, R2, R3, R4

ii) MVN R0, R1

iii) LDR R0, [R1]! **[2]**

OR

Q2) a) Draw interfacing diagram of keyboard and LCD with LPC 2148. Aslo write a program to display pressed key on LCD **[6]**

b) Describe CPSR and SPSR of ARM7. **[4]**

P.T.O.

Q3) a) Write a embedded C program for generation of square wave using on chip DAC of LPC 2148. **[6]**

b) Explain different operating modes of ARM7. **[4]**

OR

Q4) a) Draw & explain interfacing of I2C EEPROM with LPC 2148. Write a embedded C program for the same. **[6]**

b) Explain VART block in LPC 2148. **[4]**

Q5) a) Explain CMSIS standard with structure in detail. **[6]**

b) Explain features of embedded operating system & expalin its need for developing complex applications. **[6]**

c) Explain different operating modes of CORTEX M3 with the help of state diagram **[4]**

OR

Q6) a) Compare CORTEX A, CORTEX M, CORTEX R processor series. What are improvement of ARM CORTEX over ARM7 **[8]**

b) Draw & explain block diagram of ARM CORTEX M3. **[8]**

Q7) a) Draw interfacing diagram for RGB LED with LPC 1768, also write embedded C program to generate different colours. **[6]**

b) Explain features of interrupt in LPC 1768. **[4]**

c) Describe power control block of LPC 1768 **[6]**

OR

Q8) a) Interface seven segment display with LPC 1768 and also write embedded C program to display 0 to 9. **[10]**

b) What are the different clock sources available with LPC 1768? **[6]**

Q9) Write a short note on the following block in LPC 1768 (any three) **[18]**

a) VSB

b) CAN

c) SD CARD

d) ETHERNET

OR

Q10)a) Write applications of CAN, ETHERNET, USB with real world example. **[4]**

b) Draw and explain interfacing diagram of DC motor using PWM of LPC 1768, also write embedded C program for the same. **[8]**

c) Draw and explain interfacing of TFT display with LPC 1768. **[6]**

Total No. of Questions : 10] **SEAT No. :**

P3513 **[Total No. of Pages : 3**

[4858]-1058
T.E. (Electronics) (Semester - II)
POWER ELECTRONICS AND APPLICATIONS
(2012 Pattern)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) What do you mean by commutation of SCR? Explain types of commutation. **[4]**

b) Draw the circuit diagram of 3Φ Full converter operating with highly inductive load and draw the following waveform for $\alpha = 30°$. **[6]**

i) Load voltage

ii) Voltage across SCR

iii) Load current

OR

Q2) a) Explain the effect of source inductance on the performance of 1Φ full converter with waveform. **[4]**

b) A single phase controlled thyristor bridge supplies an inductive load. Assuming that the output current is virtually constant equal to I_0 determine the following if supply voltage is 220 V & $\alpha = 60°$. **[6]**

i) Average output voltage

ii) Supply RMS Current

iii) Supply fundamental current

iv) DF (Displacement Factor)

Q3) a) i) Power MOSFET is best switch in PWM Inverter. Justify. **[4]**

ii) Explain Cross Conduction in Inverter.

b) Explain Quasi square wave inverter for inductive load. Also derive an expression for rms value of n^{th} harmonic of output voltage and n^{th} harmonic distortion factor. **[6]**

P.T.O.

OR

Q4) a) For a 1Φ bridge inverter DC input voltage is 200V and feeds resistive load of 5Ω. Determine : **[6]**

i) RMS output voltage

ii) The average current of each power MOSFET.

iii) 3^{rd} and 5^{th} harmonic rms content at output.

b) Compare 180° mode and 120° mode of the Inverter. **[4]**

Q5) a) What is need of resonant converters? Explain the operation of zero current switching (ZCS) resonant dc-dc converter with the help of equivalent diagrams and waveforms. **[8]**

b) What is power Quality? Why it is required? Explain different type of power line disturbance. **[6]**

c) What are the advantages of resonant converters over switched-mode converters? **[4]**

OR

Q6) a) Explain series loaded resonant (SLR) DC to DC converter. **[6]**

b) What is ZVS? Explain with the circuit diagram & waveforms working of ZVS. State its advantages & disadvantages. **[8]**

c) Explain active filters for power conditioning. **[4]**

Q7) a) A UPS is driving a 600W rating load which as a lagging PF of 0.8. The efficiency of the inverter is 80%. The battery voltage is 24V dc. Assume that there is separate charger for the battery. Determine : **[8]**

i) KVA rating of the inverter

ii) Wattage of the rectifier

iii) A-H rating of the battery back-up time of 30 minutes.

b) Explain Electronic Ballast and Power electronics in capacitor charging applications. **[8]**

OR

Q8) Write short note on (any two) : **[16]**

a) UPS

b) HVDC transmission line

c) Universal motor

Q9) a) Explain in brief Photo-voltaic energy conversion systems. **[8]**

b) Explain grid connected wind energy systems. **[8]**

OR

Q10)a) Explain the need of renewable energy sources. Explain the role of DC to DC converter in variable Wind energy conversion system. **[8]**

b) Compare Stand alone PV system and Grid connected PV system. **[4]**

c) Explain following terms of UPS : **[4]**

i) Efficiency of the battery

ii) Capacity of the battery

Total No. of Questions : 8] SEAT No. :

P1323 [Total No. of Pages : 2

[4858] - 1059
T.E. (Electronics)
INDUSTRIAL MANAGEMENT
(Semester - II) (2012 Pattern) (End Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2. Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Draw organization chart of Line and Staff organization. Give merits and demerits **[8]**

b) Write a note on

i) Ishikawa Diagram

ii) Kaizen **[8]**

c) Write a note on Quality Circles **[4]**

OR

Q2) a) Explain Project crashing and Resource Leveling in Project Management **[8]**

b) Explain Project Management **[8]**

c) State the functions of Capital Market **[4]**

Q3) a) Define strategic HRM & State the reasons due to which HRM gained importance **[6]**

b) What are the Roles and Responsibilities of HR Professionals **[6]**

c) Explain the process of Talent Acquisition **[4]**

P.T.O.

OR

Q4) a) Explain objectives and Process of HR Planning **[6]**

b) Write a note on Human Resource Information System **[6]**

c) Explain the need of Executive Development **[4]**

Q5) a) How do you come with good business idea Explain **[6]**

b) Write a note on Project Proposal **[6]**

c) State the Qualities of an Entrepreneur **[4]**

OR

Q6) a) Define Entrepreneurship and what are the features of Entrepreneurship **[6]**

b) What are types of Entrepreneur and explain any two in detail **[6]**

c) State the problems of women entrepreneurs **[4]**

Q7) a) Define MIS and Explain the benefits of MIS **[6]**

b) Explain the types of Information system **[6]**

c) What are the components and resources of Information system **[6]**

OR

Q8) a) State any four characteristics of Information and explain any two in detail. **[6]**

b) Write a note on

i) Decision support system

ii) Executive support system **[6]**

c) Compare Data and Information. State the importance of information in decision making process **[6]**

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Total No. of Questions : 10]

SEAT No. :

P3156

[Total No. of Pages : 3

[4858] - 1060

T.E. (Electronics) (Semester - II)

DISCRETE TIME SIGNAL PROCESSING

(2012 Pattern) (End Sem.)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) An analog signal $x(t)=\sin(480\pi t)+3\sin(720\pi t)$ is sampled at 600 times per second.

i) What are the frequencies in radians in the resulting DT Signal $x(n)$.

ii) If $x(n)$ is passed through an ideal DAC, what is reconstructed signal $y(t)$ = ? **[6]**

b) Perform circular convolution of following sequences using matrix multiplication method.

$x_1(n)=\{1,2,3,4\}$

$x_2(n)=\{2,1,1,2\}$. **[4]**

OR

Q2) a) Draw butterfly structures of 8 point DIT FFT & 8 point DIF FFT. **[6]**

b) Give advantages of Digital Signal Processing over analog signal processing. **[4]**

Q3) a) A system has unit sample response $h(n)$ given by **[6]**

$$h(n)=-\frac{1}{4}\delta(n+1)+\frac{1}{2}\delta(n)-\frac{1}{4}\delta(n-1)$$

P.T.O.

i) Is the system BIBO stable.

ii) Is filter causal.

iii) Find frequency response.

b) State following properties of DFT **[4]**

i) Convolution in time domain (circular convolution).

ii) Time shifting (circular time shift).

OR

Q4) a) Compute inverse Z transform of the following: **[6]**

$$X(Z)=\frac{Z^2}{(Z-1)(Z-0.2)}.$$

b) State & explain sampling theorem. **[4]**

Q5) a) Design a FIR digital filter to approximate an ideal LPF with passband gain of unity, cut off frequency of 850 Hz & working at sampling frequency of 5000 Hz. The length of impulse response should be 5. Use rectangular & hamming window. **[9]**

b) Deduce cascade realization of **[4]**

$$H(z)=\left(1+\frac{1}{4}z^{-1}+z^{-2}\right)\left(1+\frac{1}{8}z^{-1}+z^{-2}\right).$$

c) Explain frequency sampling method for FIR filter design. **[4]**

OR

Q6) a) Determine impulse response *h* (*n*) of a filter having desired frequency response

$$H_d(e^{j\omega})=e^{-j(M-1)\omega/2} \quad 0\le\omega\le\pi/2$$
$$=0 \quad \pi/2\le\omega\le\pi$$

M = 7. Use frequency sampling approach. **[10]**

b) Show that symmetric FIR filter has linear phase response. **[7]**

Q7) a) Explain Impulse invariance transformation. What is drawback of this transformation & how BLT overcomes it. Show graphical representation. Explain concept of frequency pre-warping. **[8]**

b) The system transfer function of analog filter is given by

$$H(s)=\frac{s+0.1}{(s+0.1)^2+16}$$

Obtain the system transfer function of digital filter using BLT which is resonant at $\omega_r = \pi/2$. **[9]**

OR

Q8) a) Consider LTI system, initially at rest described by difference equation

$$y(n)=\frac{1}{4}y(n-2)+x(n)$$

i) Determine impulse response $h(n)$ of the system.

ii) Determine direct form II & parallel form realization of this system.

[8]

b) Write short note on Butterworth filter approximation. **[5]**

c) Give comparison between IIR & FIR filters. **[4]**

Q9) a) Design two stage decimator with sampling rate to be reduced from 10 KHz to 500 Hz. Passband edge 150 Hz, stopband edge 180 Hz, passband ripple 0.002 & stopband ripple 0.001. Consider decimation factors 10 & 2. **[8]**

b) With the help of block diagram explain architecture of TMS320 C28XX processor. **[8]**

OR

Q10) a) Explain methods of sample rate reduction & increase. **[8]**

b) Explain implementation of triggering for converter with DSP processor. **[8]**

Total No. of Questions : 8] **SEAT No. :**

P1324 **[Total No. of Pages : 2**

[4858] - 1061
T.E. (Electrical) (2012 Pattern)
Advance Microcontroller and its Applications
(Semester - I) (End Sem.)

Time : 2:30 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Compare CISC and RISC architecture **[7]**

b) Explain following instructions with flags they are affecting

i) MULLW

ii) CPFSLT

iii) LFSR **[6]**

c) Write an assembly program using timer 1 to blink LED connected to PORTB at every 500 microsec. Crystal frequency is 16MHz **[7]**

OR

Q2) a) Explain the GP RAM and SFRs for PIC microcontroller **[6]**

b) Write a program to add 5 elements in an array starting from 0×20H. Store the results at 0×40H **[7]**

c) Write short note on **[7]**

i) Compiler

ii) Assembler

P.T.O.

Q3) a) Eight LED are connected to port A.Write a program which will continuously blink LED connected to port A. Assume delay subroutine written at 0×30H **[8]**

b) Explain the functions of pins associated with LCD (16×2) and draw a flowchart for outputting data on LCD. **[8]**

OR

Q4) a) Write a program to transfer a letter 'P' serially and continuously at a baud rate of 4800. Assume Crystal frequency of 10 MHz. **[8]**

b) With a flow chart explain interfacing of 4×4 keypad with PIC microcontroller. **[8]**

Q5) a) Explain SFR CCP1CON register in detail **[8]**

b) Using compare mode, write the assembly language program to generate square wave with frequency of 2.5 kHz and 50% duty cycle on CCP1 pin using timer 3 **[8]**

OR

Q6) a) Explain steps for programming in capture mode **[8]**

b) Explain steps for programming the CCP module for PWM generation. **[8]**

Q7) a) Write a program to read a data from ADC and store results from memory location 0×50H onwards. **[9]**

b) Show interfacing of level sensor with PIC18F458. Write a program to measure and display level. **[9]**

OR

Q8) a) Explain how voltage is measured using PIC18F458. Write a program to measure voltage and display result in PORT D. **[9]**

b) Explain with a neat diagram, interfacing of DAC with PIC microcontroller and write a program for triangular waveform generation using DAC. **[9]**

Total No. of Questions : 10]

SEAT No. :

P1325

[Total No. of Pages : 3

[4858] - 1062
T.E. (Electrical)
ELECTRICAL MACHINES - II
(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Compare salient pole type construction with nonsalient pole type construction for three phase alternator. **[4]**

b) A 550V, 55 KVA, 1 phase alternator has an effective resistance of 0.2Ω. A field current of 10A produces an armature current of 200A on short circuit and an electromotive force of 450V on open circuit. Calculate the voltage regulation at full load 0.8 pf lagging p.f. **[6]**

OR

Q2) a) Define voltage regulation of alternator. Draw the equivalent circuit of alternator. **[4]**

b) With neat diagram explain bright lamp method of synchronization of 3 phase alternators. **[6]**

Q3) a) A 400V 3 phase star connected synchronous motor has armature resistance of 0.2Ω /phase & synchronous reactance of 2Ω /phase . While delivering certain load it takes 25 Amp from supply. Calculate back ent induced in motor if it is working with – **[8]**

i) 0.8 pf lag.

ii) 0.9 pf lead.

b) Draw Vee and inverted Vee curve for synchronous motor at no load. **[2]**

OR

P.T.O.

Q4) a) With neat diagram explain slip test. How X_d and X_q can be determined? **[6]**

b) Define short circuit ratio in use of alternator. Elaborate its significance. **[4]**

Q5) a) What are different methods of controlling speed of 3 phase induction motor. Explain cascade control. **[8]**

b) Explain the construction & working of Linear Induction Motor. State its applications. **[8]**

OR

Q6) a) With neat diagram explain construction & working of Permanent Magnet Stepper Motor. **[8]**

b) Write short note on 3 phase induction voltage regulator. **[8]**

Q7) a) Explain the procedure to plot circle diagram of ac series motor. How speed scale can be determined. **[8]**

b) Explain the operation of dc series motor on AC supply. What are the problems associated with a.c. operation. **[8]**

OR

Q8) a) Explain the Conductively and Inductively compensated a.c. series motor. **[8]**

b) A universal motor has resistance of 30Ω and inductance of 0.5 H. When it is connected to 250V d.c. supply, it takes 0.8 Amp and runs at 2000 rpm. Determine the speed, torque and power factor when connected to 250V, 50Hz, AC. Supply and taking same current of 0.8 Amp. **[8]**

Q9) a) With neat diagram, explain the construction and working of split phase induction motor. Draw the phasor diagram & torque - speed characteristics of this motor. **[10]**

b) A 1ph split phase induction motor has following details: **[8]**

Main winding impedance $Z_m = 4 + j7.5\Omega$

Auxiliary winding impedance $Z_a = 7.5 + j4\Omega$

Supply voltage = 230 V, 50Hz

Calculate – i) Main winding current.

ii) Auxiliary winding current.

iii) Motor current.

iv) Power factor of the motor.

OR

Q10) a) With neat diagram, explain the construction and working of shaded pole Induction Motor. State applications of this motor. **[10]**

b) With suitable diagram explain no load and blocked rotor test on single phase induction motor. How equivalent circuit parameters are obtained from these tests. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1326

[Total No. of Pages : 3

[4858] - 1063
T.E. (Electrical)
Power Electronics
(2012 Pattern) (End Sem.)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
2) *Figures to the right indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*

Q1) a) Describe the gate triggering of a thyristor. Does the gate current have any effect on the forward break over voltage. Discuss. **[5]**

b) Define latching and holding current as applicable to an SCR. Show these currents on its static IV characteristics. **[5]**

OR

Q2) a) Sketch switching (or dynamic) characteristics of a thyristor during its turn on and turn off processes. Show the variation of voltage across the thyristor and current through it with respect to time during these two dynamic processes. Write expressions for turn on time and turn off time. **[8]**

b) Discuss the conditions which must be satisfied for turning on an SCR with a gate signal. **[2]**

Q3) A single phase half wave SCR circuit feeds power to a resistive load. Draw waveforms for source voltage, load voltage, load current, and voltage across the SCR for a given firing angle α. Hence obtain expressions for average and rms load voltages in terms of source voltage and firing angle. **[10]**

OR

P.T.O.

Q4) a) For a 3 phase full converter, explain how output voltage wave, for firing angle 60º is obtained by using **[5]**

i) phase voltages and

ii) line voltages.

b) Discuss the effect of source inductance on the performance of a single-phase full converter indicating clearly the conduction of various thyristors during one cycle. **[5]**

Q5) a) Describe the principle of step-up chopper. Derive an expression for the average output voltage in terms of input voltage and duty cycle. State the assumptions made. **[10]**

b) A step up chopper has input voltage of 220V and output voltage of 660V. If the conducting time of thyristor chopper is $100\mu s$, compute the pulse width of output voltage. Draw circuit diagram. **[6]**

OR

Q6) a) Explain switching characteristics of an IGBT. **[8]**

b) Compare power of MOSFETs with BJTs. **[8]**

Q7) a) Draw neat circuit and describe the working of a single phase full bridge inverter feeding Inductive load with square wave output. Draw output voltage and current waveforms to show conduction intervals of devices. Comment on drawback of square output voltage. **[8]**

b) The single phase half-bridge inverter has a resistive load of $R = 2.4\Omega$ and the dc input voltage is $V_s = 48V$. Determine **[8]**

i) the rms output voltage.

ii) the output power P_o,

iii) the average and peak currents of each transistor,

iv) the peak reverse blocking voltage V_{BR} of each transistor,

OR

Q8) a) What are the main differences between voltage source and current source inverters. Explain current source inverter in detail with neat circuit diagram. **[8]**

b) Explain sinusoidal - pulse width modulation as used in PWM inverter. What are modulation indices? How they affect output voltage? Discuss the effect of number of pulses generated per half cycle on harmonics in output voltage. **[8]**

Q9) a) Draw and explain working of 3ph inverter bridge to feed 3ph resistive load (star connected) using 120° mode of conduction. Draw control signals for devices used and output phase and line voltage. **[10]**

b) Draw a single phase CSI is fitted with ideal SCRs. Describe its working when its load is a inductive. Show output current and voltage waveforms. **[8]**

OR

Q10) a) What are the types of Multilevel Inverter. Explain diode clamped multilevel inverter. **[10]**

b) What is a cascaded multilevel inverter? What are the advantages of a cascaded multilevel inverter. **[8]**

Total No. of Questions : 8]

SEAT No. :

P1327

[Total No. of Pages : 2

[4858] - 1064

T.E. (Electrical) (Semester - I) (End Sem.)

