[4958] - 1001

T. E. (Civil)

HYDROLOGY AND WATER RESOURCES ENGINEERING

(2012 Course) (Semester - I)

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) How hydrology is interdisciplinary science? **[5]**

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

OR

Q2) a) State the formula to calculate optimum number of raingauges. Explain the terms in the formula. **[5]**

b) State deltas for Gram, Maize, Sugarcane, Rice and cotton also explain methods to improve duty. **[5]**

Q3) a) Differentiate between furrow irrigation and Drip irrigation system. **[5]**

b) Explain with neat sketch tipping bucket type gauge to determine the stage of river and also state the advantages of this gauge. **[5]**

OR

Q4) a) Derive the formula to calculate discharge of a well in a confined aquifer. **[6]**

b) State various types of tube wells and explain construction of Slotted Type Tube well. **[4]**

Q5) a) What is hydrograph? Explain all the parts of the typical hydrograph. Explain fern shaped catchment. **[8]**

b) Maximum values of 24 hour precipitation (mm) at a Rainguage station are 140, 113, 132, 115, 130, 118, 127, 123, 121. Estimate maximum and minimum precipitation having a recurrence interval of 5 and 15 years. Use Hazen's Method. Use graphical method. **[10]**

OR

Q6) a) What is S- curve hydrograph? Explain its construction with sketch. **[8]**

b) In a 10 hr storm rainfall depths occurred over a the catchment are **[10]**

Hour	1	2	3	4	5	6	7	8	9	10
Depths (cm/hr)	1	1.5	5	6	10.5	8.5	9	7	1.5	1.5

Surface runoff resulting from the storm is equivalent to 20 cm of depth over the catchment. Determine

i) Average infiltration, and

ii) Average rate of infiltration.

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 ancient system of water distribution which still exist in North Maharashtra. **[8]**

b) Explain Global Water Partnership. (GWP) **[8]**

OR

*Q10)*a) What is water logging? Explain tile drain method and also state formula for spacing of tile drains. **[8]**

b) Draw a neat section for lift irrigation scheme and state various components of lift irrigation scheme. Explain various design steps in lift irrigation system. **[8]**

෴෴෴

[4958]-1002

T.E. (Civil)

STRUCTURAL ANALYSIS - II

(2012 Pattern) (Semester - I)

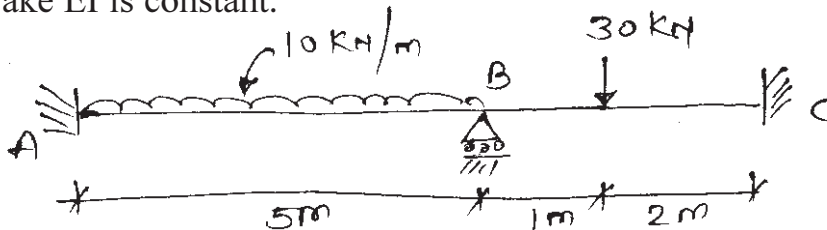*Time : 2½ Hours*   *[Max. Marks :70]*
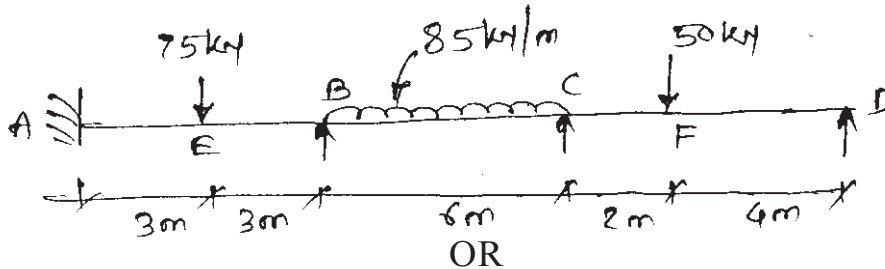
Instructions to the candidates:

    1)   Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or 6, Q.7 or Q.8.

    2)   Figures to the right indicate full marks.

    3)   If necessary, assume suitable data & indicate clearly.

    4)   Use of electronic pocket calculator is allowed.
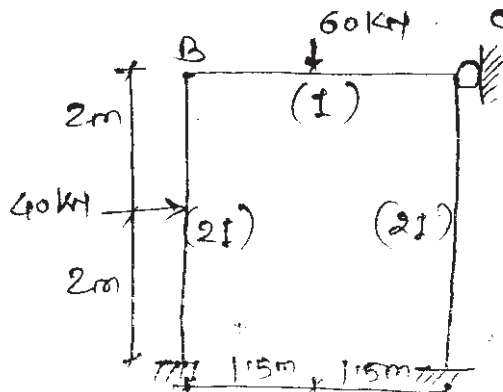
Q1) a)   Analyse the beam by slope deflection method. Draw BMD & SFD. Take EI is constant.   **[10]**
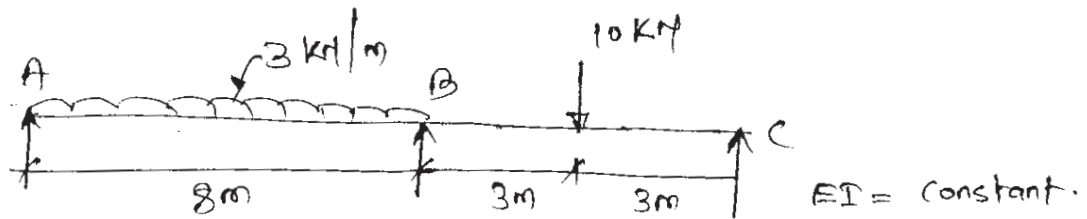

    b)   Analyse the continuous beam shown in figure using flexibility method & draw the bending moment diagram.   **[10]**