Electrical Installation, Maintenance & Testing

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Unit - I, II & III

Q1) a) Explain the different strategies of maintenance. **[6]**

b) Explain the transformer contamination process. Explain the filtration of t/f oil with block diagram. **[7]**

c) What are the faults that occur in Induction Motor? What are the causes & remedies for them. **[7]**

OR

Q2) a) Define & Explain w.r.t. to condition monitoring **[6]**

i) Polarization Index.

ii) Dielectric Absorption Ratio.

b) Discuss in detail various failure modes of transformer. **[7]**

c) What is Signature Analysis? How it is useful for Condition Monitoring of Induction Motor. **[7]**

Unit - IV

Q3) a) Describe the various failure modes of power cables. Also explain the test conducted on power cables. **[8]**

b) Explain the various abnormal condition and causes of failure of Induction Motor. **[8]**

OR

Q4) a) Explain tan delta measurement for condition monitoring of insulation. **[8]**

b) Write a detail note on thermography & its use in condition monitoring of Induction Motor. **[8]**

P.T.O.

Unit - V

Q5) a) Differentiate between: **[8]**

i) Feeder & Distributor.

ii) Overhead Line & Underground line.

b) A.1Φ a.c. distributor AB 300 m long is fed from end A and is loaded under

i) 100 A at 0.707 pf lagging 200m from pt. A

ii) 200 A at 0.8 pf lag 300m from pt. A.

The load resistance and reactance of the distributor is 0.2Ω and 0.1Ω per KM. Calculate the total voltage drop in the distributor. The load pf refer to the voltage at the far end. **[10]**

OR

Q6) a) Explain the general design consideration of the Distribution feeder. **[8]**

b) A2 conductor cable 1 km long is required to supply a constant current of 200A throughout the year. The cost of cable including installation is Rs. (20a + 20)/ meter where 'a' is the area of the cross section of conductor in cm^2. The cost of energy is 5paise/KWH and the interest and depreciation charges amount to 10%. Calculate the most economical conductor size. Assume resistivity of conductor material to be $1.73\mu\Omega cm$. **[10]**

Unit - VI

Q7) a) Explain the following terms with their equivalent circuit **[6]**

i) Touch potential.

ii) Step potential.

b) Explain in detail the design of earthing grid of substation w.r.t. IEEE standard 80-2000. **[10]**

OR

Q8) a) Write the general rules for the residential and commercial wiring work. **[6]**

b) State the general factors that should be considered in estimation of HT or LT lines. **[10]**

Total No. of Questions : 10]

SEAT No. :

P1328

[Total No. of Pages : 2

[4858] - 1065

T.E. (Electrical) (Semester - I)

INDUSTRIAL AND TECHNOLOGY MANAGEMENT

(2012 Pattern) (End Sem.)

Time : 2 1/2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, wherever necessary.***

Q1) a) Explain the following types of business organizations. **[6]**

i) partnership firm.

ii) joint stock company.

iii) Co-operative society.

b) Differentiate between administration and management. **[4]**

OR

Q2) a) Explain the importance of technology management for National Economy. **[4]**

b) Explain in detail various methods of costing, explain any two. **[6]**

Q3) a) Differentiate between marketing and selling. **[4]**

b) Explain the detail classification of technology. **[6]**

OR

Q4) a) Define capital, debit, credit. Explain the two types of capital. **[4]**

b) Write a short note on: **[6]**

i) Marketing research.

ii) Online Marketing.

P.T.O.

Q5) a) Write a short note on Theory X and Theory Y. **[6]**

b) What are the qualities of Good Leadership. **[4]**

c) Write a short note on Group dynamics. **[4]**

d) Write a short note on Qualities of Entreprenuer. **[4]**

OR

Q6) a) Explain Hezberg's two factor theory of motivation. **[6]**

b) Explain theories and styles of leadership. **[4]**

c) Discuss Maslaw's theory of Hierarchy of needs. **[4]**

d) Write a short note on formation team and team work. **[4]**

Q7) a) Write a short note on stress management. **[6]**

b) Explain recruitment and selection of employees. **[6]**

c) Write a short note on Importance of Training in development of Employees. **[4]**

OR

Q8) a) Write a short note on Labour Welfare. **[6]**

b) Write the importance of business ethics. **[6]**

c) Explain what is job satisfaction and organizational commitment. **[4]**

Q9) a) Write a short note on criteria for securing patents. **[6]**

b) What are the different forms of intellectual property rights. **[6]**

c) Write a short note on Trademark copy right law. **[4]**

OR

Q10) a) Describe the structure and format of patent. **[6]**

b) What is the meaning of Intellectual Property Rights (IPR). **[4]**

c) Differentiate between Trademark and Copyright and patent. **[6]**

Total No. of Questions : 10]

P2032

SEAT No. :

[Total No. of Pages : 2

[4858] - 1066
T.E. (Electrical) (End Semester)
Energy Audit and Management
(2012 Pattern) (Semester - II)

Time : 2.5 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4 Q.5 or Q.6, Q.7 or Q.8. and Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain Indian and Global Energy Scenario. **[4]**

b) What is energy conservation? Why it is important in India? **[6]**

OR

Q2) a) Explain principles of energy management. **[4]**

b) Explain duties of Energy Auditor under EC act - 2001. **[6]**

Q3) a) Define supply side management (SSM). What are its Constraints? **[6]**

b) Explain features of automatic meter reading in utility energy management. **[4]**

OR

Q4) a) Define energy management as per energy conservation act-2001. Why Demand side Management (DSM) is important in India? **[6]**

b) Explain DSM in agriculture sector. **[4]**

Q5) a) What are the types of energy audit? Explain in detail **[10]**

b) Energy audit case study of sugar factory. **[8]**

OR

Q6) a) Explain action plans for implementation of energy conservation options. **[10]**

b) Enlist and explain various instrumentation used in energy audit. **[8]**

P.T.O.

Q7) a) Explain various energy conservation opportunities in illumination area. **[8]**

b) What is cogeneration? What are the advantages and disadvantages of co-generation? **[8]**

OR

Q8) a) Explain energy conservation techniques in heating systems. **[8]**

b) Explain energy conservation potential in electric motors. **[8]**

Q9) a) Explain financial appraisal methods. **[8]**

b) Explain energy audit case study in IT Industries. **[8]**

OR

Q10)a) Discuss the main objectives of carrying out sensitivity analysis. Also state the different factors that are considered for sensitivity analysis. **[8]**

b) Explain energy audit case study in Municipal corporations. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1329

[Total No. of Pages : 4

[4858] - 1067

T.E. (Electrical) (Semester - II)

Power System - II

(2012 Pattern) (End Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) Determine sending end complex power, of a transmission line delivering 50MVA at 132kV, 50Hz and 0.8 power factor lagging. The ABCD constants of transmission lines are $A = D = 0.9855 \angle 0.32^{\circ}$, $B = 67.3 \angle 68.69^{\circ} \Omega$. **[5]**

b) Give the advantages and limitations of HVDC transmission. **[5]**

OR

Q2) a) Explain surge impedance & surge impedance loading. **[5]**

b) Explain phenomena of corona in EHV transmission lines. **[5]**

Q3) a) Draw single line diagram of HVDC transmission system and explain the components used (any four). **[5]**

b) A transmission circuit is represented by symmetrical π network in which the series impedance is $120 \angle 60^{\circ} \Omega$ and each shunt admittance is $2.5 \times 10^{-3} \angle 90^{\circ} S$.

i) Calculate value of general circuit constants ABCD

ii) the characteristic impedance of the circuit.

[5]

OR

P.T.O.

Q4) a) Estimate the corona loss per phase per km by using peek's formula for three phase 110kV, 50Hz, 150km long transmission line consisting of three conductors each of 10mm diameter and spaced 2.5 m apart in an equilateral triangle formation. The temperature of air is 30ºC and the atmospheric pressure of 75 mm of Hg. Take the irregularity factor as 0.85. Ionization of air may be assumed to take place at a maximum voltage gradient of 30kV per cm (peak). **[5]**

b) Prove that apparent power S = V.I*. **[5]**

Q5) a) What do you mean by p.u. system? Prove that the single phase and three phase values are same in p.u. **[8]**

b) A sample power system has following line data. Form bus admittance matrix (Y_{BUS}) for this system. **[8]**

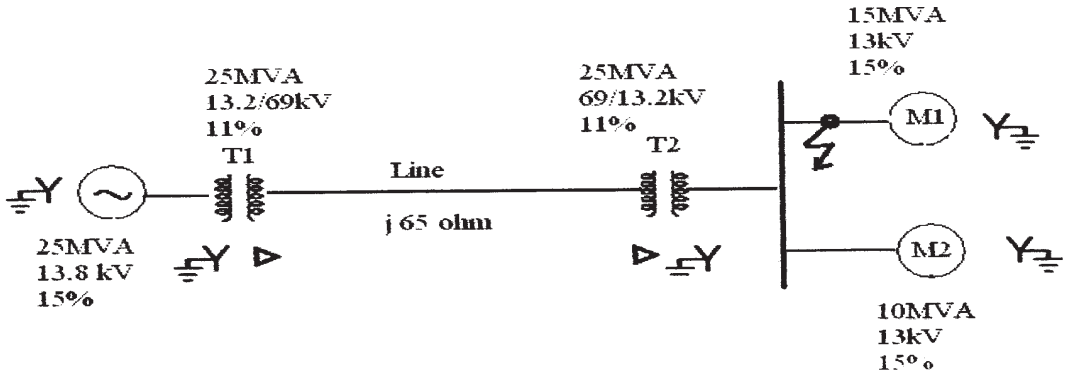
Bus code	Series impedance in pu	PU line charging admittance Y/2
1-2	0.02+j0.08	0.0+j0.04
1-3	0.06+j0.24	0.0+j0.03
2-3	0.04+j0.16	0.0+j0.025
2-4	0.04+j0.16	0.0+j0.025
3-4	0.01+j0.04	0.0+j0.015

OR

Q6) a) Derive static load flow equations for *n* bus system. **[8]**

b) Compare Newton Raphson method with Gauss Seidal method of load flow analysis. **[8]**

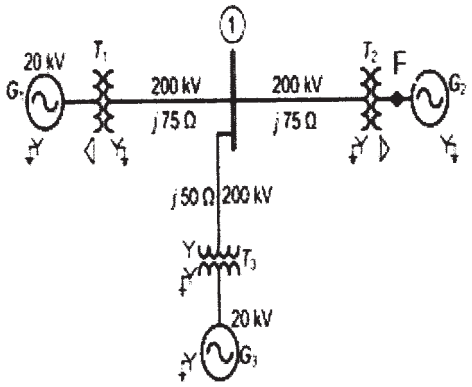
Q7) a) A one line diagram of a three phase power system is shown in fig. A three phase short circuit fault occurs at point shown in fig. Choose 13.8kV, the generator voltage as the base voltage and 25MVA as the base MVA, Find fault current at fault location. **[8]**



b) Explain the concept of sub transient, transient and steady state current and impedances of unloaded alternator under symmetrical fault condition. **[8]**

OR

Q8) a) A three phase short circuit fault occurs at a point F shown in the figure. Find fault current and Fault MVA. **[8]**

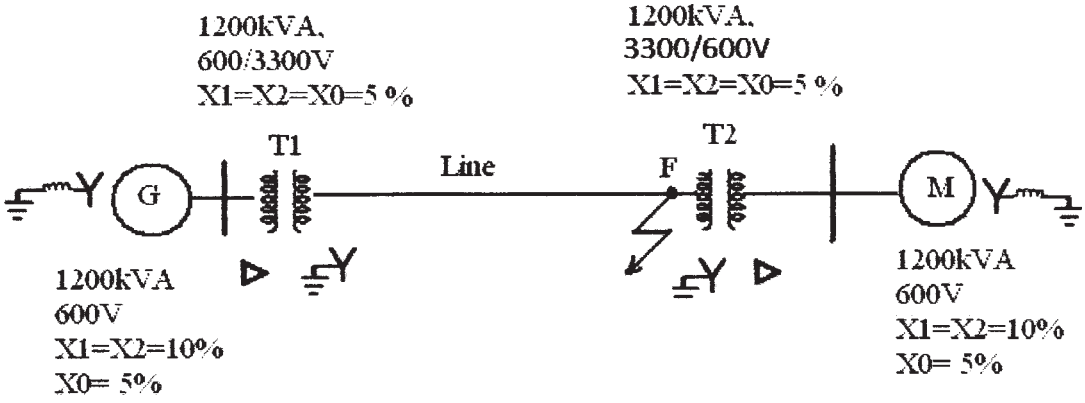


Generator G_1	200 MVA, 20 kV, X_d = 15%
Generator G_2	300 MVA, 18 kV, X_d = 20%
Generator G_3	300 MVA, 20 kV, X_d = 20%
Transformer T_1	300 MVA, 220Y/22 kV, X_d = 10%
Transformer T_2	Three single-phase units each rated 100 MVA, 130Y/25 kV, X = 10%
Transformer T_3	300 MVA, 220/22 kV, X = 10%

b) What is current limiting reactor. Explain it with a suitable example. **[8]**

Q9) a) A Single line to ground fault occurs on line at point F as shown in fig. near transformer T_2 find the fault current and fault MVA for following data

The reactances of transmission line are $X_1 = X_2 = 20\%$ and $X_0 = 40\%$ on the base of 1200kVA, 3300V. The reactance of the neutral grounding reactors are 5% on the kVA base of the machine. **[9]**



b) Draw zero sequence diagram for all types of combinations of transformer. **[9]**

OR

Q10) a) Show that fault current $If = \frac{E}{X_1 + \left(\frac{X_2 * X_0}{X_2 + X_0} \right)}$ when L-L-G fault occurs at the terminals of solidly grounded star connected alternator. Draw the sequence network. **[9]**

b) The line to neutral voltages in a three phase system are

$Van = 200\angle 0^\circ, Vbn = 600\angle 100^\circ$ $Vcn = 400\angle 270^\circ$. Find the symmetrical components of the voltages. **[9]**

Total No. of Questions : 10]

SEAT No. :

P1330

[Total No. of Pages : 3

[4858] - 1068

T.E. (Electrical) (Semester - II)

Design of Electrical Machines

(2012 Pattern) (End Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic table, slide rule, Mollier chart, electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) From the design point of view compare distribution and power transformer. **[4]**

b) Prove that **[6]**

$$\theta = \theta_m \left(1 - e^{-t/T_h}\right)$$

where, θ = temperature rise at any time t, ºC;

θ_m = final steady temperature rise while heating, ºC;

T_h = heating time constant, second;

t = time, second.

OR

Q2) a) A copper bar 12 mm in diameter is insulated with micanite tube which fits tightly around the bar and into the rotor slot of an induction motor. The micanite tube is 1.5 mm thick and its thermal resistivity is $8\Omega - m$. Calculate the loss that will pass from copper bar to iron if a temperature difference of 25ºC is maintained between them. The length of bar is 0.2m. **[4]**

b) Derive the output equation of single phase core type transformer. **[6]**

P.T.O.

Q3) a) Derive the expression for finding the leakage reactance of three phase core transformer. **[6]**

b) A 300 kVA, 6600/440 V, three phase, delta/star core type transformer has a maximum flux density of 1.35 wb/m^2 and the total weight of core is 650 kg. The magnetizing VA/kg and the iron loss/kg corresponding to 1.35 wb/m^2 are 30 and 2.5 W respectively. Calculate the no load current if the mmf required for joints is 2.5 percent of that for iron. **[4]**

OR

Q4) a) Explain the process of design of cooling tubes of a transformer. **[6]**

b) A 500 KVA, 11000/440 Volts, Delta/Star transformer has the following data:

i)	HV Turns	=	1660
ii)	Length of mean turn	=	93 cm
iii)	Length of coil	=	52 cm
iv)	Short circuit current	=	20 x rated current

Find radial force in tones on the HV winding under short circuit conditions. **[4]**

Q5) a) Derive the output equation of 3-phase induction motor. **[8]**

b) Determine the main dimensions, turns per phase, number of slots of a 250 HP, 3 phase, 50Hz, 415V, 1450 RPM slip ring induction motor. Assume B_{av} = 0.5 wb/m^2, ac = 30000 A/m, efficiency = 0.9 and power factor = 0.9, winding factor = 0.955, current density = 3.5 A/mm^2. The ratio of core length to pole pitch is 1. The machine is delta connected. **[10]**

OR

Q6) a) Explain various types of ac windings used for 3-phase induction motor. **[8]**

b) Explain different factors affecting selection of **[10]**

i) Specific electrical loading.

ii) Specific magnetic loading of 3-phase induction motor.

Q7) a) Explain the concept of 'Unbalanced Magnetic Pull'. Why is the Unbalanced Magnetic Pull high when the 3-phase induction motor is designed with a small air gap? **[8]**

b) A 15 kW, 3-phase, 6 pole, 50 Hz squirrel cage induction motor has the following data. **[8]**

Stator bore diameter = 0.32 m

Axial length of stator core = 0.125 m

Number of stator slots = 54

Number of conductors per stator slots = 24

Current in each stator conductor = 17.5 A

Full load power factor = 0.85 lagging

Design a suitable cage rotor giving number of rotor slots, section of each bar and section of each ring. The full load speed is about 850 rpm approximately. Use copper for the rotor bars and end rings. Resistivity of copper is $0.021\Omega / m$ and mm^2.

OR

Q8) a) Discuss various factors affecting choice of length of air gap for 3-phase induction motor. **[8]**

b) Derive the expression for end ring current in induction motor. **[8]**

Q9) a) Explain the procedure to find out mmf required for air gap, stator teeth, stator core, rotor teeth and rotor core of 3 phase induction motor. **[8]**

b) A 100 kW, 3300V, 50Hz, 8 pole, 3-phase, star connected induction motor has a magnetizing current which is 25 percent of the full load current. Calculate the stator turns per phase if the mmf required for flux density at 30° from pole axis is 450 A. Assume winding factor = 0.955, Efficiency = 0.88, Power factor = 0.85. **[8]**

OR

Q10) a) What is the significance of B_{60} from inter-polar axis. **[8]**

b) State the different leakage fluxes that exit in the 3-phase induction motor. Show their location by simple sketches. **[8]**

Total No. of Questions : 8]

SEAT No. :

P1331

[Total No. of Pages : 4

[4858] - 1069

T.E. (Electrical) (Semester - II)

Control System - I

(2012 Pattern) (End Semester)

Time : 2 1/2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer all questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) State and explain the terms: **[6]**

i) Transfer function.

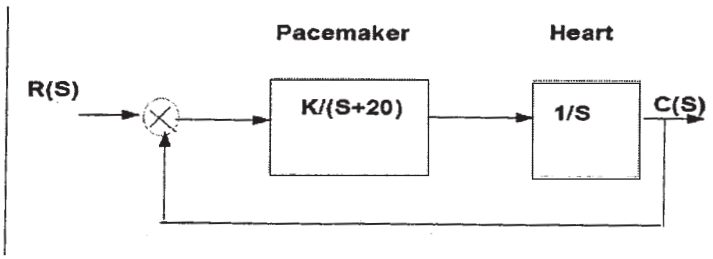
ii) Feedback.

iii) Feed forward system.

iv) Regulatory system.

b) Derive transfer function of interacting two tank system. **[7]**

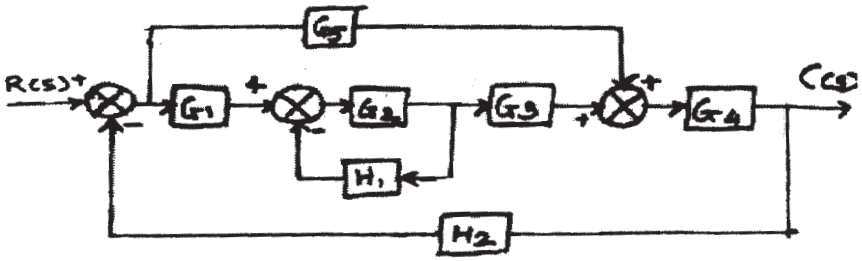
c) The block diagram of an electronic pacemaker is given in fig. Determine the steady state error for unit ramp input when K = 400. Also, determine the value of K for which the steady state error to a unit ramp will be 0.02. **[7]**



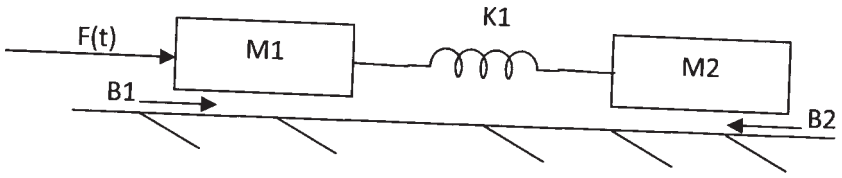
OR

P.T.O.

Q2) a) Derive transfer function using block diagram reduction. **[7]**



b) Explain force voltage analogy. Derive transfer function of following system using F-V analogy. **[7]**



c) A unity feedback system has open loop transfer function as $G(s)=\frac{K}{s(s+10)}$. Determine the gain K so that system will have damping ratio of 0.5. For this value determine settling time, peak overshoot. **[6]**

Q3) a) Explain stability analysis using Routh Hurwitz criterion and test the system stability whose characteristic equation is : $S^3+5S^2+6S+30=0$. **[8]**

b) Explain rules for construction of root locus. **[8]**

OR

Q4) a) Sketch the root locus for open loop system **[10]**

$$G(s)=\frac{K}{s(s+1)(s^2+4s+5)}H(s)=1$$

i) Find range of K for stability.

ii) Find the value of K for marginally stable and corresponding close loop poles.

b) Explain Routh Hurwitz stability criterion. If a complete row becomes zero what is its significance. **[6]**

Q5) a) Draw bode plot for following system $G(s)=\frac{40}{s(s+2)(s+5)}$. Find gain margin and phase margin comment on stability. **[12]**

b) Explain Nyquist stability criterion. **[6]**

OR

Q6) a) Explain correlation between frequency domain and time domain. **[9]**

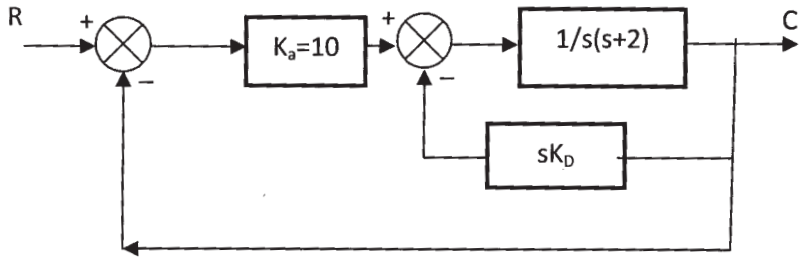
b) Draw the polar plot of the given system $G(s)H(s)=\frac{10}{s(s+2)}$. **[9]**

Q7) a) Draw block diagram and discuss **[8]**

i) PD controller.

ii) PI controller.

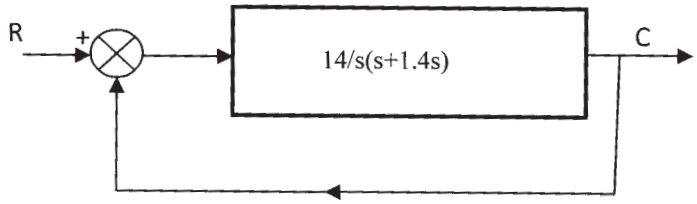
b) A feedback system which employs output rate feedback is shown. Determine the derivative feedback constant K_D which will increase the damping factor of the system to 0.6. What is the steady state error to unit ramp input. **[8]**



OR

Q8) a) Define tuning and explain tuning method for controllers. **[8]**

b) A closed loop control system with unity feedback is shown in figure by using derivative control, the damping ratio is to be made 0.7. Determine the value of Td, also determine the rise time, peak time and maximum overshoot without derivative control and with derivative control. The input to the system is unit step. **[8]**



Total No. of Questions : 8]

SEAT No. :

P1332

[Total No. of Pages : 3

[4858] - 1070

T.E. (Electrical) (Semester - II)

UTILIZATION OF ELECTRICAL ENERGY

(2012 Pattern) (End Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Write a short note on float switches and relays. **[6]**

b) Explain with neat diagram electric arc welding. **[6]**

c) A low frequency induction furnace operating at 12V takes 480 kW at 0.5 power factor when hearth is full. If the secondary voltage be maintained at 12V, estimate the power factor and power absorbed when hearth is half full. Assume the resistance of secondary circuit is to be halved and reactance to remain the same. **[8]**

OR

Q2) a) Draw electric circuit diagram used in Air conditioner and explain in brief. **[6]**

b) Explain temperature control methods of resistance furnace in brief. **[6]**

c) Calculate the time taken to melt 5 ton of steel in 3ph arc furnace having following data:- **[8]**

Current :- 8000A ; Resistance :- 0.003 Ω ; Arc voltage:-50V

Reactance:- .005 Ω ; Latent heat :- 8.89 kcal/kg; Specific heat: - 0.12

Initial temp:- 18ºC; Melting Point:- 1370ºC

If the overall efficiency is 50%, find power factor of the furnace.

P.T.O.

Q3) a) Sketch a neat block diagram and explain various equipment used in electric locomotive. **[6]**

b) Write a short note on Street lighting. **[6]**

c) Explain composite system of track electrification in detail. **[6]**

OR

Q4) a) A hall of 30*20 meter area with a ceiling height of 6m is to be provided with general illumination of 200 Lux, taking a coefficient of utilization of 0.6 and depreciation factor of 1.6. Determine the no. of tubes required considering suitable space to height ratio. Take luminous efficiency of tube 25 lumens/w for 300 W tube and show the arrangement. **[6]**

b) Explain in detail interrupter and circuit breaker used in traction substation. **[6]**

c) Write a short note on Pentograph-current collecting device. **[6]**

Q5) a) A 200T motor coach having 5 motors each developing 5000Nm torque during acceleration, starts from rest. If up gradient is 30 in 1000, gear ratio is 4, gearing efficiency is 90%, wheel radius is 45cm, train resistance is 50 N/T, additional inertia is 10% then calculate time taken to attain speed of 55 km/hr. If line voltage is 3kVdc and efficiency of motor is 87%, find the current taken during notching period by each motor. **[8]**

b) With a suitable diagram explain train lighting system. **[8]**

OR

Q6) a) Explain regenerative braking for DC series Motor. **[8]**

b) What is meant by specific energy consumption? Derive the expression for specific energy consumption. **[8]**

Q7) a) An electric train uniformly accelerated at 6km/hr/sec for 21 sec on a level track, braked at 6km/hr/sec. the free running period for the train is 10 min and stop time of 5 min. Draw speed time curve and calculate distance between stations, average speed and schedule speed. **[8]**

b) Explain Bridge transition process with suitable diagram. **[8]**

OR

Q8) a) An electric train has an average speed of 42 km/hr on level track between stops 1400m apart. It is accelerated at 1.7 km/hr/sec and braked at 3.3 km/hr/sec. Draw the speed time curve for the run and show all the timings. Estimate specific energy consumption of the train. Take tractive resistance as 50N/T and rotational inertia of 10%. **[8]**

b) Write a short note on railway signaling system. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1333

[Total No. of Pages : 2

[4858]-1071

T.E. (Instrumentation & Control) (Semester - I)

INSTRUMENTAL METHODS FOR CHEMICAL ANALYSIS

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain principal and experimental set up of Potentiometry. **[6]**

b) Write a short notes on Babington type of nebulizer. **[4]**

OR

Q2) a) Explain with neat sketch direct reading spectrophotometer. **[6]**

b) List various radiometric and photometric unit used in chemical analysis. **[4]**

Q3) a) Explain FTIR with neat sketch. **[6]**

b) Write a short note on Sputtering in Hollow Cathode Lamp. **[4]**

OR

Q4) a) Explain DCP with neat sketch. **[6]**

b) Write a short notes on "Role of Instrumentation in chemical analysis". **[4]**

P.T.O.

Q5) a) What is chemical shift explain working of NMR with neat sketch. **[10]**

b) Explain CO_2 Analyser with neat sketch. **[8]**

OR

Q6) a) Derive relation between fluorescence power and sample concentration. **[10]**

b) Write a short on Spectroflouriometer. **[8]**

Q7) a) Explain Magnetic depletion mass spectrometer with neat sketch. **[8]**

b) Explain Gas Chromatography with neat sketch. **[8]**

OR

Q8) a) Explain reciprocating pump used in HPLC with neat sketch. **[8]**

b) Explain Thin Layer chromatography with neat sketch. **[8]**

Q9) a) State and prove Bragg's law of X-ray diffraction. **[8]**

b) Explain GM Counter with sketch. **[8]**

OR

Q10) a) Explain Proportional counter with neat sketch. **[8]**

b) Explain Instrumentation for X-ray Spectroscopy with neat sketch. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1956

[Total No. of Pages : 2

[4858] - 1072

T.E. (Instrumentation and Control) (Semester - I)

EMBEDDED SYSTEM DESIGN

(2012 Pattern) (End Sem.)

Time :2$\frac{1}{2}$ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Enlist various flags in PSW register of 8051 μC. Discuss the function of each flag. **[6]**

b) Explain alternate functions of port-3 of 8051 μC. **[4]**

OR

Q2) a) Explain with suitable diagram, timer mode-2 operation of 8051 μC. **[6]**

b) Write a program to clear 10 RAM locations starting at RAM address 1000H. **[4]**

Q3) a) With neat sketch explain interfacing of DAC0808 with 8051 μC. **[7]**

b) Explain the difference between ACALL and LCALL instructions of 8051 μC. **[3]**

OR

Q4) a) Explain with neat sketch interfacing of four digit common anode multiplexed LED. Display with 8051 μC. **[7]**

b) Explain the function of two hardware interrupt pins-INT0 and INT1 of 8051 μC. **[3]**

Q5) a) Explain the interfacing of LM35 with 89C51 μC with suitable interfacing diagram. **[8]**

b) Explain with suitable diagram interfacing of electromechanical relay with 89C51 μC. **[8]**

P.T.O.

OR

Q6) On-Off temperature control system is designed using 89C51 μC. Pt-100 temperature sensor and 4 × 4 matrix keyboard is used. The temperature is displayed on 16 × 2 LCD display.

Discuss the system based on following points.

a) Block diagram with explanation. **[6]**

b) Circuit diagram with explanation. **[10]**

Q7) a) Explain with suitable block diagram reset logic of ATMega8535 AVR μC. **[8]**

b) Explain any four addressing modes with suitable instructions of AVR μC. **[8]**

OR

Q8) a) Explain with suitable block diagram reset sources of ATMega8535 AVR μC. **[8]**

b) Explain the register file structure of ATMega8535 AVR μC. **[8]**

Q9) a) Explain 8-bit Timer/Counter0 prescaler of AT8535 AVR microcontroller. **[9]**

b) What are the features of UART of ATMega8535 AVR microcontroller? Explain how the baud rate is defined with the help of UBRR in AVR microcontroller. **[9]**

OR

Q10) a) Explain with suitable block diagram ADC prescaler of ATMega8535 AVR μC. **[9]**

b) Explain the Watchdog timer of AT8535 AVR microcontroller. **[9]**

Total No. of Questions : 10]

SEAT No. :

P1334

[Total No. of Pages : 2

[4858]-1073

T.E. (Instrumentation & Control) (Semester - I)

CONTROL SYSTEM COMPONENTS

(2012 Pattern) (End Semester)

Time : 2 1/2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Draw neat sketches wherever necessary.***
2) ***Answer 5 questions.***
3) ***Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
4) ***Assume suitable data.***

Q1) a) Draw and explain the use of a pressure switch in a compressor. **[6]**

b) Compare pneumatic and electrical system. **[4]**

OR

Q2) a) Draw & explain concept of motor control center. **[6]**

b) Compare relay and contactor. **[4]**

Q3) a) Draw the symbols for push button, slide, DIP, rotary and limit switches. **[5]**

b) Draw and explain working of 5/2 double pilot operated spool type direction control valve. **[5]**

OR

Q4) a) Explain with diagram the concept of plugging a motor to stop. **[5]**

b) Explain with diagram construction & working of solid state relay. **[5]**

P.T.O.

Q5) a) Define positive and non-positive displacement pumps. Draw and explain any one positive displacement pump. **[10]**

b) Draw & explain the working of a direct operated pressure relief valve in hydraulics. **[8]**

OR

Q6) a) Draw & explain the meter-in and meter-out circuit in hydraulics. **[10]**

b) Draw & explain the working of a hydraulic non-return flow control valve. **[8]**

Q7) a) Draw and explain the basic principle of synchros. Classify synchros. **[8]**

b) Define computing relay. Draw & explain the use of high selector in a temperature control applications. **[8]**

OR

Q8) a) Define flow totalizer. Draw and explain nutating disc flow meter. **[8]**

b) Define current rating, minimum fusing current and fusing factor for a fuse. Draw and explain construction of a rewireable fuse. **[8]**

Q9) a) Explain the principle of fluidic gate. Draw and explain the bistable amplifier. **[8]**

b) Draw and explain the ignition triangle for combustion. Enlist different methods for protection against combustion. **[8]**

OR

Q10) a) Define hazardous area. Explain with diagram purging and its methods. **[8]**

b) Define intrinsic safety. Explain with diagram passive (zener) safety barrier. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3621

[Total No. of Pages : 3

[4858] - 1074

T.E. (Instrumentation and Control)

CONTROL SYSTEM DESIGN

(2012 Pattern) (End-Sem.)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of non-programmable calculator is allowed.***
5) ***Assume Suitable data, if necessary.***

Q1) a) Explain the frequency Response of Lead and Lag compensator. **[8]**

b) Find damping factor and natural frequency if dominant pole is located at $-2 \pm 3i$ on root locus. **[2]**

OR

Q2) Design a suitable compensator for a system **[10]**

$$G(s) = \frac{K}{s(s+5)} H(s) = 1$$

so that the resulting compensated system satisfy following performance criteria

i) Peak overshoot ≤ 15%

ii) Natural Frequency of oscillation will be 20 radian/sec

iii) Velocity error constant $K_v \geq 15$

Q3) a) Explain Ziegler Nichols close loop tuning method along with it's advantages over open loop tuning. **[8]**

b) Open loop response to step input of a system gives gain 10, dead time 2sec and time constant 30 sec find the equation for PI controller. **[2]**

OR

P.T.O.

Q4) Design a proportional integral controller for a system with open loop gain $G(s) = \dfrac{K}{s(s+2)(s+4)}$ so that $k_v = 30$ and dominant pole be –0.5+j0.5. **[10]**

Q5) a) Define State, State Variable, State Vector, State Space. **[4]**

b) Derive the expression to convert state space into transfer function. **[4]**

c) Convert the following transfer function in to diagonal canonical form

$$G(s) = \frac{2s^2 + s + 1}{s^2 + 11s + 30}$$ **[8]**

OR

Q6) a) Find the transfer function of following state space representation **[8]**

$$\dot{x} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} u$$

$$y = [2, 4, 3]x + 3u$$

b) Convert the following transfer function in to controllable canonical form and observable canonical form **[8]**

$$G(s) = \frac{4s^2 + 2s + 1}{s^2 + 9s + 50}$$

Q7) a) A system is represented by **[9]**

$$x = A\dot{x} + Bu$$

$$y = Cx + Du$$

Derive following equation giving solution of state space equation for certain input.

$$x = e^{At}x(0) + \int_0^t e^{A(t-\tau)}Bu(t-\tau)d\tau$$

b) State whether following system is controllable and observable or not

$$\dot{x} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 6 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = [2, 4, 3]x$$ **[9]**

OR

Q8) a) Define controllability, observability and state properties of state transition matrix. **[6]**

b) Obtain the response of system given by following equation if no input is applied **[12]**

$$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -5 & -4 & -6 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = [1, 4, 2]x$$

Q9) A system is represented in as given below **[16]**

$$\frac{Y(s)}{U(s)} = \frac{4}{s^2 + 5s + 6}$$

Find State Model and verify system is controllable. If controllable find the feedback gain matrix if the desired poles are –1, –4.

OR

Q10)A system is represented in as given below **[16]**

$$\frac{Y(s)}{U(s)} = \frac{6}{s^2 + 6s + 8}$$

Find State Model and verify system is observable or not. If so then find the observable gain matrix if the desired poles are –3, –2.

Total No. of Questions : 10]

SEAT No. :

P1957

[Total No. of Pages : 2

[4858] - 1075

T.E. (Instrumentation and Control Engineering)

INDUSTRIAL ORGANIZATION AND MANAGEMENT

(2012 Pattern) (Semester - I) (End Sem.)

Time :2$\frac{1}{2}$ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.*
2) *Neat diagrams should be drawn whenever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) Write short notes on **[10]**

a) ISO 9000 QMS.

b) BCG Matrix.

OR

Q2) a) Explain "Quality Circle". **[4]**

b) Explain any three clauses in ISO 9001. **[6]**

Q3) a) What is management? Explain any four functions of it. **[5]**

b) Write a note on Mergers and Takeovers. **[5]**

OR

Q4) a) Explain the concept of supply chain management, strictly with reference to any suitable example. **[6]**

b) Write a note on Inventory Management. **[4]**

Q5) Write notes on : **[18]**

a) Manpower planning.

b) Training of Manpower.

c) Leadership.

OR

P.T.O.

Q6) a) What is motivation? Explain Herzberg's theory of motivation. What are the benefits of motivating employees? **[12]**

b) What is performance Appraisal? What may be the contents of Appraisal form? **[6]**

Q7) a) What is capital budgeting? Explain briefly the different methods of capital budgeting. **[8]**

b) Write short notes on : **[8]**

i) Balance sheet.

ii) Budget and its types.

OR

Q8) a) Write a note on "Capital budgeting and its methods". **[8]**

b) What is finance? What is its need? Explain different sources of finance. **[8]**

Q9) Write notes on : **[16]**

a) Ethics and its importance.

b) Role of IT in modern business.

OR

Q10) Write notes on : **[16]**

a) Management Information System.

b) Enterprise Resource Planning.