OR

Q2) a)   Analyze the frame as shown in figure. The relative value of 'I' of each member are indicated in figure. 'E' is constant. Use slope deflection method.   **[10]**

b) Analyse the continuous beam shown in figure below by moment distribution method. Draw BMD & SFD. **[10]**

Q3) Analyse the beam shown by stiffness matrix method. Draw BMD & elastic curve. EI = Constant. **[16]**

OR
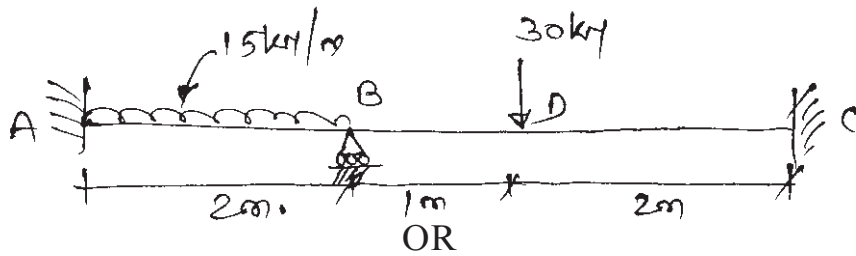
Q4) Analyse the frame by stiffness Matrix Method & Sketch BMD. Take EI = Constant. **[16]**
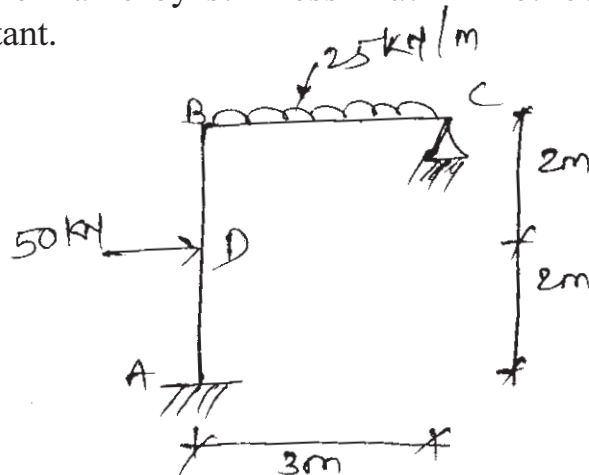
Q5) a) Analyse the frame by using cantilever Method. Area of each exterior column is one half area interior column. **[12]**
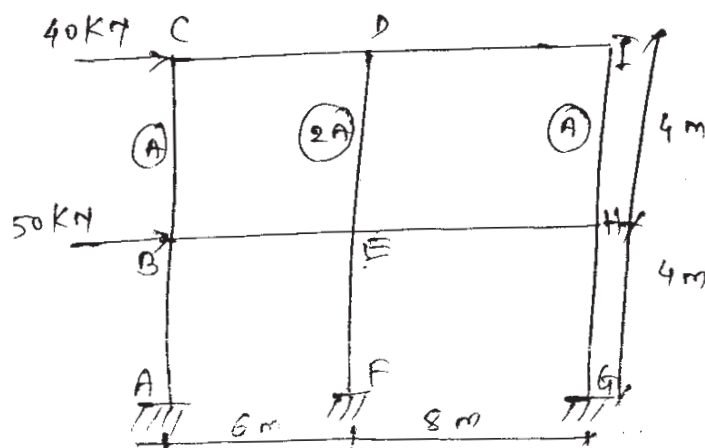
b) A simply supported beam of length 5m is loaded as shown in figure. Determine the maximum deflection. **[6]**
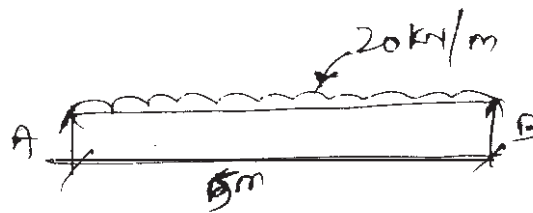
OR

Q6) a) Analyse the frame as shown in Q.5 (a) by portal method. **[10]**

b) The beam is loaded & supported as shown in figure. Determine deflection at nodal points. Take 3 nodes. **[8]**
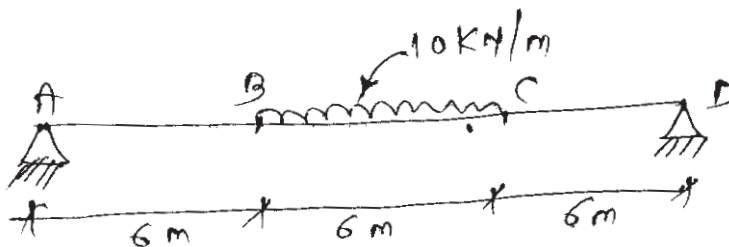
Q7) a) Explain. **[8]**

   i) Nodes.