Total No. of Questions : 10]

SEAT No. :

P1335

[Total No. of Pages : 3

[4858] - 1076

T.E. (Instrumentation & Control) (Semester - II)

DIGITAL SIGNAL PROCESSING

(2012 Pattern) (End Semester)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain in detail classification of system. **[5]**

b) Check whether following signal is energy or power signal **[5]**

$$X(n)=\begin{cases}3(-1)^n & n\geq 0\\ 0 & n<0\end{cases}$$

OR

Q2) a) Find inverse Z-transform of **[5]**

$$X(z)=\frac{Z(Z-0.5)}{(Z-0.8)(Z-1)}$$

b) Find DFT of a sequence for N = 4 **[5]**

$$X(n)=0.5 \quad 0\leq n\leq 2$$
$$=0 \quad \text{otherwise}$$

Q3) a) Find impulse and step response for the following system **[6]**

$X(n)=y(n)-3/4\,y(n-1)+1/8\,y(n-2)$.

b) Compute 4-point DFT of the sequence **[4]**

X (*n*) = {3, 1, 5}

OR

P.T.O.

Q4) a) Determine the linear convolution of the given two sequence **[6]**

$$X(n)=\{1,2,3,2\} \quad h(n)=\{1,2,1,2\}$$
$$\uparrow$$

b) Explain any two properties of Discrete Time Fourier Transform (DTFT) with proof. **[4]**

Q5) a) Obtain the 8-point DFT of a given sequence using DIT FFT Algorithm $X(n)=\{1, 1, 2, 1\}$. **[12]**

b) Explain the concept of bit reversal technique in FFT Algorithm. **[4]**

OR

Q6) a) Obtain the 4-point DFT of a given sequence using DIT & DIF FFT Algorithm $X(n)=\{4, 3, 2, 1\}$. **[12]**

b) Sketch Signal flow graph of 8-point Decimal in Frequency (DIF) FFT Algorithm. **[4]**

Q7) a) Explain various window functions used in FIR filter design. **[6]**

b) Design a low pass filter with 11 coefficients for following specification Pass band frequency edge = 250 Hz, Sampling frequency = 1000 Hz Use Rectangular and Hamming Window for Design. **[12]**

OR

Q8) a) Design a linear phase FIR filter using Hamming window for desired frequency response **[12]**

$$Hd(w)=e^{-j(N-1)w/2}, \quad 0<|w|<\pi/4$$
$$0 \quad , \quad \pi/4<|w|<\pi \qquad \text{for } N=7$$

b) Differentiate between FIR & IIR filter. **[6]**

Q9) a) Find the order of analog low pass Butter worth filter for the given specification $\alpha p = 1dB$, $\alpha s = 30dB$, $\Omega p = 200 \text{ rad/sec}, \Omega s = 600 \text{ rad/sec}$.

[6]

b) Design a Chebyshev filter with a max pass band attenuation of 2.5 dB at $\Omega p = 20 \text{ rad/sec}$ & stop band attenuation of 30 dB at $\Omega s = 50 \text{ rad/sec}$.

[10]

OR

Q10) a) Design a Butter worth filter using Impulse invariance method for following specification.

$$0.8 \leq \left| H\left(e^{jw}\right) \right| \leq 1 \quad 0 \leq W \leq 0.2\Pi$$

$$\left| H\left(e^{jw}\right) \right| \leq 0.2 \qquad 0.6\Pi \leq W \leq \Pi$$

[10]

b) Compare the features of digital Butterworth and Chebyshev type-1 filter in terms of

i) Filter order.

ii) Transition width.

[6]

Total No. of Questions : 10]

SEAT No. :

P1336

[Total No. of Pages : 3

[4858] - 1077

T.E. (Instrumentation and Control Engineering)

Instrument and System Design

(2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat circuit diagrams should be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What are standards? State the factors to be considered while making standards. **[5]**

b) With the help of a neat labelled diagram, explain how AD594 can be used as a Celsius thermometer. **[5]**

OR

Q2) a) Explain with a neat labelled diagram, how is a ground loop formed? **[4]**

b) State the transfer function of XTR110. Draw circuit diagrams indicating how its input and output current capacities can be increased? **[6]**

Q3) a) What does IP stand for? How are they classified? What do the digits indicate? **[4]**

b) Design a circuit using suitable application IC/s for the following specifications:

temperature input (0ºC to 75ºC) and voltage output expected is 0-5V.

The temperature sensor used is RTD, Pt100. **[6]**

OR

P.T.O.

Q4) a) Explain the methods of isolation with the help of diagrams to minimize the effects of multiple ground. **[6]**

b) With the help of a neat labelled diagram, explain in HCNR200 how the LED output is linearized and stabilized. **[4]**

Q5) a) Compare MCT2E with HCNR200 based on at least 4 salient points of differentiation. **[4]**

b) Draw and explain the internal schematic block diagram of MM74C922. **[6]**

c) Explain the working of Phase Comparator II of CD4046 with the help of waveforms and state diagram. **[8]**

OR

Q6) a) For ICM7217, explain the functioning of the following pins- **[5]**

i) CARRY/BORROW

ii) LOAD REGISTER/OFF

iii) LOAD COUNTER/OFF

iv) DISPLAY CONT.

v) SCAN

b) For ICL7107, explain working of the analog section with suitable waveforms. **[5]**

c) Draw neat labelled diagram for driving the following types of load using ULN2803. **[4]**

i) 9V relay.

ii) 5mm Red LED.

d) Compare Phase Comparator I of CD4046 with Phase Comparator II of CD4046 based on at least 4 salient points of differentiation. **[4]**

Q7) a) Explain the general considerations for PCB layout. **[8]**

b) Explain the design rule considerations for digital PCBs. **[8]**

OR

Q8) a) Write a short note on - Types of PCBs. **[8]**

b) What are the different soldering techniques. Explain wave soldering with suitable diagrams. **[8]**

Q9) a) What is failure? Explain the different modes of failure based on the nature of failure. **[8]**

b) Write a short note on - Maintainability and Availiability. **[8]**

OR

Q10) a) In the theory of Probability, what is distribution function? Explain Weibull Distribution and Gamma Distribution. **[6]**

b) Define the terms - MTTF, MTBF, MTTR. **[6]**

c) Write a short note on Quality Assurance. **[4]**

Total No. of Questions : 10]

SEAT No. :

P1337

[Total No. of Pages : 2

[4858] - 1078

T.E. (Instrumentation)

UNIT OPERATIONS & POWER PLANT INSTRUMENTATION

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain Evaporation Principle & types of evaporation. **[5]**

b) Explain in brief Flash distillation. **[5]**

OR

Q2) a) Explain the components of shell & tube type heat exchanger. **[5]**

b) Draw the neat sketch of evaporator & explain its working in brief. **[5]**

Q3) a) What is the difference between Heat transfer to fluids without phase change & with phase change? Give suitable example of each. **[6]**

b) What are various factors that affect the rate of evaporation? **[4]**

OR

Q4) a) Explain principle of Hydroelectric Power Plant in brief. **[5]**

b) Explain principle of Conversion of wind energy in to electrical energy in brief. **[5]**

P.T.O.

Q5) a) Explain material handling systems in thermal power plant. **[8]**

b) Explain Swell & shrink effect in boilers. **[9]**

OR

Q6) a) Explain BMS in detail. **[9]**

b) Explain pulverised coal protection system with neat sketch. **[8]**

Q7) a) Explain mandatory & optional boiler interlocks. **[8]**

b) Explain turbine supervisory instrumentation in detail. **[9]**

OR

Q8) a) Explain steam pressure control system with neat sketch. **[8]**

b) Enlist different parameters to be monitored in turbine for its safety. Suggest suitable sensor for the same. **[9]**

Q9) a) Explain factors to be considered in site selection for nuclear power plant. **[8]**

b) What is electrostatic precipitator? Why it is needed in thermal power plant? **[8]**

OR

Q10) a) Compare & contrast wind & solar power plant. **[8]**

b) Write note on safety in power plant. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1958

[Total No. of Pages : 2

[4858] - 1079

T.E. (Instrumentation and Control)

BIOMEDICAL INSTRUMENTATION

(2012 Pattern) (Semester - II) (End Semester)

Time :2 Hours 30 Minutes] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define bio electrode. Explain the necessity of micro-electrode, Micropipette electrode. **[6]**

b) Define the Electrode offset potential, Evoked potential. **[4]**

OR

Q2) a) Why silver-silver chloride electrode is suitable in biomedical applications. **[6]**

b) What is the voltage range, frequency range and electrode used for ECG and EEG signals? **[4]**

Q3) a) Discuss the various bi-polar ECG limb leads configuration in detail. **[6]**

b) What is Phono-cardiogram? List out the microphones used in Phonocardiograph. **[4]**

OR

Q4) a) Draw and explain Heart Rate meter. **[5]**

b) Enlist various Preamplifiers used in bio signal conditioning? Explain chopper amplifier. **[5]**

Q5) a) Draw and explain the structure of neuron. What do you mean by efferent and afferent nerves. **[10]**

P.T.O.

b) Draw and explain the various parts of the Brain stem. **[8]**

OR

Q6) a) What is an EEG? Explain the 10-20 Electrode placements. **[12]**

b) Explain the various types of EEG Electrodes. **[6]**

Q7) a) Draw and explain Electromyograph. **[8]**

b) Explain various errors in vision with its ways of correction. **[8]**

OR

Q8) a) Define a "Hearing threshold". Explain the Bekesy audiometer with the help of a suitable block diagram. **[10]**

b) What are three main sections of the Human auditory system? Explain the function performed by each section in human hearing phenomenon. **[6]**

Q9) a) What is an Oxygenator? Differentiate its various types. **[8]**

b) Draw and explain the spirogram with its various lung volume capacities. **[8]**

OR

Q10) a) Draw & explain Wedge Spiro meter for respiratory measurement. **[8]**

b) Draw and explain Infrared gas analyzer. **[8]**

Total No. of Questions : 10]

P2033

SEAT No. :

[Total No. of Pages : 2

[4858] - 1080
T.E. (Instrumentation and Control) (Semester - II)
Process Loop Components
(2012 Pattern) (End Sem.)

Time : 2:30 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) With neat diagram, explain Differential Pressure Transmitter based on capacitive principle. **[6]**

b) Explain the process characteristic self regulation. **[4]**

OR

Q2) a) Explain single speed floating control mode with an example of error and controller response. **[6]**

b) Draw and name the various instrument line symbols. **[4]**

Q3) a) Draw and explain the block diagram of digital PID controller. **[6]**

b) Differentiate between two wire and four wire electronic transmitter. **[4]**

OR

Q4) a) Explain current to pneumatic converter with neat diagram. State its location. **[6]**

b) A controller outputs a 4 mA to 20 mA signal to control the minimum and maximum 50 LPH to 250 LPH flow rate respectively. Calculate the current corresponding to 150 LPH flow rate. **[4]**

Q5) a) With neat block diagram, explain the architecture of programmable logic controller. **[10]**

b) Develop following logic gates in ladder logic for two inputs(A and B)**[8]**

i) AND ii) NAND iii) OR iv) NOR

P.T.O.

OR

Q6) a) Draw a neat wiring diagram to interface 2 DI and 2 DO to PLC. Explain it. **[10]**

b) When one switch is pressed, a bulb is required to be flashed by delay of 5 second and flashing will stop after 10 counts. **[6]**

c) Explain the significance of latch in ladder logic. **[2]**

Q7) a) Give the detail classification of valves. **[8]**

b) What is the need of actuator? Explain pneumatic actuator with neat diagram. **[8]**

OR

Q8) a) Explain the following terms w.r.to control valve in detail. **[8]**

i) Rangeability

ii) Turndown

iii) Valve Capacity

iv) Throttling valve.

b) Explain the operation of positioner with neat diagram. **[8]**

Q9) a) Write a note on control valve noise. **[8]**

b) Explain high temperature service valves. **[8]**

OR

Q10)a) Give the selection criteria of control valve. **[8]**

b) What is cavitation? Explain the remedies to reduce cavitation. **[8]**

Total No. of Questions : 10]

SEAT No. :

P3157

[Total No. of Pages : 3

[4858] - 1081

T.E. (Computer Engineering) (Semester - I)

Database Management Systems Applications

(2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Construct an E-R diagram for a Banking Database System. Consider various entities such as Account, Customer, Branch, Loan, Deposit, Borrower etc. Design Specialization and Generalization EER features. **[5]**

b) List significant differences between a file-processing system and a DBMS. **[5]**

OR

Q2) a) Define Normalization. Explain 2^{ND} Normal Form with suitable example. **[5]**

b) Consider Following Relational Tables: **[5]**

person(pname, street, city)

works_for(pname, cname, salary)

company(cname, city)

manages(pname, mname)

Solve following quries using SQL

i) Find the street and city of all employees who work for the Appolo, live in Pune, and earn more than Rs. 50,000.

ii) Create a view consisting of the manager name and the average salary of all employees who work for that manager.

P.T.O.

Q3) a) Explain the need for concurrency control in transaction management. **[5]**

b) Design following queries using MongoDB **[5]**

i) Create a collection called 'games'.

ii) Add 5 games to the database. Give each document the following properties: {name, gametype, rating (out of 100)}.

iii) Write a query that returns all the games.

iv) Write a query that returns the 3 highest rated games.

v) Update your two favorite games to add two achievements called 'Game Master' and 'Speed Demon'.

OR

Q4) Write a short note on (Any Two): **[10]**

a) Map Reduce Function.

b) Log based Recovery.

c) CAP and BASE theorem.

Q5) a) Explain Client Server Architecture with suitable database application. **[5]**

b) Define Distributed Database. Explain advantages and disadvantages of Distributed Databases. **[5]**

c) Explain Two Phase Commit Protocol in Distributed Databases. How 3 PC is different than 2PC. **[7]**

OR

Q6) a) Explain Transaction Servers and Data Servers. **[5]**

b) Describe Sharding in MongoDB. **[5]**

c) Explain Shared Nothing and Shared Memory Parallel Database system architectures. **[7]**

Q7) a) What is JSON? Explain JSON schema with example. **[5]**

b) What is Hadoop? Explain Components of Hadoop. **[5]**

c) Explain DTD and XML schemas with suitable example. **[7]**

OR

Q8) a) Explain is HIVE Database and HIVE Query Language in detail. **[5]**

b) Write a short note on R Programming. **[5]**

c) Explain Xquery and FLWOR Expressions with suitable example. **[7]**

Q9) a) What is BIS? Explain Components of BIS. **[5]**

b) Compare OLTP vs OLAP. **[5]**

c) Define Data Mining. Explain various Data Mining tasks with suitable example. **[6]**

OR

Q10) a) Explain Recommendation System with suitable example. **[5]**

b) Explain Regression with example. **[5]**

c) Explain k-means clustering algorithm with suitable example. **[6]**

Total No. of Questions : 8]

SEAT No. :

P1338

[Total No. of Pages : 2

[4858] - 1082

T.E. (Computer Engineering) (Semester - I)

Data Communication and Wireless Sensor Network

(2012 Pattern) (End Semester)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Explain FHSS and DSSS with help of diagram. **[8]**

b) A pure ALOHA network transmits 200-bit frame on a shared channel of 200 kbps. What is the throughput if the system (all stations together) produces **[6]**

i) 1000 frames per second.

ii) 500 frames per second.

c) Write a note on: **[6]**

i) Zigbee.

ii) WiMax.

OR

Q2) a) Explain stop and wait ARQ, GO back-n ARQ and selective repeat ARQ. Comment on the performance of each. **[6]**

b) Define sampling. Draw and explain different types of sampling with diagram. **[6]**

c) Write a note on: **[8]**

i) WiFi.

ii) Bluetooth.

P.T.O.

Q3) a) Explain exposed terminal problem and hidden terminal problem in Wireless Network in detail. **[8]**

b) Explain S-MAC protocol for WSN. **[8]**

OR

Q4) a) Write a short note on: **[8]**

i) Contention based protocols.

ii) Scheduled based protocols.

b) What is STEM, STEM-B, STEM-T? **[8]**

Q5) a) Explain various design issues and routing challenges in WSN. **[8]**

b) Explain flooding and gossiping in detail. **[8]**

OR

Q6) a) With the help of diagram explain algorithm for SPIN. Explain types of SPIN. **[8]**

b) With the help of diagram explain two phases of LEACH protocol. Compare LEACH with PEGASIS. **[8]**

Q7) a) List and explain common techniques used for Infrastructure establishment. **[8]**

b) Explain layered architecture of CDN. **[5]**

c) Write short note on Tiny OS. **[5]**

OR

Q8) a) What is localization? Why it is needed? Explain phases of localization. **[8]**

b) With flow chart explain IDSQ algorithm. **[5]**

c) List types of queries in sensor network and give example. **[5]**

Total No. of Questions : 8]

SEAT No. :

P1339

[Total No. of Pages : 2

[4858] - 1083

T.E. (Computer Engineering) (Semester - I)

Computer Forensic & Cyber Applications

(2012 Pattern) (End-Sem)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Explain schedule selection & coordination of sensor MAC. **[8]**

b) Explain staircase digital investigation process model with diagram. **[6]**

c) Describe in brief how computer intenders operate. **[6]**

OR

Q2) a) Define network topology & explain various network topologies. **[9]**

b) Describe four fundamental principles of handling digital crime scenes. **[6]**

c) Explain need of crime scene survey & documentation. **[5]**

Q3) a) Explain the following terms: **[8]**

i) Private key Encryption.

ii) Public key Encryption.

b) Write short note on preservation of Hardware as a Digital Evidence. **[8]**

OR

Q4) a) Write a short note on Cyber Stalking & Cyber stalkers? **[8]**

b) Write a short note on: **[8]**

Anonymity & Surreptitious Monitoring with respect to cyber stalking.

P.T.O.

Q5) a) Explain patents, copyrights, trademarks in detail. **[8]**

b) Explain in detail types of evidences on mobile devices. **[8]**

OR

Q6) a) Write a short note on file system traces on UNIX. **[8]**

b) Explain NTFS file system. **[8]**

Q7) a) Write short note on: **[9]**

i) Ethernet.

ii) ATM Networks.

b) Explain authentication & operating system logs in TCP/IP related digital evidence. **[9]**

OR

Q8) a) What is email forgery & tracking? **[9]**

b) Explain different Internet Services and justify Internet as an Investigative Tool. **[9]**

Total No. of Questions : 10]

SEAT No. :

P1340

[Total No. of Pages : 2

[4858] - 1084

T.E. (Computer Engineering)

OPERATING SYSTEMS DESIGN

(2012 Pattern) (Semester - I) (End Sem.)

Time : 2 1/2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Explain in short - BIOS, MBR and init( ) process. **[6]**

b) Explain Kernel Structure. With neat diagram. **[4]**

OR

Q2) a) Explain with neat diagram process states and transition. **[5]**

b) What is disk inode? State the difference between disk inode and in-core inode. **[5]**

Q3) a) Why is the principle of locality crucial to the use of virtual memory? Explain with example. **[4]**

b) Give the details of U-area field. **[6]**

OR

Q4) a) Explain the race condition in assigning inodes. **[4]**

b) Compare and contrast paging vs segmentation. **[6]**

Q5) a) What is ptrace system call? Explain Process tracing in detail. **[8]**

b) Explain the term signal and elaborate the various circumstances under which signals of the various classes are used. **[8]**

OR

P.T.O.