   ii) CST.

   iii) LST

   iv) QST.

b) Explain plain stress & plain strain problem. **[8]**

Q8) a) Differentiate between Axisymmetric & Isoparametric element. **[8]**

b) Explain shape function & state properties of shape function. **[8]**

[4958]-1003

T.E.(Civil)
STRUCTURAL DESIGN-I
(2012 Course) (Semester-I)(End Semester)

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

Instructions to the candidates:
1) *Answer Q1 or Q2,Q3or Q4, Q5 orQ 6 , Q 7 or Q8, Q9 or Q10.*
2) *Neat sketches must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Take Fe 410 grade of steel.*
5) *Take ultimate stress in bolt,f_{ub}=400N/mm²*
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.*

SECTION-I

Q1) a) Explain advantages of Limit state method over working stress method.**[4]**

b) Determine design compressive strength of an ISA 125 ×95×10 @ 16.5kg/ m in which longer leg connected to the gusset plate of thickness by 3number of M20 black bolts of 4.6 grade. **[6]**

OR

Q2) a) The built-up sections are preferred instead of rolled steel sections for a column of industrial building. Justify it. **[4]**

b) Design a suitable single equal angle section to carry a factored tensile force of 200kN. Use 5 mm size of fillet weld. **[6]**

Q3) Design a gusseted base for a built up column ISHB 350 @67.8kg/m with two plates 450×22 mm carring an axial factored load of 3000 kN. The column is supported on concrete pedestal of M20grade. Draw the design sketches.**[10]**

OR

Q4) a) Define a beam-column with suitable sketches. **[4]**

b) In a truss a principal rafter 2.1 m long consist of 2 ISA 100×100×6 mm connected to gusset by fillet weld. Find the design compressive strength of the member. **[6]**

Q5) **a)** Explain modes of failure of beam with suitable sketches. **[6]**

b) Design a simply supported, laterally supported beam of effective span 10 m carrying a total factored load of 60kN/m including self-weight. The depth of beam is restricted to 500 mm. Assume stiff bearing length is 175mm. **[10]**

OR

Q6) Determine the safe uniformly distributed load excluding self weight the section ISLB 600 @ 99.5 kg/m has been used as a simply supported beam over 7.2 m span. The compression flange is unrestrained against lateral buckling. At the end beam is fully restrained in torsion but both the flanges are free to wrap at the ends. **[16]**

SECTION-II

Q7) **a)** A beam ISLB 300 @ 37.7 kg/m carrying uniformly distributed load 50kN/m has an effective span of 8m is to be connected to the web of beam ISMB450 @ 72.4Kg/m. Design the framed connection using M20 black bolts. **[8]**

b) An ISMB 450 @ 72.4 kg/m is connected to the flange of a column ISHB 300 @58.8Kg/m. The end reaction is transmitted by the beam is 120kN. Design an unstiffened seated connection using M20 black bolts. **[8]**

OR

Q8) A plate girder subjected to a maximum factored moment 4000 kN-m and a factored shear force 600kN. Find the preliminary sections for the following condition and cross-sections. **[16]**

a) Girder without any stiffener.

b) Girder with end bearing transverse stiffener.

c) Girder with end bearing as well as intermediate transverse stiffener.

Q9) A truss shown in Figure is spaced at 5m c/c used for an industrial building situated at Pune. The truss is covered with AC sheets of weight $180N/m^2$. Calculate the panel point dead, live, and wind load. Design members L_0, L_1, U_1, L_1 and L_0U_1. Assuming $k_1=1, k_2=0.98$ and $k_3=1$ and $(Cpe-Cpi) = \pm 0.8$. Draw the design sketches. **[18]**
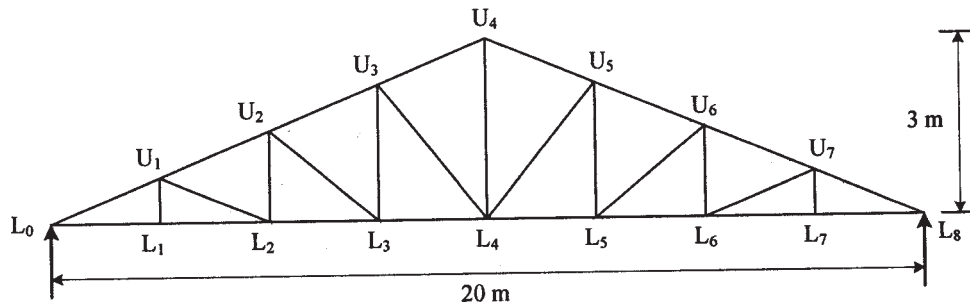
OR

Q10) Design a gantry girder supporting an electronically operated crane to the following data: **[18]**