Q6) a) Write short notes on: **[8]**

i) Tunis System.

ii) Shared memory.

b) What is deadlock? Explain necessary conditions to occur the deadlock? **[8]**

Q7) a) What is make utility? Explain it with example. Consider your own makefile. **[8]**

b) Explain with example Linux utilities - grep, egrep, fgrep and sort. **[8]**

OR

Q8) a) Write a short note on: **[8]**

i) Mork Manager.

ii) Shim Manager.

b) Explain in detail how to make USB bootable with any open source tool/ utility? **[8]**

Q9) a) Write a short note on: **[12]**

i) Multiprocessor scheduling.

ii) Real time scheduling.

iii) Linux scheduling.

b) Write short notes on: **[6]**

Fail soft operation.

OR

Q10) a) Write a short note on: **[12]**

i) Palm OS.

ii) Google Android.

iii) Windows Mobile.

b) Write a short notes on: **[6]**

Frame of reference.

Total No. of Questions : 10] **SEAT No. :**

P1341 **[Total No. of Pages : 3**

[4858] - 1085
T.E. (Computer)
Theory of Computation
(2012 Pattern) (Semester - I) (End Sem.)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data wherever necessary.***

Q1) a) Write regular expressions for the following languages over the alphabet $\sum = \{a, b\}$ **[6]**

i) All strings that do not end with '*aa*'.

ii) All strings that contain an even number of '*b*' s.

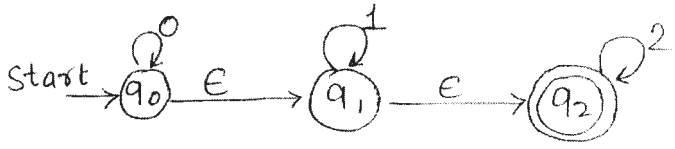
iii) All strings which do not contain the substring '*ba*'.

b) Show that for two recursive languages L1 and L2, the language L is also recursive, where L is given by **[4]**

$L1 \cap L2$

OR

Q2) a) Consider the following NFA with $\in$-transitions. Find $\in$-closures and then convert this into NFA without $\in$-moves. **[6]**

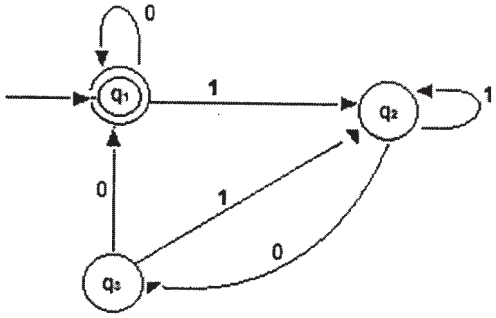


b) Prove using mathematical induction the following: **[4]**

$2^0 + 2^1 + 2^2 + ... + 2^n = 2^{n+1} - 1$, for all integers $n \geq 0$.

P.T.O.

Q3) a) Find the regular expression for the set of strings recognized by the given FA. Use Arden's theorem. **[6]**



b) Explain, with suitable examples, any two applications of context free grammars. **[4]**

OR

Q4) a) Convert the following CFG into Chomksy Normal Form (CNF): **[6]**

S -> AB

A -> CA | ^

B -> DB | ^

C -> 011 | 1

D -> 01

b) Prove the formula **[4]**

i) (r * s*)* = (r + s)*.

ii) (ab)* ≠ a* b*.

Q5) a) Design Turing Machines for each of the following problems: **[10]**

i) Given two unary numbers, m and n, display,

'G', if m > n, 'E', if m = n, 'L', if m < n

ii) Given two unary numbers, find the Greatest Common Divisor (GCD) of the two numbers.

b) Justify how a Turing Machine can simulate a General Purpose computer and vice-versa. **[8]**

OR

Q6) a) Explain : "The halting problem in Turing Machines is undecidable". **[6]**

b) Design a Turing Machine to perform right shift operation on a binary number. **[6]**

c) Design Post Machine to accept strings that belong to the language L, given by, $L = \{a^n b^{3n} \mid n >= 0\}$. **[6]**

Q7) a) Design PDA for language L = $\{a^i b^j c^k \mid i, j, k >= 1$ and $i + j = k\}$ that accepts language via **[10]**

i) Final state.

ii) Empty stack.

b) Explain the equivalence of PDA with acceptance by final state and empty stack. **[6]**

OR

Q8) a) Write context free grammar for accepting palindrome strings (even and odd). Also design PDA for the context free grammar. **[8]**

b) Consider the PDA with following moves; obtain its equivalent CFG. **[8]**

(q0, a, Z0) = (q0,aZ0),

(q0, a, a) = (q0, aa),

(q0, b, a) = (q1, ε),

(q1, b, a) = (q1, ε),

(q1, ε, Z0) = (q1, ε)

Q9) a) What do you mean by Polynomial-time reductions? Describe any problem in detail that is solvable through polynomial time reduction. **[8]**

b) What is Satisfiability (SAT) problem? Explain with a suitable example. **[8]**

OR

Q10) a) Explain the Vertex Cover problem in the context of polynomial-time reductions. Justify with a suitable example. **[8]**

b) Explain the following with example. **[4]**

i) Computational complexity.

ii) 3-SAT problem.

c) Differentiate between P-class problems and NP-class problems. **[4]**

Total No. of Questions : 10]

SEAT No. :

P1342

[Total No. of Pages : 3

[4858] - 1086

T.E. (Computer) (Semester - II)

Principles of Concurrent and Distributed Programming

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Define Computation Model. Explain specialized Computation Models in detail. **[5]**

b) Explain Flynn's architectural classification scheme with diagrams. **[5]**

OR

Q2) a) With reference to concurrent Java, explain the following methods used for multithreading. **[5]**

i) sleep ( )

ii) suspend ( )

iii) wait ( )

iv) notify ( )

v) notify All ( )

b) Write an algorithm for parallel quick sort. Explain with suitable example. **[5]**

P.T.O.

Q3) a) A program has 50% of the code that refers to the main memory (RAM), out of which 95% refers to the Cache. The speed of RAM is 100ns and that of Cache is 10 ns. Find the overall speed up of the processor. **[5]**

b) Consider there are three threads P, Q and R. Explain and list the possible dependencies that exist among the threads with respect to counting task dependencies. **[5]**

OR

Q4) Write short note on (any two): **[10]**

a) Concurrent Yacc.

b) Parallelism with GPU.

c) Systolic Architectures.

Q5) a) Why are distributed operating systems more difficult to design than operating systems for centralized time sharing systems? **[5]**

b) Explain DCE cell configuration and list uses of DCE. **[5]**

c) Why are distributed computing systems gaining popularity? Which DCS model is popularly used now a days? Justify your answer. **[7]**

OR

Q6) a) Explain workstation - server model with diagram. Enlist advantages and disadvantages of it. **[5]**

b) List major issues in designing Distributed Operating System. Explain any two issues in detail. **[5]**

c) Suppose a component of a distributed system suddenly crashes. How will this event inconvenience the users when: **[7]**

i) The system uses the processor - pool model and the crashed component is a processor in the model.

ii) The system uses the processor - pool model and the crashed component is a user terminal.

iii) The system uses the workstation - server model and the crashed component is a server machine.

Q7) a) Explain Dom O and Dom U communication in XEN. **[5]**

b) Explain various approaches for para-virtualization with suitable diagram. **[4]**

c) Explain the installation and configuration steps of XEN. **[7]**

OR

Q8) a) Differentiate between para and full virtualization. **[5]**

b) List and explain methods for platform virtualization. **[4]**

c) Draw a diagram showing asymmetric XEN system stating the differences between sysmmetric and asymmetric virtual platform. **[7]**

Q9) a) Write a program in CUDA for matrix multiplication. **[5]**

b) Explain various service models used in cloud computing. **[5]**

c) Explain problem decomposition using multi GPU with an example. **[7]**

OR

Q10) a) Explain the mobile computing principles. **[5]**

b) Describe alternative thread block layouts. Explain how to calculate X and Y thread indexes. **[5]**

c) Explain thread scheduling in GPU with hardware view. Draw a suitable diagram for scheduling cycles. **[7]**

Total No. of Questions : 8]

SEAT No. :

P1343

[Total No. of Pages : 2

[4858] - 1087
T.E. (Computer Engineering)
COMPUTER NETWORKS
(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is DNS? Explain in brief hierarchical structure of DNS. **[6]**

b) Compare link state routing and distance vector routing. **[6]**

c) Explain token bucket and leaky bucket algorithm with diagram. **[8]**

OR

Q2) a) Explain POP3 and IMAP4. **[6]**

b) Explain socket programming with its primitives. **[6]**

c) Draw the packet header format of OSPF and explain in detail. **[8]**

Q3) a) Compare and explain 802.11a, 802.11b and 802.11g wireless standards with respect to **[8]**

i) Bandwidth.

ii) Frequency.

iii) Signal to noise ratio.

iv) Range.

b) Draw and explain WAP architecture. **[8]**

OR

P.T.O.

Q4) a) What is WAE (Wireless Application Environment)? Explain in details. **[8]**

b) Write a note on: **[8]**

i) Wireless LAN.

ii) WML Script.

Q5) a) Explain the advantage of DTN over IP network with example. **[8]**

b) Draw and explain V1OIP network architecture. **[8]**

OR

Q6) a) What is Vehicular network? What are the challenges and applications of vehicular network? **[8]**

b) What is DTN? Explain different layers of DTN. **[8]**

Q7) Write a note on (any 3): **[18]**

a) Components of optical network.

b) ATM cell format.

c) GMPLS.

d) SDN.

OR

Q8) a) What is Virtualization? List advantages and disadvantages of Virtualization. **[6]**

b) Explain how packet switching is different in optical network than Ethernet. **[6]**

c) Explain SONET/SDH. **[6]**

Total No. of Questions : 10]

SEAT No. :

P1344

[Total No. of Pages : 3

[4858] - 1088

T.E. (Computer Engineering) (Semester - II)

Embedded Operating Systems

(2012 Pattern) (End Sem.)

Time : 2 1/2 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) With the help of a diagram explain the classification of real-time scheduling methods. **[6]**

b) Explain role of barrel shifter in the ARM. **[4]**

OR

Q2) a) Write an ARM assembly program to find value of expression 3X + 6Y + 9Z, where X = 4, Y = 5, Z = 3. **[6]**

b) Explain how embedded operating systems are different than desktop operating systems? **[4]**

Q3) a) Write short notes on (any two): **[6]**

i) LSB.

ii) OSDL.

iii) Kernel command line processing.

b) Differentiate between 'NOR' Flash & 'NAND' Flash. **[4]**

OR

P.T.O.

Q4) a) Why Embedded Linux is popular as OS for embedded system development? **[4]**

b) Write short note on (any two): **[6]**

i) BusyBox.

ii) Subsystem Initialization.

iii) init thread.

Q5) a) What are the challenges for bootloader in embedded system? **[6]**

b) Explain about U-boot configurable commands. **[5]**

c) Enlist device driver module utilities and explain the use of same. **[6]**

OR

Q6) a) Show the structure of PCI configuration header. **[6]**

b) Explain the JFFS2 file system. **[5]**

c) Write short notes on (any two): **[6]**

i) MTD.

ii) TFTP server.

iii) DHCP server.

Q7) a) Explain the tracing and profiling tools used in Embedded Application development. **[6]**

b) Explain the working of stepper motor? State any two applications of stepper motor in embedded systems. **[6]**

c) Draw & explain KGDB setup for kernel debugging. **[5]**

OR

Q8) a) Give different ways of debugging embedded applications. **[4]**

b) With a neat diagram explain the graphics display of data in embedded systems. **[7]**

c) Write short notes on (any two): **[6]**

i) GStreamer Media framework.

ii) OpenGL ES.

iii) ssh.

Q9) a) Explain architecture of Android with neat diagram. **[8]**

b) Write short notes on (any two): **[8]**

i) Porting Linux application.

ii) Zygote.

iii) System server.

OR

Q10) a) Give the latency components in Linux with neat diagram. **[8]**

b) Explain Android booting process with neat diagram. **[8]**

Total No. of Questions : 10]

SEAT No. :

P1345

[Total No. of Pages : 2

[4858] - 1089

T.E. (Computer Engineering) (Semester - II)

DIGITAL SIGNAL PROCESSING APPLICATIONS

(2012 Pattern) (End-Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) State the mathematical models used to represent a DT system. Define the Impulse response of the system. **[5]**

b) State the necessary condition for the existence of Fourier Transform. State and prove the convolution property of FT. **[5]**

OR

Q2) a) What is the use of Transducers in signal processing? State the sampling theorem. **[5]**

b) State the following properties of DT system and describe it by means of difference equation : **[5]**

i) Time Invariant

ii) Dynamicity

iii) Causality

Q3) a) Draw a pole zero plot for a system described as **[5]**

$y(n) = x(n) - x(n-1) + 3y(n-1) - 2y(n-2)$

b) Draw the basic butterfly structures for DIT and DIF FFT algorithms and hence obtain the computational complexity of FFT algorithm. **[5]**

OR

Q4) a) Use ZT properties to obtain ZT of a DT sequence $x(n) = a^n\, u(n-1)$. **[5]**

b) What is convolution property of DFT? Compare Linear Convolution with Circular Convolution. **[5]**

P.T.O.

Q5) a) Obtain and realize Direct Form – I and Direct Form – II IIR filter structure for a system described as – **[9]**

$$y(n) = y(n-1) - \frac{1}{2}y(n-1) + x(n) - x(n-1) + x(n-2)$$

b) Discuss the form of Linear Phase FIR filter structure and realize it for M = 7 where M is the length of the filter (i.e. 6th order filter) **[9]**

OR

Q6) a) Obtain parallel form realization for IIR filter having transfer function

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.125z^{-2}}$$ **[9]**

b) What are filter structures? Explain how the Direct and Cascade form of FIR filters are obtained and realized from the system function H(Z). **[9]**

Q7) a) Explain the characteristics of DSP processor. Explain basic building blocks of DSP processor. **[8]**

b) What is OMAP? Explain the Software architecture of OMAP in brief. **[8]**

OR

Q8) a) Compare conventional microprocessor architecture with Harvard and SHARC DSP architectures with important features. **[8]**

b) Draw and explain the architecture of SHARC DSP processor. **[8]**

Q9) a) What is Companding? How important this process is in audio processing? Explain the Companding process in brief. **[8]**

b) What is image enhancement in digital image processing? Explain any two gray level transforms used for image enhancement. **[8]**

OR

Q10) a) Draw and explain block diagram of compact disk playback system. **[8]**

b) Explain the operation of CCD (Charge Coupled Device) used in electronic cameras? **[8]**

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Total No. of Questions : 12]

SEAT No. :

P1346

[Total No. of Pages : 2

[4858] - 1090

T.E. (Computer Engineering) (Semester - II)

SOFTWARE ENGINEERING

(2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

UNIT - I

Q1) Discuss the similarity and differences between pure evolutionary development and the agile development approaches in use today? **[7]**

OR

Q2) What is Extreme Programming? Explain the Extreme Programming process. **[7]**

UNIT - II

Q3) What do you mean by CRC? Write the steps for identifying analysis classes using CRC modeling. **[7]**

OR

Q4) Explain how do we negotiate and validate requirements during requirement analysis process? **[7]**

UNIT - III

Q5) Explain refactoring? Give the importance of refactoring in improving quality of software. **[6]**

OR

Q6) Enlist different types of architectural styles and explain any one software architecture in detail. **[6]**

P.T.O.

UNIT - IV

Q7) a) What are the main objective of Software Testing and what are the principles of software testing? **[9]**

b) Differentiate between : **[8]**

i) Condition and loop Testing

ii) Verification and Validation

OR

Q8) a) What do you understand by system testing? What are the different kinds of System testing that are usually performed on large software products? **[9]**

b) What do you understand by the term integration testing? Which types of defects are uncovered during integration testing? **[8]**

UNIT - V

Q9) a) Explain in detail software process and project metrics. **[9]**

b) What are the different categories of Risk. Explain Risk management process in detail. **[8]**

OR

Q10) a) What is project decomposition? What are the work task for communication process using process decomposition. **[9]**

b) Explain COCOMO model for project cost estimation. **[8]**

UNIT - VI

Q11) a) What is the need for Software Quality ? Explain different McCall's quality factors. **[8]**

b) What is significance of Object Constraint Language (OCL)? Explain in detail. **[8]**

OR

Q12) a) Explain the working of service-oriented architecture. **[8]**

b) What is Software Quality? What are the factors affecting Software Quality? **[8]**

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Total No. of Questions : 10]

SEAT No. :

P3622

[Total No. of Pages : 3

[4858] - 1091

T.E. (Chemical) (Semester - I)

Chemical Engineering Mathematics

(2012 Pattern)

Time : $2\frac{1}{2}$ *Hours]* *[Max. Marks : 70*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
2) *Assume suitable data, if necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of scientific calculator is allowed.*

Q1) a) Determine the lowest real root of equation $6x^3-5x^2+7x-2=0$ using bisection method. **[5]**

b) Use Gauss elimination to solve **[5]**

$$4x_1+x_2-x_3=-2$$
$$5x_1+x_2+2x_3=4$$
$$6x_1+x_2+x_3=6 \quad \text{Employ partial pivoting}$$

OR

Q2) a) Determine lowest real root of $-2.5x^3+17x^2-22x-11=0$ using secant position method. **[5]**

b) Use gauss Seidal method to obtain the solution of following system of equations **[5]**

$$3x_1-0.1x_2-0.2x_3=7.85$$
$$0.1x_1+7x_2-0.3x_3=-19.3$$
$$0.3x_1-0.2x_2+10x_3=71.4$$

P.T.O.

Q3) a) Solve the following System of equations using LU decomposition method **[5]**

$$2x+3y+z=9$$
$$x+2y+3z=6$$
$$3x+y+2z=8$$

b) Fit a power equation to the data in the following table using logarithmic transformation of the data **[5]**

X	1	2	3	4	5
Y	0.5	1.7	3.4	5.7	8.4

OR

Q4) Given the data **[10]**

X	5	10	15	20	25	30	35	40	45	50
Y	16	25	32	33	38	36	39	40	42	42

Use least square regression to fit

a) Saturation growth rate equation and

b) Parabola.

Q5) Use a) Fourth order Runge Kutta method and

b) Eulers method to integrate

$$F(x,y)=-2x^3+12x^2-20x+8.5$$

Using a step size of $h = 0.5$ and initial conditions of $y = 1$ and $x = 0$

Find value of y at $x = 1.5$ **[16]**

OR

Q6) a) Derive formula for Eulers method and also give its graphical interpretation.

b) Differentiate between Eulers method and modified Eulers method.

c) Differentiate between Initial value and boundary value problems with suitable chemical engg. Examples.

[16]

Q7) a) Explain applications of elliptic and parabolic equation in chemical engineering. **[4]**

b) Use Cranck Nicolson method to determine temperature distribution of a long thin rod with a length of 10 cm and following values; k' = 0.49 cal/(s.cm. ºC), $\Delta x = 2$cm and $\Delta t = 0.1$ sec. At $t = 0$ the temperature of the rod is zero and boundary conditions are fixed for all times at T (0) = 50 deg C and T (10) = 100 deg C. Note that the rod is of Aluminium with C = 0.2174 cal/(g.ºC) and $\rho = 2.7$ gms/cm^3. Therefore $k = 0.835$ cm^2/sec and $\lambda = 0.020875$. **[12]**

OR

Q8) a) Differentiate between **[4]**

i) Explicit and Implicit method

ii) Fixed boundary conditions and derivative boundary conditions**.**

b) Use Liebmann's method to determine temperature distribution on a square heated plate with 9 grids (3 x 3) and lower edge insulated. The temperature on left edge of the plate is 75 deg C, top edge 100 deg C and right edge 50 deg C. Solve for two iterations. **[12]**

Q9) a) What is optimization? Explain. Enlist the applications of optimization in Chemical Engineering. **[4]**

b) Using Simplex method **[14]**

$$\text{Maximize } Z = 5x_1 + 3x_2$$

Subject to $x_1 + x_2 \le 2$

$$5x_1 + 2x_2 \le 10$$

$$3x_1 + 8x_2 \le 12$$

$$x_1, x_2 \ge 0$$

OR

Q10)Use a) Golden Search method to find the maximum of

$f(x) = 2\sin x - x^2/10$ within interval $x1 = 0$ and $xu = 4$. **[9]**

b) Use quadratic interpolation method to find the maximum of

$f(x) = 2\sin x - x^2/10$ within interval $x0 = 0$, $x1 = 4$ and $x2 = 4$.