Capacity of crane = 120 kN

Span between crane rails = 20 m

Self-weight crane girder = 100 kN

Weight of crab, electric motor, Hook etc.= 15kN

Minimum hook approach = 1.2m

Wheel Base = 2 m

Span of Gantry = 5.5 m

[4958] - 1004

T. E. (Civil)

FLUID MECHANICS - II

(2012 Course) (301005) (Semester - I)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q. No.1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 11 or 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)   What is wake formation in flow around submerged bodies & why is wake developed? What is the affect of wake on the body & different methods to reduce wake formation.   **[4]**

   b)   A submarine is moving in sea water of density 1030 kg/m³ at a velocity of 12 km/hr. The periscope of submarine is 10 cm in diameter. Find the frequency of vortex shedding & the force per metre length of periscope. Find, also the Strouhl's No. Assume C_D for periscope = 0.25, kinematic viscosity = 1.25×10^{-6} m²/s.   **[4]**

OR

Q2) a)   Briefly discuss the effect of time of closure of valve on the rise of pressure in a pipe line. What is the best method to avoid water hammer effect in pipe lines.   **[4]**

   b)   Derive the expression for celerity of elastic wave through flow medium.**[4]**

Q3) a) Briefly explain the velocity distribution in open channel. What is the effect of shape & surface roughness on velocity distribution in open channel. **[3]**

b) A trapezoidal channel has a bottom width of 10 m & side slopes of 2 horizontal to 3 vertical. If the depth of flow is 4.5 m & Chezy's C = 55, find the discharge. Assume the bed slope of channel as 1 in 4000. **[3]**

OR

Q4) a) What are the various conditions for critical flow to occur in open channel? Explain the methods to calculate the critical depth for an trapezoidal channel section. **[3]**

b) A water channel is V shaped, each side making an angle of 45° with vertical. Calculate the discharge when depth of water is 0.3 m & bed slope is 1 in 500.Take C = 50. **[3]**

Q5) a) A Rectangular channel is 4.0m wide & carries a discharge of 3.2 m³/s with a depth of flow 0.8 m. If Manning N = 0.016 find

    i) Specific Energy

    ii) Specific force

    iii) Bed slope **[3]**

b) Derive the conditions for most efficient or economical triangular channel section. **[3]**

OR

Q6) a) What are the various assumption in the analysis of hydraulic jump? **[2]**

b) At the toe of an hydraulic jump the Froude No & depth of flow are 9 & 0.3 m respectively. Estimate the specific energy head at the heel of jump. **[4]**

Q7) a) Derive the equation for force, workdone, & maximum efficiency developed by a jet of water on a series of flat plates fixed on the periphery of wheel. **[8]**

b) A discharge of 0.01m³/s moves out of a nozzle at a velocity of 25 m/s & strikes at one tip of a curved vane such that it is deflected through an angle of 120°. Find **[8]**

    i)   Force exerted & work done by jet on vane in the direction of motion, when plate is fixed.

    ii)   Work done when vane moves with velocity of 10m/s.

    iii) Work done & maximum efficiency on a series of vane.

OR

Q8) a) Compare centrifugal & Reciprocating pump. What are the different types of casing for a centrifugal pump & explain any one with neat sketch.**[4]**

    b) What is multistage certrifugal pump & explain **[4]**

       i)   Impeller in series &

       ii)   Impeller in parallel

    c) The impeller of an centrifugal pump running at 1000 rpm against a head of 15m. It has a diameter of 30 cm, width of 5 cm & vane angle, at exit of 30°. Find **[8]**

       i)   Absolute velocity of water at outlet.

       ii)   Velocity of flow at outlet

       iii) Angle of absolute velocity at outlet

       iv) Discharge developed by pump

Q9) a) Explain the working principle of an impulse turbine. Explain with example the classification of turbine based on **[8]**

       i)   Specific speed

       ii)   Head on turbine

       iii) Action of water

       iv) Direction of flow of water

    b) A Pelton wheel runs at 450 rpm under an effective head of 175m. The ratio of nozzle diameter to pitch circle diameter is $\dfrac{1}{10}$. Assuming overall efficiency of 85%, determine **[8]**

       i)   Size of wheel

       ii)   Size of jet

       iii) Discharge of water required

       iv) Power developed

OR

*Q10)*a) For an inward flow reaction turbine, draw inlet & outlet velocity triangle & derive the condition for maximum efficency of turbine. **[6]**

b) What are unit & specific quantity? Derive the expression for **[4]**
   i) Unit discharge
   ii) Unit power of a turbine.

c) A turbine having an efficiency of 85% runs at 350 rpm at an head of 20m. If the discharge through turbine is 12m³/s find **[6]**
   i) Power developed
   ii) Specific speed
   iii) Type of turbine
   iv) Performance under a head of 15 m.

*Q11)*a) State the assumption made in the analysis of gradually varied flow. What is the concept of wide rectangular channel. Derive the dynamic equation for wide rectangular channel using Manning & Chezy formula. **[8]**

b) What is the criteria for classification of channel slope, and list out the various possible types of channel slope. **[4]**

c) Draw the flow profile in the following giving the governing equation for developing the profile. **[6]**
   i) Zone 3 on adverse slope
   ii) Zone 2 on horizontal slope
   iii) Zone 3 on vertical slope

OR

*Q12)*a) What is control section? Discuss the location of control section with Froude No. **[4]**

b) What are the various methods for finding the length of flow profile? Explain graphical integration method & any one method of direct integration method of finding the length of flow profile. **[6]**

c) A discharge of 20m³/s flows through a rectangular channel of 10 m width and a bed slope of 1 in 4000. At a particular section the depth of flow is 1.2m. Determine how far U/S or D/S the depth of will be 1.8m. Take Manning N = 0.02. Use step method & take 2 steps. **[8]**

ೞಓೞಓ

[4958]-1005

T.E. (Civil)
INFRASTRUCTURE ENGINEERING
(2012 Course) (Semester - I) (301002) (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 side indicate full marks.*

 4)   *Assume suitable data if necessary.*

Q1) a)   Discuss in detail provisions made for infrastructure of railway with reference to 12th five year plan.   **[5]**

   b)   What are the functions of rails? Name the various types of rail in use.**[5]**

OR

Q2) a)   Explain in detail role of construction sector in economic development of country.   **[5]**

   b)   Write short note on: Requirement of good ballast.   **[5]**

Q3) a)   What do you mean by PPP. State the advantages and disadvantages of PPP.   **[5]**

   b)   Explain in brief slip form pavers.   **[5]**

OR

Q4) a)   Discuss various provisions proposed in the 12th five year plan for energy and power sector.   **[5]**

   b)   State the requirements of good track.   **[5]**

Q5) a) Enlist the various methods of tunneling in Hard rock. Explain any one method. **[6]**

b) Write down advantages and disadvantages of tunnel. **[6]**

c) What are the precaution to be taken during construction of tunnel. **[4]**

OR

Q6) a) Classify the tunnel according to their purpose. **[6]**

b) Discuss advantages and disadvantages of TBM. **[6]**

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

Q7) a) Define harbour. State the requirements of good harbour. **[6]**

b) Explain in brief following: **[6]**

i) Dry dock   ii) fenders   iii) Jetties

c) Explain in detail vertical wall breakwater. **[4]**

OR

Q8) a) Explain in brief merits and demerits of water transportation. **[6]**

b) Draw the schematic diagram of harbor layout showing all components. **[6]**

c) Differentiate between wharves and quay. **[4]**

Q9) a) Construction machinery costs Rs. 50,000. Its useful life is 6 years. The salvage value at the end of five year is Rs. 5000. Estimate the yearly depreciation of the equipment using; **[6]**

i) Straight line method

ii) Double - declining balance Method

b) What are the types of scraper? Explain the working of scraper. **[6]**

c) Explain with sketch working of drag line. **[6]**

OR

Q10) a) Discuss in detail Power shovels. **[6]**

b) State the various preventive maintenance of equipment. **[6]**

c) Write short note on: loaders. **[6]**

✗   ✗   ✗

[4958] - 1006

T.E. (Civil)

ADVANCE SURVEYING

(2012 Course) (Semester - II)

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)   Define,   **[5]**

      i)   Well conditioned triangle

      ii)   Strength of a figure

      iii)   Accuracy of triangulation

      iv)   Towers

      v)   Phase of a signal

   b)   State any five advantages of space based positioning systems.   **[5]**

OR

Q2) a)   Define triangulation, state the object of triangulation and state its applications.   **[5]**

   b)   Describe briefly various applications of Global Positioning System. **[5]**

P.T.O.

Q3) a) Explain the three point problem and method of solution of three point problem using Tracing paper and station pointer method. **[5]**

b) Describe in brief how location survey for pier of a bridge is carried out at site. **[5]**

OR

Q4) a) State various methods of locating the position of boat in hydrographical surveying and explain briefly. **[5]**

i) One angle from the shore and other from the boat

ii) Intersecting ranges

b) Describe the procedure for setting out of pipelines and sewers, explain with a sketch. **[5]**

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

b) Define the following terms **[5]**

i) Conditioned equation

ii) Weight of an observation

iii) Most probable value

iv) Mistake

v) True error

c) The angles were A, B were measured as follows. Find the most probable values of the angles A and B (Use direct method) **[8]**

Angle	Weight
A = 45° 30' 10"	2
B = 40° 20' 20"	3
A+B = 85° 50' 10"	1

OR

Q6) a) Explain laws of weight. **[5]**

b) Explain step by step procedure for figure adjustment for a geodetic quadrilateral without central station. **[5]**

c) Neglecting the spherical excess, adjust the angle of triangle of which observed values are (Use method of correction) **[8]**

Angle	Weight
Angle A = 48° 18' 22"	3
Angle B = 76° 32' 47.2"	1
Angle C = 55° 08' 53.8"	3

Q7) a) Write a note on Radial line method of plotting. **[5]**

b) Write short notes on: Crab and Drift **[5]**

c) The scale of aerial photograph is 1 : 25000, effective at an average elevation of terrain of 335 m. The size of aerial photograph is 230 mm × 230 mm. Focal length of camera lens is 200 mm. Speed of aircraft is 270 km/h, longitudinal overlap is 65% and side overlap is 28%. Determine the number of photographs required to cover an area of 150km × 105 km. **[6]**

OR

Q8) a) Define the following terms **[5]**

　　i) Air base distance

　　ii) Relief displacement

　　iii) Oblique photograph

　　iv) Principal point

　　v) Mosaic

b) Define Ground Control Points, state their role in photogrammetry and bring out difference between pre marked and post marked Ground Control Points (GCP). **[5]**

c) A line measured 11.00 cm on a photograph taken with camera having focal length of 21.5 cm. The same line measured 3 cm on a map drawn to the scale 1:45000. Calculate the flying height of the aircraft, if the average altitude is 350m. **[6]**