[9]

Total No. of Questions : 10]

SEAT No. :

P1347

[Total No. of Pages : 3

[4858] - 1092

T.E. (Chemical Engineering)

CHEMICAL ENGINEERING THERMODYNAMICS - II

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier Charts, Electronic pocket calculator and steam table is allowed.***
5) ***Assume suitable data if necessary.***

Q1) For the binary system shows that any thermodynamic solution property is related with its component partial molar property, derive the following equations. **[10]**

$$\overline{M1} = M + x1\frac{dm}{dx1}$$

$$\overline{M2} = M - x1\frac{dm}{dx1}$$

OR

Q2) The data for methyl ethyl ketone (1) /toluene(2) at 50 °C is given as below. Calculate $\ln\gamma_1$, $\ln\gamma_2$ and G^E/RT **[10]**

P (N/m^2)	12.30	15.51	18.61	21.63	24.01	25.92	29.96	30.12	31.75	34.15	36.09
x_1	0.00	0.09	0.20	0.32	0.42	0.51	0.61	0.71	0.79	0.91	1.00
y_1	0.00	0.27	0.46	0.59	0.68	0.74	0.80	0.86	0.90	0.96	1.00

Q3) For the system methanol(1)/Methyl Acetate (2) the following equations provide a reasonable correlations for the activity coefficients : **[10]**

$\ln\gamma_1 = Ax_2^2$, $\ln\gamma_2 = Ax_1^2$, where, $A = 2.7771 - 0.00523T$

The Antoine equations are

$\ln P_1^{sat} = 16.59158 - [3643.31/(T - 33.424)]$

$\ln P_2^{sat} = 14.25326 - [2665.54/(T - 53.424)]$

P.T.O.

where T is in K and the vapor pressures are in kPa. Assuming the validity of Raoult's law.

Calculate, P and yi, for t/T = 45 °C/318.15 K and $x_1 = 0.25$

OR

Q4) a) Explain in detail Chemical potential as a criterion of phase equilibrium. **[5]**

b) Explain and derive the equation for Phase rule for non reaction system. **[5]**

Q5) a) Derive the following relationships for criteria of phase equilibrium. **[8]**

$dS_{U,V} \geq 0$

$dA_{T,V} \leq 0$

$dG_{T,P} \leq 0$

b) Define and derive the equation for the osmotic pressure. **[8]**

OR

Q6) a) Explain in detail binary liquid-liquid equilibrium system with the help of T-X diagram. **[8]**

b) Derive the Claucious-Clapeyron equation using the criteria of equilibrium. **[8]**

Q7) a) Derive the relationship between mole fraction and reaction coordinate with stoichiometric coefficient of reaction components. **[6]**

b) Calculate the equilibrium constant for the vapor phase hydration of ethylene at 145 °C from the data given below **[10]**

$C_p/R = A + BT + CT^2$

$C_2H_4 + H_2O \rightarrow C_2H_5OH$

Component	$\Delta G°$ (25 °C) (J/mole)	$\Delta H°$ (25 °C)	A	B	C
C_2H_4	68460	52510	1.424	14.394×10^{-3}	-4.392×10^{-6}
H_2O	–228570	–241810	3.470	1.450×10^{-3}	–
C_2H_5OH	–168490	–235100	3.518	20.001×10^{-3}	-6.002×10^{-6}

OR

Q8) a) For the following reactions obtain the relation between mole fraction and reaction coordinate for 2 moles of CH_4 and 3 moles of H_2O initially present. **[8]**

$CH_4 + H_2O \rightarrow CO + 3H_2$

$CH_4 + 2H_2O \rightarrow CO_2 + 4H_2$

b) Derive the equation. **[8]**

$\Delta G^\circ = -RT \ln k$

Q9) a) Explain and derive the relation between equilibrium constant and composition in case of liquid phase reactions. **[6]**

b) Discuss Duhem's theorem in case of reacting systems. **[6]**

c) Explain fuel cell with its types. **[6]**

OR

Q10) a) Explain and derive the relation between equilibrium constant and composition in case of gas phase reactions. **[6]**

b) Acetic acid is esterified in the liquid phase with ethanol at 100 °C & at atmospheric pressure to produce ethyl acetate & water according to the reaction **[8]**

$CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

If initially there is 1 mole of each acetic acid and ethanol. Estimate the mole fraction of ethyl acetate in the reacting mixture at equilibrium with the help of following data

Component	$\Delta H^\circ f_{298}$ (j/mol)	ΔG°_{298} (J/mole)
CH_3COOH	–484500	–389900
C_2H_5OH	–277690	–174780
$CH_3COOC_2H_5$	–463250	–318280
H_2O	–285830	–237130

c) Explain the phase rule for reacting systems. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P1348

[Total No. of Pages : 2

[4858] - 1093

T.E. (Chemical Engineering)

CHEMICAL PROCESS TECHNOLOGY

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q. 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the production of common salt from sea water.

b) What do you mean by PFD and major Engg. Problems? **[10]**

OR

Q2) Describe the process for chlorine and caustic soda production with the help of reactions. **[10]**

Q3) Draw and explain the production of ethyl alcohol by fermentation of molasses. **[10]**

OR

Q4) Discuss production of UREA. Give its major Engg. problems. **[10]**

Q5) Explain hydrogenation of Oil by neat PFD and give its major Engg. problems. **[10]**

OR

Q6) Explain how cleaning action takes place when soap or detergents are used and discuss the production of soap. **[10]**

P.T.O.

Q7) Draw and explain the fluidized bed type catalytic cracking process. **[20]**

OR

Q8) Explain : **[20]**

a) Pyrolysis

b) Refinery operations

Q9) a) Explain production of Methanol.

b) Explain production of Ethylene dichloride

[20]

OR

Q10) a) Explain production of phenol by rasclig process.

b) Explain production of phenol by cumene process.

[20]

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Total No. of Questions : 10]

SEAT No. :

P1349

[Total No. of Pages : 2

[4858] - 1094

T.E. (Chemical) (Semester - I)

INDUSTRIAL ORGANISATION AND MANAGEMENT (New)

(2012 Pattern) (End Semester)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***
4) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***

Q1) a) Explain Line Organization with advantages and disadvantages. **[6]**

b) Write a note on Management by Objectives. **[4]**

OR

Q2) Explain in detail Selection Process. **[10]**

Q3) a) Write a note on Stores and store location. **[4]**

b) Explain different types of Wages. **[6]**

OR

Q4) Explain in detail . **[10]**

a) Job Evaluation

b) Comparative Statement

Q5) a) Explain in detail Sales Promotion. **[8]**

b) Explain any two Pricing Strategies in detail. **[8]**

OR

Q6) a) What is sales forecasting? Explain the two types of sales forecasting in detail. **[8]**

b) Write an explanatory note on Advertising. **[8]**

P.T.O.

Q7) a) Write notes on : **[8]**

i) Custom duty and VAT

ii) International Trade

b) Explain in detail Quality Circle. **[8]**

OR

Q8) a) Explain Total Quality Management of a process industry. **[8]**

b) Explain ISO along with its various types. **[8]**

Q9) a) Explain the term Agreement in Contract Act. Explain the various types of Contract according to enforceability, formation and performance. **[12]**

b) Write note on Patent and Patent Rights. **[6]**

OR

Q10) a) Write notes on : **[12]**

i) Flow Chart

ii) Flow Diagrams

iii) FERA and FEMA

b) Write note on MRTP. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P1350

[Total No. of Pages : 3

[4858] - 1095

T.E. (Chemical) (Semester - I)

MASS TRANSFER - I

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q. 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is permitted.***

Q1) Calculate the amount of diffusion of acetic acid (A) across a film on non diffusing water (B) solution, 1 mm thick at 17°C, when concentration on opposite side of the film are 9 and 3 weight % acid respectively. The diffusivity of acetic acid in solution is 0.95×10^{-9} m^2/sec. **[10]**

Data : At 17°C :

Density of 9% solution = 1012 kg/m^3

Density of 3% solution = 1003 kg/m^3

Molecular weight of acetic acid = 60

Molecular weight of water = 18

OR

Q2) a) Derive the expression to calculate the flux of steady state diffusion of A through non diffusing B. **[5]**

b) Write short notes on penetration theory and surface renewal theory. **[5]**

Q3) a) Discuss about minimum L/G ratio. **[5]**

b) 90 % of component A is being absorbed from a gas stream containing 2 mole% A in a absorption tower. The equilibrium relation is Y* = 0.8X and if pure solvent is used, find $(L/G)_{min}$, absorption factor, and number of overall transfer unit if A = 1. **[5]**

P.T.O.

OR

Q4) Ammonia is absorbed by waters in a wetted wall column being operated at 20°C and 1 atm. The overall gas coefficient is 1 kmol/m^3.atm. At the one point in the column the gas contain 10 mol 1% NH_3 and the liquid phase contain 0.155 mole NH_3/m^3 of solution. 96% of total resistance is in the gas phase. Assume Henrys law constant = $4.247*10^{-3}$ atm/mol NH_3/m^3. Determine the individual coefficients and interfacial compositions. **[10]**

Q5) a) In process benzene used as a solvent is evaporated into dry nitrogen. The resulting mixture at a temperature of 297°K and pressure of 101.3 KN/m^2 has a relative humidity of 60%. It is required to recover 80% of benzene present by cooling to 283 °K and compressing to suitable pressure. What should this pressure be?. Vapor pressure of benzene at 297 °K and 283 °K are 12.2 KN/m^2 and 6 KN/m^2 respectively. **[8]**

b) What are the different types equipments used for humidity measurement? Explain any one in brief. **[8]**

OR

Q6) a) Air is entering in to the cooling tower at 25 °C. The total pressure of tower is maintained at 1 atmospheric. If wet bulb temperature of cooling air is 22 °C, find : **[8]**

i) humidity,

ii) humid heat,

iii) percentage relative humidity,

iv) dew point and

v) enthalpy of air

b) Define wet bulb temperature and derive an expression relating wet bulb temp with absolute humidity and psychometric ratio. **[8]**

Q7) a) What are the various equipments used for gas-liquid contact. With neat sketch explain **[8]**

i) Venturi Scrubber

ii) Spray Towers.

b) Give classification of packing's used in packed columns? **[4]**

c) What are the characteristics that tower packing should offer? **[4]**

OR

Q8) a) Write short notes on : **[8]**

i) Flooding and loading conditions

b) Differentiate between packed and plate columns. **[8]**

Q9) a) Derive the equation required for calculating the total time of drying. **[10]**

b) Give classification of drying equipments and working of fluidized bed dryer. **[6]**

c) What are the factors affecting the rate of drying? **[2]**

OR

Q10) a) 1400 kg (bone dry) of granular solid is to be dried under constant drying conditions from moisture content of 0.2 kg/kg dry solid to final moisture content 0.002 kg/kg dry solid. The material has an effective area of 0.615m^2/kg. Under same conditions the following rates were previously known. Calculate the time required for drying. **[10]**

kg/kg dry solid (X)	:-	0.3	0.2	0.14	0.096	0.056	0.042	0.026	0.016
kg/hr.m^2(N)	:-	1.71	1.71	1.71	1.46	1.29	0.88	0.54	0.376

b) Explain rate of drying curve with neat sketch. **[6]**

c) What are the uses of drying operation? **[2]**

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Total No. of Questions : 10]

SEAT No. :

P1991

[Total No. of Pages : 3

[4858]-1096

T.E. (Chemical) (End - Semester) (Semeser - II)

TRANSPORT PHENOMENA

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of logarithmic tables slide rule mollier charts electronic pocket calculator and steam table is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) An oil is flowing in laminar region in a 1.27×10^{-2} m diameter tube at the rate of 22.72 lit/min. The oil viscosity is 300 cp & its density is 960.6 kg/m^3. Calculate **[6]**

i) pressure drop per meter of pipe length.

ii) the wall stress, N/m^2

iii) velocity at the center of the tube

b) Derive Newton's law of viscosity. **[4]**

OR

Q2) a) A copper wire has a radius of 2 mm and a length of 5 m. For what voltage drop would the temperature rise at the wire axis be 10°C, if the surface temperature of the wire is 20°C. Lorenz number for copper = 2.23×10^{-8} ($volt^2/K^2$). **[5]**

b) Derive the expression for temperature distribution for the viscous heat source. **[5]**

Q3) a) Calculate the mass flux of benzene througth a layer of air of 10 mm thickness at 25°C and 200 KN/m^2 (total pressure), partial pressure of benzene is 6000 N/m^2, the left of the layer and 1 KN/m^2 at the right side. The mass diffusivity at this temperature and pressure is 4.4×10^{-6} m^2/sec. **[5]**

b) Derive the expression for concentration distribution for diffusion through homogeneous chemical reaction. **[5]**

P.T.O.

OR

Q4) a) A cold storage room is constructed of an inner layer of 12.7 mm of pine, a middle layer of 101.6 mm of cork board and an outer layer of 76.2 mm of concrete. The wall surface temperature is 255.4 K inside the cold room and 297.1 K at the outer surface of the concrete. Use thermal conductivities of pine, 0.151; for cork board, 0.0433; and for concrete, 0.762 W/m K. Calculate the heat loss in W for 1 m^2 and the temperature at the interface between the wood and cork board. **[5]**

b) Explain following: **[5]**

i) Brinkman Number

ii) Forced and Free Convection

Q5) a) Derive equation of motion in a Cartesian co-ordinate system for a flow of fluid through a control volume of size $\Delta x \Delta y \Delta z$. **[10]**

b) A Newtonian fluid is confined between two parallel and vertical plates. The surface on the left is stationary and the other is moving vertically at a constant velocity V_0. Assuming that the flow is laminar, solve for the velocity profile. **[8]**

OR

Q6) a) Derive the equation of continuity in three dimensional coordinate, for a flow of a fluid through isothermal systems? **[10]**

b) Give step by step procedure to setup and solve viscous flow problem. **[8]**

Q7) a) Derive equation for the friction factor for flow in packed column. **[8]**

b) What is the value of ΔP through 30 m of pipe if 75 lit/hr of benzene is flowing through a pipe of 2.35 cm I.D. Also find the velocity at the centre of pipe. Assume viscosity of benzene 0.65 cp and density of 880 kg/m^3. **[8]**

OR

Q8) a) Discuss the semi-empirical expressions for Reynold's Stresses. **[8]**

b) An aqueous salt solution is flowing through a sudden enlargement at a rate of 1701 liter/min. The internal diameter of the smaller pipe is 12.7×10^{-2} m and that of the larger pipe is 22.86×10^{-2} m. What is the pressure rise it the density of the solution is 1008 kg/m^3. **[8]**

Q9) a) Write a short notes on **[16]**

i) Definition of binary mass transfer coefficient in one phase.

ii) Definition of transfer coefficients for high mass trasnfer rates.

OR

Q10) a) Derive the correlation of binary mass transfer coefficient in one phase at low mass transfer rates. **[8]**

b) Explain in detail about "Reynolds and Chilton-Coburn j-Factor Analogy". **[8]**

Total No. of Questions : 10]

SEAT No. :

P3158

[Total No. of Pages : 4

[4858] - 1097

T.E. (Chemical) (Semester - II)

Chemical Reaction Engineering - I

(2012 Pattern) (End - Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Experiment shows that the homogeneous decomposition of ozone proceeds with a rate : **[6]**

$$-r_{O_3} = k[o_3]^2[o_2]^{-1}$$

i) What is the overall order of reaction?

ii) Suggest a two-step mechanism to explain this rate and state how you would further test this mechanism.

b) Differentiate between elementary and non-elementary reactions. **[4]**

OR

Q2) a) Find the first order rate constant for disappearance of A in the gas reaction, $A \rightarrow 1.6R$. If the volume of reaction mixture starting with pure A increases by 50% in 4 minutes. The total pressure within the system stays at 1.2 atm and the temperature is 250C. **[6]**

b) Explain integral and differential method of analysis for first order reaction. **[4]**

Q3) a) Derive the performance equation for steady state MFR. **[6]**

b) In an isothermal batch reactor 70% of a liquid reactant is converted in 13 min. What space-time and space-velocity are needed to effect this conversion in a plug flow reactor and in a mixed flow reactor? **[4]**

OR

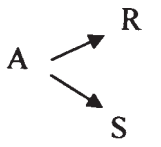
P.T.O.

Q4) For the elementary reaction in series.

$$A \xrightarrow{k_1} R \xrightarrow{k_2} S, k_1 = k_2 \text{ at } t = 0$$

Find the maximum concentration of R and when it is reached? **[10]**

Q5) a) Substance A in a liquid reacts to product R and S as follows:



R first order

S first order

A feed (C_{A0} = 1, C_{R0} = 0, C_{S0} = 0) enters two mixed flow reactors in series (τ_1 = 2.5min, τ_2 = 2.5 min). Knowing the composition in the first reactor (C_{A1} = 0.4, C_{R1} = 0.4, C_{S1} = 0.2), find the composition leaving the second reactor. **[8]**

b) Give quantitative treatment of product distribution and of reactor size. **[8]**

OR

Q6) a) Liquid reactant A decomposes as follows: **[12]**

$r_R = k_1 C_A^2, \quad k_1 = 0.4 m^3 / mol.min$

$r_S = k_2 C_A, \quad k_2 = 2 min^{-1}$

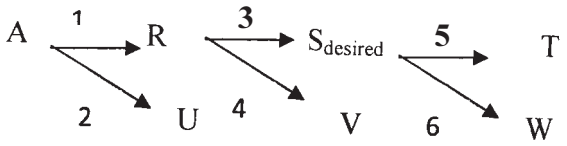
A feed of aqueous A (C_{A0} = 40 mol/m^3) enters a reactor, decomposes, and a mixture of A, R and S leaves. Find C_R, C_S, τ for X_A = 0.9 in;

i) Mixed flow reactor.

ii) Plug flow reactor.

b) Define instantaneous fractional yield and overall fractional yield. **[4]**

Q7) a) Quantitatively find the optimum temperature progression to maximize C_S for the reaction scheme.