Q9) a) Define remote sensing. State importance of digital image processing.**[5]**

b) What is GIS? State various GIS software's and explain how remote sensing and GIS are linked? **[5]**

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

OR

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

b) Enlist advantages and limitations of remote sensing. **[5]**

c) Discuss in brief the various data sources to build GIS for civil engineering applications such as watershed development. **[6]**

ೞೲಊೞೲಊ

[4958]-1007

T.E. (Civil)

FOUNDATION ENGINEERING

(2012 Pattern) (End Semester) (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, Q7 or Q.8 and Q.9 or Q.10.*

2) *Answer to the two sections should be written in separate books.*

3) *Figures to the right indicate full marks.*

4) *Use of logarithimic tables, slide rule, Mollier charts, electronics pocket calculator and steam tables is allowed.*

5) *Assume suitable data, if necessary.*

6) *Neat diagrams must be drawn wherever necessary.*

Q1) Explain with neat sketch standard penetration test. Define standard penetration number. State various corrections applied to this number. **[7]**

OR

Q2) Define the term: inside clearance, outside clearance and area ratio. A sampling tube of 15 cm internal diameter is 1m thick. It is fitted with a cutting edge. The inside diameter of cutting edge is flushed with sampling tube. The cutting edge is 1.2 mm thick. Compute inside clearance, outside clearence and area ratio. Comment on sample collected by this tube. **[7]**

Q3) State Terzaghi's bearing capacity equation for strip, circular, square footing and describe all the terms. **[6]**

OR

Q4) A column carries a load of 1000 KN resting on dry sand weighing 20 KN/m^3 and having angle of internal friction as 35°. Find the size of square footing resting on ground surface. The required Terzaghi's bearing capacity Nc=57.8, Nq=41.4 and Nr=42.4. **[6]**

P.T.O.

Q5) Define Differential settlement. What is angular distortion? Explain causes and technique to reduce differential settlement. **[7]**

OR

Q6) A consolidation test performed in laboratory on a sample of clay having thickness of 2.3 cm indicates that half the ultimate compression occurs in the first 5 min. Under the similar condition, how long will be required for a building on 6 m layer of the same clay to experience half of its final settlement. **[7]**

Q7) a) Define Negative Skin Friction. How it is determined. Also explain how it is prevented. **[6]**

b) Design square pile group to carry 500 kN load in clay with an unconfined compressive strength of 80 kN/m². The pile are 30cm diameter and 8m long and adhesion factor 0.6. Use FS=3. **[6]**

c) Discuss the necessity of pile foundation. **[6]**

OR

Q8) a) Enlist the classification of piles and explain with neat sketch pile classified with respect to function. **[6]**

b) Draw the neat sketch of Well Foundation showing all components and state function of each. Also enlist various forces acting on well foundation. **[6]**

c) Write a short note on caisson disease. **[6]**

Q9) a) What is coffer dam? Discuss the types of coffer dam. Explain any one in detail. **[6]**

b) List out the various techniques of soil improvement. Explain any one.**[6]**

c) Explain any four engineering problem associated with black cotton soil.**[4]**

OR

*Q10)*a) Explain design principle of undreamed pile. **[6]**

b) Explain in details about the R.C. diaphragm wall method. **[6]**

c) Explain vibro-floatation method of soil improvement. **[4]**

*Q11)*a) State the various function of geosynthetic materials and explain any two function with suitable example? **[6]**

b) What is liquefaction? Discuss the effect of liquefaction. **[6]**

c) What is strong ground motion? Write down any four characteristic of strong ground motion. **[4]**

OR

*Q12)*a) Write down the classification of geosynthetics and explain any two geosynthetic with suitable example. **[6]**

b) Differentiate between P-wave and S-wave. **[6]**

c) Explain with neat sketch mechanism of reinforced soil. **[4]**

🌢 🌢 🌢

[4958]-1008
T.E.(Civil Engg.)
ENVIRONMENTAL ENGG.-I
(2012Pattern) (Semester-II)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

 1) *Answer Q.1 or Q.2,Q.3or Q.4, Q.5 or Q.6 , Q .7 or Q. 8, Q .9 or Q.10 , Q.11 or Q. 12.*
 2) *Neat diagram must be drawn wherever necessary.*
 3) *Assume suitable data, if necessary.*

Q1) a) Explain various techniques used to control noise pollution? **[3]**

 b) Explain. **[3]**

  i) Frequency

  ii) Sound pressure Level

  iii) Wavelength of sound

OR

Q2) a) Explain the effect of various atmospheric stability conditions on dispersion of air pollutants. **[3]**

 b) Explain in brief the method of calculating resultant noise level when there are number of sources of noise existence. **[3]**

Q3) a) How is provision made for fire demand in water supply scheme. **[4]**

 b) Describe various types of screens used for screening the water? **[4]**

OR

Q4) a) What are the different types of pipes available for use in water supply scheme? **[4]**

 b) Describe different phases involved in water supply scheme? **[4]**

Q5) Enumerate and discuss in brief the various physical,chemical and bacterial characteristics of testing of raw water supplies. What steps would you take in order to make them fit for drinking? **[6]**

OR

Q6) Explain cascade Aeration? How aeration is achieved in trickling beds? Explain with neat, labeled sketch? **[6]**

Q7) a)   Define the terms: **[4]**

   i)   Detention period

   ii)   Discrete particle

   iii)   Surface loading

   iv)   Mean Velocity Gradient(G)

b)   Design a rectangular plain sedimentation tank for the following data, **[6]**

   i)   desired average outflow from sedimentation tank=275m³/hr

   ii)   water lost in desludging=2%

   iii)   Minimum number of particles to be removed=0.02mm

   iv)   Expected removal efficiency of minimum size particles=70%

   v)   specific gravity of particles=2.65

   vi)   Assumed performance of settling tank=good=n=1/4

   vii)   kinematic viscosity of water at 20°C=1.10 X10⁻⁶m²/sec

   viii)   L:B=4:1

   ix)   Detention time=3.5hrs

c)   Enlist and Explain operational troubles associated with rapid sand filters**[6]**

OR

Q8) a)   What do you understand by Coagulation and Flocculation? Why are they necessary?   **[4]**

b)   A filter unit is of size 4.5MX 9M. After filtering 10000m³/d in 24 hour period, the filter is backwashed at the rate of 10 lit/m²sec for 10min. Compute average filtration rate, quantity and percentage of treated water used in washing and rate of waste water flow in each trough. The unit has 4troughs.   **[6]**

c)   What are the merits and Demerits of Rapid sand filters as compared with slow sand filters?   **[6]**

Q9) a)   Enlist various methods of color and odour removal and explain any one?   **[4]**

b)   Chlorine usage in treatment of 25000m³/day is 9kg/day, The residual chlorine after 10 min contact time is 0.2mg/lit. Calculate the dosage in milligram per litre and chlorine demand of water.   **[6]**

c) Explain the necessary chemical reaction "Lime soda process" of water softening. Also explain advantages and disadvantages of this method.**[6]**

OR

*Q10)*a) Compare "Lime soda" and Zeolite process? **[4]**

b) What do you understand by desalination? Why it is important? Explain in short Electrodialysis for desalination? **[6]**

c) What do you know about fluoridation"? Why it is necessary? Explain any three methods of removing excess fluorides from water? **[6]**

*Q11)*a) Write a short note on Mass curve method. **[4]**

b) Explain methods of Rainwater Harvesting? **[6]**

c) Write a short note on various methods for detection of water wastage? Explain how this wastage can be prevented? **[6]**

OR

*Q12)*a) Explain RO process with a neat sketch. **[4]**

b) Describe the various methods of distributing water and discuss advantages and disadvantages of each? **[6]**

c) Which methods are adopted for packaged water treatment plant? Explain the working of pressure filters? **[6]**

◆▶ ◆▶ ◆▶

[4958]-1009

T.E. (Civil)
STRUCTURAL DESIGN -II
(2012 Course) (Semester - II) (End - Semester) (301010)

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

Instructions to the candidates:

   1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10, Q11 or Q12.*
   2) *Figures to the right indicate full marks.*
   3) *Use of IS 456-2000 and non programmable calculator is allowed.*
   4) *Neat diagrams must be drawn wherever necessary.*
   5) *Mere reproduction from IS code as answer, will not be given full credit.*
   6) *Assume any other data, if necessary.*

Q1) a)   Explain the meaning of balanced section with respect to WSM and LSM.
                                                                              [3]

    b)   Describe modes of failures of concrete beam.   **[3]**

<div align="center">OR</div>

Q2) Design a R.C.C Beam subjected to bending moment of 75 kN-m, using M20 and Fe415. Keep the depth of beam twice the width of beam. Use WSM.**[6]**

Q3) A simply supported beam over a span of 6 m carries a UDL of 40 kN/m throughout if the size of the beam is restricted to 230 x 525 overall and effective cover for reinforcement is 40 mm using M20 and Fe 415, design the suitable reinforcement for the beam using LSM.   **[8]**

<div align="center">OR</div>

Q4) A T-Beam has the following details   **[8]**

    a)   Width of flange = 1150 mm

    b)   Depth of flange = 110 mm

<div align="right">*P.T.O.*</div>

c)   Width of rib = 300 mm

d)   Effective depth = 500 mm

e)   Tension steel - 4 No's 25 mm dia

Material - M20 and Fe 500 Using LSM, Find

     i)   Position of neutral axis

     ii)   Type of section

     iii)   Ultimate flexural strength

Q5) The center line plan of a typical floor of residential building is as shown in Fig.1. Design the cantilever slab panel S3 only for flexure by L.S.M.   **[6]**

Draw neat sketches showing details of reinforcement.