Data : $E_1 = 10, E_2 = 25, E_3 = 15, E_4 = 10, E_5 = 20, E_6 = 25$ **[4]**

b) Between 0ºC and 150ºC determine the equilibrium conversion for the elementary aqueous reaction.

$$A \rightleftarrows R \begin{cases} \Delta G^0_{298} = -14130\, cal/mol \\ \Delta H^0_{298} = -75300\, cal/mol \end{cases} \quad C_{pA} = C_{pR} = \text{Constant}$$

Present the results in the form of a plot of temperature versus conversion. What restriction should be placed on the reactor operating isothermally if we are to obtain a conversion of 80% or higher? **[12]**

OR

Q8) a) Compare and explain Arrhenius and collision theory. **[4]**

b) A first order liquid phase reaction is carried out in mixed flow reactor. The concentration of reactant in feed is 3 kmol/m^3 and volumetric flow rate is 60 x 10^{-6} m^3/s. The density and specific heat of reaction mixture are constant at 103 kg/m^3 and 4.19 x 103 J/(kg.K). The volume of the reactor is 18 x 10^{-3} m^3. The reactor operates adiabatically. If feed enters at 298 K, what are steady state conversions and temperatures in the product stream?

Data : $\Delta H_R = -2.09 \times 10^8$ J/kmol

Rate = 4.48 x 10^6 exp (–62800/RT) C, kmol (m^3/s). **[12]**

Q9) Write short notes (any 3): **[18]**

a) Tank in series model.

b) C, E, F curves.

c) Micro and macro fluid.

d) Examples of non ideality in reactors.

OR

Q10) a) Derive and discuss dispersion model. **[8]**

b) From a pulse input into a vessel we obtain the following output signal:

Time, min	1	3	5	7	9	11	13	15
Concentration (arbitrary)	0	0	10	10	10	10	0	0

We want to represent the flow through the vessel with the tank-in-series model. Determine the number of tanks to use. **[10]**

Total No. of Questions : 10]

SEAT No. :

P1351

[Total No. of Pages : 3

[4858] - 1098

T.E. (Chemical) (Semester - VI)

CHEMICAL ENGINEERING DESING - I

(2012 Pattern) (End Semester)

Time : 3 Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Write a short note on Hortonspheres? **[3]**

b) Design the skirt support for a cylindrical vertical vessel with the help of following data : **[7]**

Diameter of the vessel = 3000 mm

Height of the vessel = 37,500 mm

Weight of the vessel with attachments = 2,00,000 kg

Diameter of skirt = 3000 mm

Height of skirt = 4800 mm

Wind pressure = 1285 N/mm^2

Permissible stress = 140 N/mm^2

Yield point = 200

Permissible stress of concrete = 35 N/mm^2

OR

Q2) a) Discuss in detail classification of vessel supports? **[5]**

b) Give the step by step method for designing of rectangular tanks as per IS:804? **[5]**

P.T.O.

Q3) 1.2 kg/sec of an organic liquid is to be cooled from 45 °C to 20°C . The organic liquid is cooled by chilled water supplied from a refrigeration unit at a temperature of 5 ºC and can be heated upto 10 °C. Use tubes of 12 mm ID and 2 mm wall thickness. Length of tubes is 1.5 m. **[10]**

Properties of organic liquid and water are:

Properties	Organic liquid	Water
Specific heat, J/Kg K	2150	4180
Viscosity, Ns/m^2	0.25×10^{-3}	0.8×10^{-3}
Density, kg/m^3	716	1000
Thermal conductivity, W/mK	0.133	0.61

Fouling resistance for organic liquid = 0.0002 m^2K/W, Fouling resistance for water = 0.0004 m^2K/W, Correction factor for LMTD = 0.86. Steel tubes are to be used. Thermal conductivity of steel tube = 45 W/mK.

Design a suitable heat exchanger.

OR

Q4) a) Discuss the step by step method for designing Shell and Tube Heat Exchanger? **[7]**

b) Write a short note on LMTD Correction factor? **[3]**

Q5) a) What are Evaporators? Explain the detailed classification of Evaporators? **[8]**

b) A single effect evaporator is used to concentrate 7 kg/s of a solution from 10 to 50 % solids. Steam is available at 205 KN/m^2, at temperature 394 K and evaporation takes place at 13.5 KN/m^2, at temperature 325 K. If the overall coefficient of heat transfer is 3 KW/m^2K, estimate the heating surface required and the amount of steam used if the feed to the evaporator is at 294 K and the condensate leaves the heating space at 352.7 K. The specific heats of 10 & 50 percent solutions are 3.76 & 3.14 KJ/Kg K respectively. **[10]**

The total enthalpy of steam at 205 KN/m^2 = 2530 KJ/Kg

The total enthalpy of steam at 13.5 KN/m^2 = 2594 KJ/Kg

OR

Q6) a) Write a short note on : **[10]**

i) Condensation inside and outside vertical tubes

ii) Condensation of mixtures

b) What are Reboilers? Discuss the classification of reboilers? **[8]**

Q7) a) Explain in detail various types of agitators and their selection criteria? **[8]**

b) Discuss the power requirement calculation for agitation systems? **[8]**

OR

Q8) a) Discuss in detail design of various types of jackets in reaction vessels? **[8]**

b) Calculate the diameter of the shaft for an agitation system. The horse power required is 3. Torque acting over shaft is 18,900 kg.m, while bending moment is 27,700 kg.m, Permissible shear and tensile stresses are 400 and 600 kg/cm^2 respectively. **[8]**

Q9) Write short notes on : **[16]**

a) Knock-out drum

b) Decanter

c) Gravity separator

d) Liquid-liquid separators

OR

Q10) Design the reaction vessel wherein the first case heat transfer is in a plain jacket and in the second case heat transfer is in a limpet coil using the following data : **[16]**

Reaction vessel :

Vessel shell internal diameter = 2130 mm, Jacket Internal diameter = 2260 mm Jacket length = 2500 mm, Dia of half coil or width of channel jacket = 100 mm

Flanged dished end :

Internal diameter = 2130 mm, Crown radius = 2130 mm, Knuckle radius = 128 mm, Straight flange length = 60 mm, Dished end length = 360 mm, Internal pressure (shell) = 0.55 N/mm^2, Internal pressure (jacket) = 0.35 N/mm^2, Temperature - 150 °C

Material :

Allowable stress = 96 N/mm^2, Modulus of Elasticity = 190×10^3 N/mm^2 Poisson's ratio = 0.3.

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Total No. of Questions : 10]

SEAT No. :

P3159

[Total No. of Pages : 2

[4858] - 1099

T.E. (Chemical) (Semester - II)

Process Instrumentation & Control

(2012 Pattern) (End-Semester)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide ruler, Mollier Charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What are transducers? Explain types of transducers. **[5]**

b) Explain all the static characteristics of measuring instruments. **[5]**

OR

Q2) a) Give the classification of instruments. **[5]**

b) Define all the process variable and state their unit of measurement. **[5]**

Q3) a) Explain with diagram, construction and working calibration of pressure sensors using dead-weight tester. **[5]**

b) Explain with diagram, construction and working bellows. **[5]**

OR

Q4) a) Define temperature and give temperature scales with inter-relation. **[5]**

b) Explain with diagram, construction and working thermocouples. **[5]**

Q5) a) Explain classification of flow measuring instruments. **[8]**

b) Explain with diagram, construction and working venturimeter. **[8]**

OR

P.T.O.

Q6) a) Explain classification of level measuring instruments. **[8]**

b) Explain with diagram, construction and working ultrasonic level measurement method. **[8]**

Q7) Describe with diagram the following techniques of composition analysis. **[16]**

a) IR absorption spectroscopy.

b) Mass spectroscopy.

OR

Q8) Write note on: **[16]**

a) HPLC.

b) Gas chromatography.

c) Refractometry.

d) P^H meter.

Q9) a) Describe the heat exchanger automatic control system with block diagram. **[9]**

b) Describe the characteristics of step response of second order under damped system. **[9]**

OR

Q10) a) An air to open valve on the inflow controls level in a tank. When the process is at the set point the valve opening is 50%. An increase in outflow results in the valve opening increasing to a new steady state value of 70%. What is the resulting offset if the controller PB is:

i) 10%.

ii) 20%.

[9]

b) Explain with diagram different control actions. **[9]**

Total No. of Questions : 10]

SEAT No. :

P1352

[Total No. of Pages : 3

[4858] - 1100

T.E. (Chemical Engg.) (End Semester)

MASS TRANSFER - II

(2012 Pattern)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) 100 moles of benzene (A) and toluene (B) mixture containing 40% mole of benzene is subjected to flash distillation at atmospheric pressure till the composition of the benzene in the liquid is 30 %. Calculate the total moles of the mixture distilled and the composition of the vapour. The equilibrium data : **[6]**

x	0	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
y	0	0.13	0.21	0.375	0.5	0.6	0.7	0.77	0.83	0.9	0.95	1

b) Write short note on steam distillation. **[4]**

OR

Q2) a) Feed containing 0.15 mole fraction ethyl alcohol and 0.85 mole fraction water is continuously distilled to yield a product containing 0.77 mole fraction and a bottom product containing 0.02 mole fraction ethyl alcohol. The reflux ratio is 2 and feed is liquid at bubble point. Determine the theoretical number of plates required giving the location of feed plate. Determine the plate which has an ethyl alcohol concentration of 0.5 in the liquid. If the plate efficiency is 0.8 find the actual number of plates. Equilibrium data : **[7]**

x	0	0.05	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.89	1.0
y	0	0.325	0.423	0.538	0.577	0.62	0.65	0.705	0.76	0.825	0.89	1.0

b) Derive equation of operating line for stripping section in fractionating column. **[3]**

P.T.O.

Q3) a) Derive the Fenske Underwood equation for R_{min}. **[6]**

b) Describe the working principle of spray extraction column. **[4]**

OR

Q4) a) A continuous contact extraction column is used For extracting a solute from an aqueous solution (A) using an organic solvent (B). The distribution coefficient is y*/x = 1, where y* is the mass fraction of solute in the extract and x is the mass fraction of solute in the raffinate. The height of transfer unit based on extract phase is 1m. Assuming water and organic solvent to be immiscible find the required height of the column. Flow rate of aqueous solution = 100 kg/h with weight fraction of solute = 0. 1, flow rate of solvent = 100 kg/h (pure solvent is used), weight fraction of solute in the raffinate phase is = 0.01. **[8]**

b) Define selectivity and distribution coefficient. **[2]**

Q5) a) 350 kg per hour of halibut liver is to be extracted in a countercurrent cascade to recover oil. The ether which has been partially purified contains 2% oil. The fresh liver contains 20% oil and are to be extracted to a composition 1% oil (on solvent free basis)250 kg of solvent is to be used. **[12]**

i) What % of oil entering with the liver is recovered in the extract?

ii) How many equilibrium stages are required?

Data :

Kg oil/kg solution	0	0.1	0.2	0.3	0.4	0.5	0.6
Kg solution /kg exhausted liver	0.288	0.368	0.44	0.51	0.6	0.71	0.87

b) Write material balance for single stage leaching. **[4]**

OR

Q6) a) Give detail procedure for finding the number of stages in multistage countercurrent leaching with graphical representation. **[10]**

b) Give the functioning of a Rotocel Extractor. **[6]**

Q7) a) The equilibrium relation for the decolourisation operation is $Y = 0.5X^{0.5}$ where Y = gm color removed / gm of adsorbent, X = gm color in oil / 1000 gm of color free oil. 100 Kg oil containing one part of color to three part of oil is agitated with 25 Kg of adsorbent. Calculate the percentage color removed if two cross-current stages are used and 12.5 Kg of adsorbent is used in each stage. **[8]**

b) Explain the breakthrough curve in detail giving its significance; mention the factors affecting its shape. **[8]**

OR

Q8) a) A solution of washed raw cane sugar is colored by the presence of small amounts of impurities. The solution is to be decolorized by treatment with an adsorptive carbon in a contact filtration plant. The original solution has a color concentration of 9.6 measured on an arbitrary scale and it is desired to reduce color of 0.96. Calculate the necessary dosage of the fresh carbon per 1000 kg solution for a single stage process. The data for an equilibrium isotherm is as follows : **[10]**

Kg carbon/kg solution	0	0.001	0.004	0.008	0.02	0.04
Equilibrium color	9.6	8.6	6.3	4.3	1.7	0.7

b) Explain briefly Pressure Swing Adsorption and Temperature Swing Adsorption. **[6]**

Q9) a) Give classification of membrane processes. Explain the working and application of reverse osmosis. **[8]**

b) State methods of super saturation and explain Miers super saturation theory. **[6]**

c) Explain the terms rejection, permeability, membrane fouling, cake resistance. **[4]**

OR

Q10) a) Give construction and working of vacuum crystallizer. **[8]**

b) A Swenson Walker crystallizer is used to produce hydrated crystals of sodium sulphate ($Na_2SO_4.10H_2O$) by cooling a solution from 300 K to 290K with the help of cooling water which enters at 280K and leaves at 290K. Assuming evaporation to be negligible, determine the number of sections of the crystallizer each 3m long, required to process 0.25 kg/s of product. Data: Solubility of Na_2SO_4 at 300K = 40 kg/100 kg water, Solubility of Na_2SO_4 at 290K = 14 kg/100 kg water, Mean heat capacity of liquor = 3.8 kJ/kg K, heat of crystallization = 230 kJ/kg, available area for heat transfer = $3m^2$/m length of crystallizer, overall heat transfer coefficient = 0.14 kW/m^2K. **[10]**

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Total No. of Questions : 10]

SEAT No. :

P1353

[Total No. of Pages : 3

[4858] - 1101

T.E. (I.T.) (End Semester)

DATA BASE MANAGEMENT SYSTEMS

(2012 Pattern) (Semester - I)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Discuss the entity integrity & referential integrity constraints. **[4]**

b) For a Library Management System following information is maintained. **[6]**

Books (Accession_no, Title, Author, Price, Booktype, publisher)

Borrower(Membership_no, Name, Address, Category, max_no_of _books_issued, Accession_no)

Draw E-R Diagram for the above taking into consideration following constraints and by making use of atleast one Extended ER feature :

i) A book may have more than one author.

ii) There may be more than one copy of a book.

iii) Borrower can be staff or a student. Depending on this category max number of books that can be issued will vary. [i.e. student can ask for max 3 books whereas staff can ask for 10 books]

OR

Q2) a) What do you mean by correlated subquery? How it is different from uncorrelated subquery. **[4]**

b) How to use oracle sequences? Explain with proper example. **[6]**

P.T.O.

Q3) a) For the Given transactions T1 & T2 check if the schedule is conflict serializable. **[5]**

T1	T2
Read (A)	
Write (A)	
	Read (A)
	Write (B)
Read (A)	
Write (A)	
	Read (B)

Justify your Answer.

b) What are the costs to be considered when a transaction has to be rolled back when recovering from deadlock. **[5]**

OR

Q4) a) Explain Join in SQL. Give proper example for Recursive Join. **[6]**

b) How multiple granularity locking can improve two phase locking. **[4]**

Q5) a) Enlist the technical advantages when going from one tier to two tier architectures also specify the disadvantages with which 2 tier architectures suffer from. **[8]**

b) What are the key elements of parallel processing. **[6]**

c) Enlist the Advantages & Disadvantages of Replication. **[4]**

OR

Q6) a) If you were designing a web based system to make airline reservations & sell airline tickets, which DBMS architecture would you choose from Centralized & client server Architecture? Why? Why would the other architectures not be a good choice **[8]**

b) Draw & Explain architecture of parallel databases. **[8]**

c) Enlist various architectural models for parallel databases. **[2]**

Q7) a) How data validation is done in XML. **[4]**

b) What are different data types of JSON? What is difference between XML & JSON. **[6]**

c) Discuss Hbase Data Model. **[6]**

OR

Q8) a) Give the DTD for an XML representation of the following nested relational schema. **[7]**

Emp = (ename, ChildrenSet set of (Children), SkillSet Set of (Skills))

Children = (name, Birthday)

Birthday = (day, month, year)

Skills = (type, Examset setof (Exams))

Exam = (year, city)

Use the DTD and write the following queries in Xqueries format.

Find the names of all employees who have a child who has a birthday in March.

b) What is HDFS? Explain in detail. **[5]**

c) When to use Hbase & When not to use it. **[4]**

Q9) a) What are the characteristics of NoSQL cloud databases? **[8]**

b) Draw & explain the machine learning system model. What factors affect the performance of the system? **[8]**

OR

Q10) a) What are the design criteria for mobile databases? List existing mobile databases. **[8]**

b) XML can be used to create new Internet language. Justify. Enlist features & advantages of XML. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P1354

[Total No. of Pages : 2

[4858] - 1102

T.E. (Information Technology)

SOFTWARE ENGINEERING

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Draw neat diagrams whenever necessary.***
3) ***Assume suitable data if necessary.***

Q1) a) Discuss practitioner's myths of software development. **[5]**

b) What formal techniques are available for assessing the software process? **[5]**

OR

Q2) a) What is spike solution in XP? **[5]**

b) Describe XP concepts of refactoring and pair programming in your own words. **[5]**

Q3) a) Why is it difficult to gain a closer understanding of what the customer wants? **[5]**

b) How to prioritize software requirements based on Kano Analysis? **[5]**

OR

Q4) a) Explain how an ATM machine is supposed to behave with the help of a state diagram. **[5]**

b) What new practices are appended to XP to create IXP? **[5]**

Q5) a) Discuss the characteristics of a good software design. **[8]**

b) What types of classes does the designer create? What is a well-formed design class? **[8]**

P.T.O.

OR

Q6) a) What is an architectural style? Explain in brief taxonomy of architectural styles. **[8]**

b) What are domain specific architectures? Distinguish between domains and product-lines. **[8]**

Q7) a) What are different categories of users? How do we learn what user wants from UI? **[8]**

b) Explain any four of Shneiderman's 8 golden rules of user interface design. **[8]**

OR

Q8) a) Perform a detailed task-analysis for - A Library Management System. **[8]**

b) Discuss use of mental models and metaphors in UI design. **[8]**

Q9) a) What is the goal of cleanroom testing? Discuss in brief the statistical use testing. How do we certify a software component in cleanroom testing? **[10]**

b) What is software configuration management repository? Discuss role and features of SCM repository. **[8]**

OR

Q10) Write short notes on ANY THREE : **[18]**

a) CASE tools.

b) Technology evolution.

c) Test driven development.

d) Model driven development.

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Total No. of Questions : 10]

SEAT No. :

P1355

[Total No. of Pages : 2

[4858] - 1103

T.E. (Information Technology) (Semester - I)

End Semester Examination

COMPUTER NETWORK TECHNOLOGY

(2012 Pattern)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data if necessary.***

Q1) a) How token bucket algorithm works in case of smooth and bursty traffic. **[6]**

b) What is classless addressing? Explain. **[4]**

OR

Q2) a) Differentiate between IPv4 and IPv6. **[4]**

b) A company is assigned site address 140.55.0.0. The company needs 1000 IP address. Find the no. of subnet and range of IP address of each subnet. **[6]**

Q3) a) State the ICMP message format and list ICMP message types. **[6]**

b) Explain Mobile IP. **[4]**

OR

Q4) a) Explain working of DHCP with transition diagram. **[6]**

b) How to overcome the problems in RIP? **[4]**

Q5) a) Write characteristics of radio propagation and propagation impairments. **[8]**

b) Explain Bluetooth architecture and its protocol stack. **[10]**

OR

P.T.O.

Q6) a) Write short note on : (any two) **[10]**

i) LEACH

ii) AODV

iii) DSR

b) Explain IEEE 802.11 FHSS and DSSS. **[8]**

Q7) a) Explain the basic architecture of WLAN and discuss various components in it. **[8]**

b) Discuss naming and addressing in wireless sensor network. **[8]**

OR

Q8) a) State different MAC protocols in sensor network? Explain S-MAC in detail. **[8]**

b) What are different design issues and challenges of wireless sensor network? **[8]**

Q9) a) Explain in detail CSMA/CA. **[8]**

b) Differentiate between content based and geographic routing. **[8]**

OR

Q10) a) Explain SPIN routing protocol for WSN. **[8]**

b) What are the advantages and disadvantages of BYOD? **[8]**

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Total No. of Questions : 10]

SEAT No. :

P1356

[Total No. of Pages : 2

[4858] - 1104

T.E. (Information Technology)

WEB ENGINEERING & TECHNOLOGY

(2012 Pattern) (Semester - I)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What do you mean by components of generic web application architecture? Explain in brief. **[5]**

b) Explain get(), post(), head(), put() and delete() methods to handle the HTTP actions? **[5]**

OR

Q2) a) What do you mean by web browser? What facilities it provides to the user? **[5]**

b) Differentiate between HTTP versus FTP. **[5]**

Q3) a) Explain how frames are constructed in HTML document. **[4]**

b) Difference between : Client side Programming and Server side Programming. **[6]**

OR

Q4) a) List various tags in HTML with simple example for a web page. **[5]**

b) Explain Image Map with example. **[5]**

P.T.O.

Q5) a) Discuss about various control structures used in PHP. Give suitable example for each. **[8]**

b) Briefly explain the basic structure of PHP program with an example. **[8]**

OR

Q6) a) Discuss about string functions used in PHP with a suitable example. **[8]**

b) What are the similarities and differences between fgets() and fread() in PHP? Give suitable example. **[8]**

Q7) a) Explain XML DOM and XML Schema with example. **[8]**

b) What is JSP? Enlist advantages of JSP over CGI? **[8]**

OR

Q8) a) What do you mean by JSP processing? How JSP pages are handled? Explain with an architecture. **[8]**

b) Explain various JSP directives with suitable example. **[8]**

Q9) a) Write a short note on - Drupal. **[9]**

b) What accessibility guidelines should be followed while creating websites for individuals? **[9]**

OR

Q10) a) Write a Short note on - Joomla. **[9]**

b) What is a Content Management System and what is not a Content Management System? Explain in brief with suitable example. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P1357

[Total No. of Pages : 3

[4858] - 1105

T.E. (I.T.) (Semester - I)

THEORY OF COMPUTATION

(2012 Pattern) (End Sem.)

Time : 2½ Hour] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicates full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Design an FA for the languages that contain strings with next-to-last symbol O. **[5]**

b) Write formal definition of NFA - Λ. Also define Λ - closure. **[5]**

OR

Q2) a) Draw an FA recognizing the regular language corresponding to give regular expression **[5]**

1(01 + 10)* + 0 (11 + 10)*

b) Write a short note on the applications of Regular Expressions. **[5]**

Q3) a) State pumping Lemma for context - free languages. Also Define context - free language. **[5]**

b) Construct parse trees for the strings using specified derivation format for the given grammar G. **[5]**

G = ({S, A, B}, {a, b}, P, {S})

P = {S → a B | b A

A → a|aS | b AA

B → b | b S | a BB }

Strings :

i) aaabbb (rightmost derivation)

ii) aababb (leftmost derivation)

P.T.O.

OR

Q4) a) Define **[5]**

i) Ambiguous Grammar

ii) Regular Grammar with suitable example.

b) Convert given CFG into Greibach Normal Form **[5]**

$S \rightarrow ABA$

$A \rightarrow aA|\in$

$B \rightarrow bB|\in$

Q5) a) Design a PDA which accepts only odd number of a's over $\Sigma = \{a, b\}$. Simulate PDA for the string "aabab". **[9]**

b) Define PDA and Post machine with suitable example. Compare DPDA, NPDA and CFG. **[9]**

OR

Q6) a) For the PDA $(\{q_0, q_1\}, \{0, 1\}, \{0, 1, z_0\}, \delta, q_0, z_0, \phi)$ where δ is **[9]**

$\delta(q_0, \Lambda, z_0) = (q_0, \Lambda)$

$\delta(q_0, 0, z_0) = (q_0, 0, z_0)$

$\delta(q_0, 0, 0) = (q_0, 00)$

$\delta(q_0, 1, 0) = (q_0, 10)$

$\delta(q_0, 1, 1) = (q_0, 11)$

$\delta(q_0, 0, 1) = (q_1, \Lambda)$, $\delta(q_1, 0, 1) = (q_1, \Lambda)$

$\delta(q_1, 0, 0,) = (q_1, \Lambda)$

$\delta(q_1, \Lambda, z_0,) = (q_1, \Lambda)$

obtain CFG accepted by the above PDA.

b) Compare PDA and post machine. Design a post machine to accept the language $L = \{a^n b^{n+1} \mid n \geq 0\}$ **[9]**

Q7) a) Construct a TM for obtaining two's complement of a given binary number. Simulate TM for any string. **[8]**

b) Write a short note on : **[8]**

i) Multi - tape TM ii) Universal TM

OR

Q8) a) Compare FM, PDA, PM and TM with respect to language, grammar, powerfulness and example. **[8]**

b) Design a turing machine that accepts the language of all strings which contain 'aba' as a substring. **[4]**

c) Discuss categories of problems based on solvability with suitable example. **[4]**

Q9) a) Write a note on each of the following : **[8]**

i) Recursively enumerable language.

ii) Recursive language.

iii) Recursive Functions.

iv) Partial Recursive function.

b) Write a short note on Encoding of Turing Machine. **[8]**

OR

Q10) a) Explain post-correspondence problem. **[8]**

Let $\Sigma = \{0, 1\}$ and let A & B defined as shown in the table. Find the post correspondence sequence of integers i_1, i_2, i_3 ....., i_m for $m \geq 1$ such that wi_1, wi_2, ..., $wi_m = xi_1, xi_2$, ..., xi_m.

	A	B
i	*wi*	*xi*
1	0	000
2	01000	01
3	01	1

b) Define decidability of problem with suitable example. Describe undecidable problems for context-free Grammar. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P1358

[Total No. of Pages : 4

[4858] - 1106

T.E. (Information Technology)

SYSTEMS PROGRAMMING

(2012 Pattern) (Semester - II) (End-Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Your answers will be valued as whole.***
5) ***Assume suitable data if necessary.***

UNIT - I, II & III

Q1) a) Explain how forward reference is handled in Single Pass assembler and solve it for the given example : **[6]**

```
        START 202
        MOVER AREG, = 5
        MOVEM AREG , A
LOOP    MOVER AREG, A
        MOVER CREG, B
        ADD CREG, = '1'
        MOVEM CREG, B
        SUB CREG,A
        BC ANY, NEXT
        LTORG
        ADD CREG,B'
        BC LE LOOP
```

P.T.O.

```
NEXT    SUB AREG, = '1'
        BC LT, BACK
        STOP
        ORIGIN 219
        MULT CREG, B
A       DS 1
BACK    EQU LOOP
B       DS 1
        END
```

b) Explain different parameter passing mechanisms in Macro-processor. **[4]**

OR

Q2) a) Compare how the four basic tasks of loader are performed in BSS loading scheme and DLL scheme. **[4]**

b) Explain various advanced macro facilities like AIF, AGO, LCL, GBL, REPT and IRP statements with syntax and example. **[6]**

UNIT - I, II & III

Q3) For the code given below, show macro name table, macro definition table, Expanded code and the stack frame. **[10]**

```
MACRO
    XYZ &A, &B, &C
    READ &A
    ADD&B, ='5'
    PRINT & C
MEND
MACRO
    MIT &Z
    MACRO
        &z&W
        SUB &W, ='6'
        XYZ AREA, BREG, CR
        ADD &W, '=5'
    MEND
```

```
        ADD CREG , = '5'
    MEND
START 200
MIT HELLO
MULT BREG , = '4'
HELLO BREG
PRINT C
C DS 1
END
```

OR

Q4) a) List down various phases of compiler. What are functions of Lexical Analyzer? Explain patterns, tokens and lexemes with examples. **[6]**

b) Give the flowchart for pass I of DLL scheme. **[4]**

UNIT - IV

Q5) a) Differentiate between top down parser and bottom up parser. **[4]**

b) Generate SLR parsing table for the grammar given below and parse the string id1 + id2 + id3 * id4 **[10]**

Grammar:

$E \rightarrow E + T/T$

$T \rightarrow T * F/F$

$F \rightarrow id$

c) Explain operator precedence parser. **[4]**

OR

Q6) a) Design LR(1) parser for the given grammar. Also show the moves by the parser for input string "ab". **[10]**

$S \rightarrow aABb$

$A \rightarrow c/\epsilon$

$B \rightarrow d/\epsilon$

b) Compare SLR and LALR parsing methods. **[4]**

c) Define Handle and handle pruning w.r.t. bottom up parser. For the grammar given, **[4]**

$S \rightarrow 0S1 / 01$

Identify the handles at each step and parse the string 000111.

UNIT - V

Q7) a) Explain the following : **[8]**

i) Dependency graph of Type expression.

ii) Synthesized and inherited attributes.

b) Write the context free grammar for following and also perform syntax directed translation for the same into three address code. **[8]**

while condition do S

OR

Q8) a) Explain the need of Intermediate code generation in compiler. Generate quadruple and triple for the given expression: a = b + c * d. **[8]**

b) Write the method of generating intermediate code for the Boolean expression. **[8]**

UNIT - VI

Q9) a) Obtain the TAC for the following code before and after applying the optimization techniques using. **[12]**

i) Removal of Loop Invariants

ii) Elimination of common sub expressions

```
for (i = 1; i < = 10; i++)
    X[i][2*j–1] = Y[i][2*j–1]
```

b) Explain different intermediate code generation techniques. **[4]**

OR

Q10) a) Discuss code generation issues. **[4]**

b) Discuss with suitable example machine dependent code optimization. **[8]**

c) Write a short note on activation record. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P1359

[Total No. of Pages : 3

[4858] - 1107

T.E. (Information Technology) (Semester - II)

OPERATING SYSTEMS

(2012 Pattern) (End-Sem)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q. 8, Q.9 or Q.10.***
2) ***Figures to the right hand indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, wherever necessary.***

Q1) a) What are the OS design consideration for multiprocessor & multicare architecture? **[5]**

b) Explain different types of schedulers in an operating systems. **[5]**

OR

Q2) a) Explain any classical synchronization problem. **[5]**

b) Explain thread & process management in Android Operating System. **[5]**

Q3) a) What is deadlock? State & explain necessary conditions for deadlock. **[5]**

b) What is busy waiting with respective to process synchronization? Explain how semaphore reduces the severity of this problem. **[5]**

OR

P.T.O.

Q4) a) For the table given below draw a Gantt chart illustrating process execution using priority non-preemptive scheduling algorithm. (A larger no indicates higher priority) **[5]**

Process	A.T.	B.T.	Priority
01	0	5	4
02	2	4	2
03	2	2	6
04	4	4	3

b) What are different requirements for mutual exclusion. **[5]**

Q5) a) Write a short note on paging. **[6]**

b) For the following page reference string with 3 frames : **[12]**

A, B, C, D, E, C, D, A, F, G, H, G, H, I, G, H, I, E, D, E, D, B.

Calculate the no. of page faults for the following page replacement algorithm.

i) FIFO ii) LRU iii) Optimal

OR

Q6) a) Explain memory management in linux. **[10]**

b) What is page fault? How the OS handles when a page fault occurs and what are the actions taken by OS explain it with neat diagram. **[8]**

Q7) a) Explain different file organization techniques. **[8]**

b) Assume a disk with 200 tracks & the disk request queue has random requests in it as follows : 55, 58, 39, 18, 90, 160, 150, 38, 184. **[8]**

Find the no. of tracks traversed and average seek length if

i) SSTF

ii) SCAN

iii) C-SCAN

disk scheduling algorithm is used & initially head is at track no. 100.

OR

Q8) a) Describe 3 methods of record blocking with the help of neat diagram. **[8]**

b) Explain the different file system performance issues. **[8]**

Q9) Write a short note on the following (any three) : **[16]**

a) Service Oriented Operating System. SOOS.

b) Ubunty EDGE.

c) Android OS.

d) Embedded Linux

OR

Q10) a) Explain procedure of inserting new module in existing kernel with all necessary steps. **[8]**

b) Explain NACH OS Components in brief. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P2020

[Total No. of Pages : 2

[4858] - 1108

T.E. (Information Technology) (Semester - II)

MULTIMEDIA TECHNOLOGIES (314452)

(2012 Pattern) End Semester

Time :2.30 Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Multimedia authoring tools. Which authoring tools are used in Entertainment industry? **[5]**

b) Explain the principle of LZ compression algorithm. **[5]**

OR

Q2) a) What is an image? Distinguish between binary, grayscale and color images **[5]**

b) Explain any one image enhancement techniques using point processing. **[5]**

Q3) a) Draw the block diagram of JPEG encoder and explain in brief **[5]**

b) Discuss the fundamental characteristics of sound waves. **[5]**

OR

Q4) a) In relation to MIDI, distinguish between channel messages and system messages giving examples. **[5]**

b) Write short note on RMF and WMA file formats. **[5]**

P.T.O.

Q5) a) Why inter-frame correlation is important in video encoding? How I, P and B-frames technique help in the MPEG video compression technique? **[8]**

b) Distinguish between component, composite and S-video signal formats. Explain their applications. **[8]**

OR

Q6) a) Why do we need video file formats ? Explain H .261 and H.263 briefly. **[8]**

b) Describe MPEG-4 decoder and encoder with the help of diagrams. **[8]**

Q7) a) Explain the terms Shape Tweening and Motion Tweening with the help of an example with respect to animation. **[8]**

b) What is OPEN GL? Explain OPEN GL rendering pipeline with key stages. **[8]**

OR

Q8) a) State and explain techniques of animation. **[8]**

i) Cel animation

ii) Stop motion animation

b) How animation differs from the video? Explain tools used to create the animation. **[8]**

Q9) a) Explain the need for synchronization in multimedia applications. State and explain types of synchronizations. **[6]**

b) Explain CCD and its use in the multimedia applications. **[6]**

c) Explain with diagram Android Multimedia Framework architecture. **[6]**

OR

Q10)a) What is virtual reality? Describe the input devices used in Virtual Reality **[6]**

b) What is GStreamer? Explain. **[6]**

c) Explain Head Mounted Displays and their use in multimedia applications. **[6]**

Total No. of Questions : 10]

SEAT No. :

P1360

[Total No. of Pages : 3

[4858] - 1109

T.E. (Information Technology)

INFORMATION TECHNOLOGY PROJECT MANAGEMENT

(2012 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) State the difference between : **[4]**

i) High level design and detailed design.

ii) Unit testing and system testing.

b) Explain process used for decision making. **[3]**

c) Explain bottom up approach in effort estimation during project planning. **[3]**

OR

Q2) a) Explain the concept of SWOT analysis. **[4]**

b) Why all engineers need leadership skills? **[3]**

c) Write short note on Six sigma Process **[3]**

Q3) a) Explain 4 m's in resources for project. **[4]**

b) What are essential qualities a person should have to lead technical people? **[6]**

P.T.O.

OR

Q4) a) What is process capability baseline? Explain outcomes of it. **[4]**

b) Enlist any 6 essential contents of proposal in Project initiation. **[6]**

Q5) a) What are steps in Project monitoring and control? **[8]**

b) Explain in short importance of HR management and communication management in Project execution. **[8]**

OR

Q6) a) What are essential contents of any Project management plan? **[8]**

b) Order following 6 processes of Time Management in proper sequence and explain each of them. **[8]**

- Schedule control
- Activity Duration estimation
- Schedule Development
- Activity Sequencing
- Activity Definition
- Activity Resource estimating

Q7) a) What are the risks and benefits of ERP? **[8]**

b) Explain any 8 success factors for ERP implementation. **[8]**

OR

Q8) a) What is ERP? Why it is important to a company? **[8]**

b) Explain ERP implementation Life cycle. **[8]**

Q9) a) Explain concept of Supply chain management with suitable example. **[8]**

b) Write short note on : **[10]**

i) Software configuration management.

ii) Reverse Engineering.

OR

Q10) a) What are essential features of any IT Project management tool? **[8]**

b) Write short note on : **[10]**

i) Reengineering.

ii) Software maintenance.

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Total No. of Questions : 10]

SEAT No. :

P1361

[Total No. of Pages : 3

[4858] - 1110

T.E. (Information Technology)

DESIGN AND ANALYSIS OF ALGORITHMS

(2012 Pattern) (Semester - II) (Theory) (End Sem.)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 and Q.9 or Q.10 .***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Solve following recurrence relation : **[5]**

$T(n) = T(n/2) + 1$

$T(1) = 1$

b) Analyze merge sort and find time complexity of merge sort. **[5]**

OR

Q2) a) Write an algorithm to solve "Tower of Hanoi" problem. **[5]**

b) Consider following instance for simple knapsack problem. Find the solution using greedy method. **[5]**

$N = 8$

$P = \{ 11, 21, 31, 33, 43, 53, 55, 65\}$

$W = \{1, 11, 21, 23, 33, 43, 45, 55\}$

$M = 110$

Q3) a) Write Prim's algorithm to find minimum spanning tree. **[5]**

b) What is Principle of optimality? Differentiate between greedy and dynamic method. **[5]**

P.T.O.

OR

Q4) a) Write Dijkstra's algorithm to find all pairs shortest path. **[5]**

b) Write short note on : Proof by counterexample. **[5]**

Q5) a) Write an algorithm to find hamiltonian path using backtracking method. **[8]**

b) Differentiate between backtracking and branch and bound. Draw state space tree for given sum of subset problem : **[8]**

Set of elements = {3, 5, 6, 7} and d = 15

OR

Q6) a) What is backtracking? Write general recursive algorithm for backtracking. **[8]**

b) Discuss and analyze problem of graph coloring using backtracking with the help of example. **[8]**

Q7) a) Describe in brief the general strategy used in branch and bound method. Write general algorithm for Branch and Bound Method. **[10]**

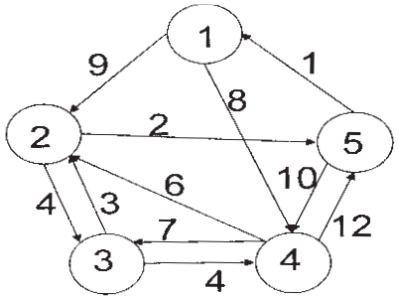
b) Consider 0/1 Knapsack instance n = 4 with capacity 10 kg. such that **[8]**

Item	Profit (in Rs.)	Weight (in Kg)
1	40	4
2	42	7
3	20	5
4	12	3

Find maximum profit using Least Cost branch and bound (LCBB) method. Use fixed size formation for state space tree.

OR

Q8) What is travelling salesman problem? Find the solution of following travelling salesman problem using branch and bound method. **[18]**



Q9) a) Prove that vertex cover problem is NP complete. **[8]**

b) Explain in detail models for parallel computing. **[8]**

OR

Q10) a) Explain : NP-Hard, NP-Complete, Decision Problem and Polynomial Time Algorithm. **[8]**

b) Write an algorithm for pointer doubling problem. What is the time complexity of this algorithm? **[8]**

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