a)   Take live load = 4 kN/m²

b)   Floor finish = 1.5 kN/m²

c)   Materials: M25 and Fe 415
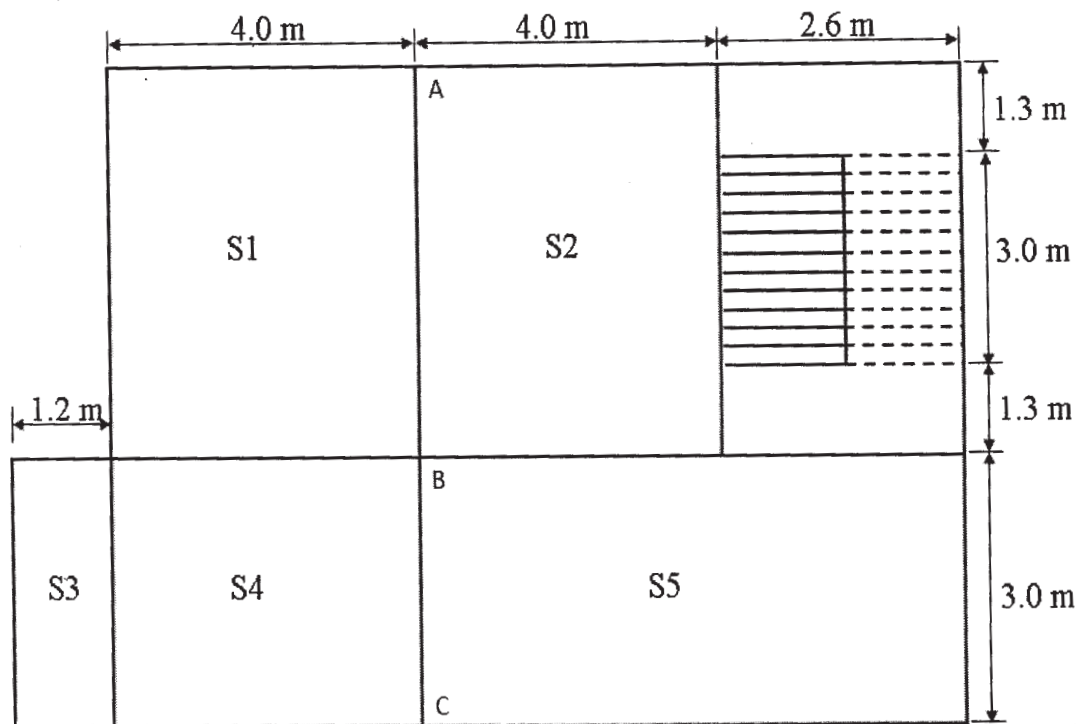
Fig 1: Center line plan of a typical floor of building

OR

Q6) Design slab panel S4 as shown in Fig. 1 only for flexure. Use same data in Question 5. Draw neat sketches showing details of reinforcement. Use LSM. **[6]**

Q7) Design a continuous beam ABCDE (AB = BC = 3.25 m and CD = DE = 3.5m) for flexure and shear using IS code method for following data: LSM is recommended **[16]**

Dead load = 18 kN/m

Live load = 12 kN/m

Grade of concrete = M 20

Grade of steel = Fe 415

Draw details of reinforcement at mid span and at continuous support.

OR

Q8) a) Design reinforcement required for a rectangular RC beam section for following data: **[10]**

Size of beam (b X D) = 300 mm X 450 mm

Factored shear Vu = 50 kN.

Factored bending moment Mu = 85 kN -m

Factored torsional moment Tu = 35 kN -m

Grade of concrete = M 20 Grade of steel = Fe 415

Draw the detail of reinforcement

b) A RCC beam of size 230 x 525 mm overall having clear cover of 25mm is reinforced with 3 no's 16 mm dia bars throughout and 2 no's of 12 mm dia curtailed is provided over a span of 5 meter along with 8 mm dia two legged stirrups about 175 mm c/c throughout by using M20 and Fe 415 calculate what ultimate UDL the beam can carry including self weight. **[6]**

Q9) Design a continuous floor beam ABC as shown in Fig. 1 for flexure and shear using 15% redistribution of moments using LSM. Thickness of the all floor slab is 150 mm; live load and floor finish load on all slabs are 4.0 kN/m² and 1.5kN/m², respectively. The wall on this beam is 230 mm thick and 2.75 m high. Use M 20 and Fe 415 steel. Show details of load calculations, bending moment envelop and main and shear reinforcement.   **[18]**

OR

*Q10)*Design a rectangular column and its footing subjected to working axial load of 700 kN, along with a working moment of 75 kN -m about an axis bisecting the depth. The unsupported length of column is 3.5 m. Assume column is effectively held in position and restrained against rotation. Grade of concrete is M 20 and steel as Fe 415. Take SBC of strata as 200kN/sq-m. Use charts for column design.   **[18]**

*Q11)*Design an axial loaded short column and its Isolated footing carrying axial load of 1200 kN, the column is having unsupported length as 3.3 m and both ends hinged assume M20 and Fe500 and SBC of soil as 200kN/sq-m.   **[16]**

OR

*Q12)*Design a short column to carry working load of 1000kN and working moment of Mx = 100kN-m and My = 25 kN-m acting about axis bisecting the depth and width of column respectively the unsupported length of column is 4.5 m assuming both ends of columns are fixed. Also design the footing considering axial load and moment about major axis only. Take SBC of soil as 210kN/sq-m. Use M 20 and Fe415. Show detail calculations and details of Reinforcements.   **[16]**
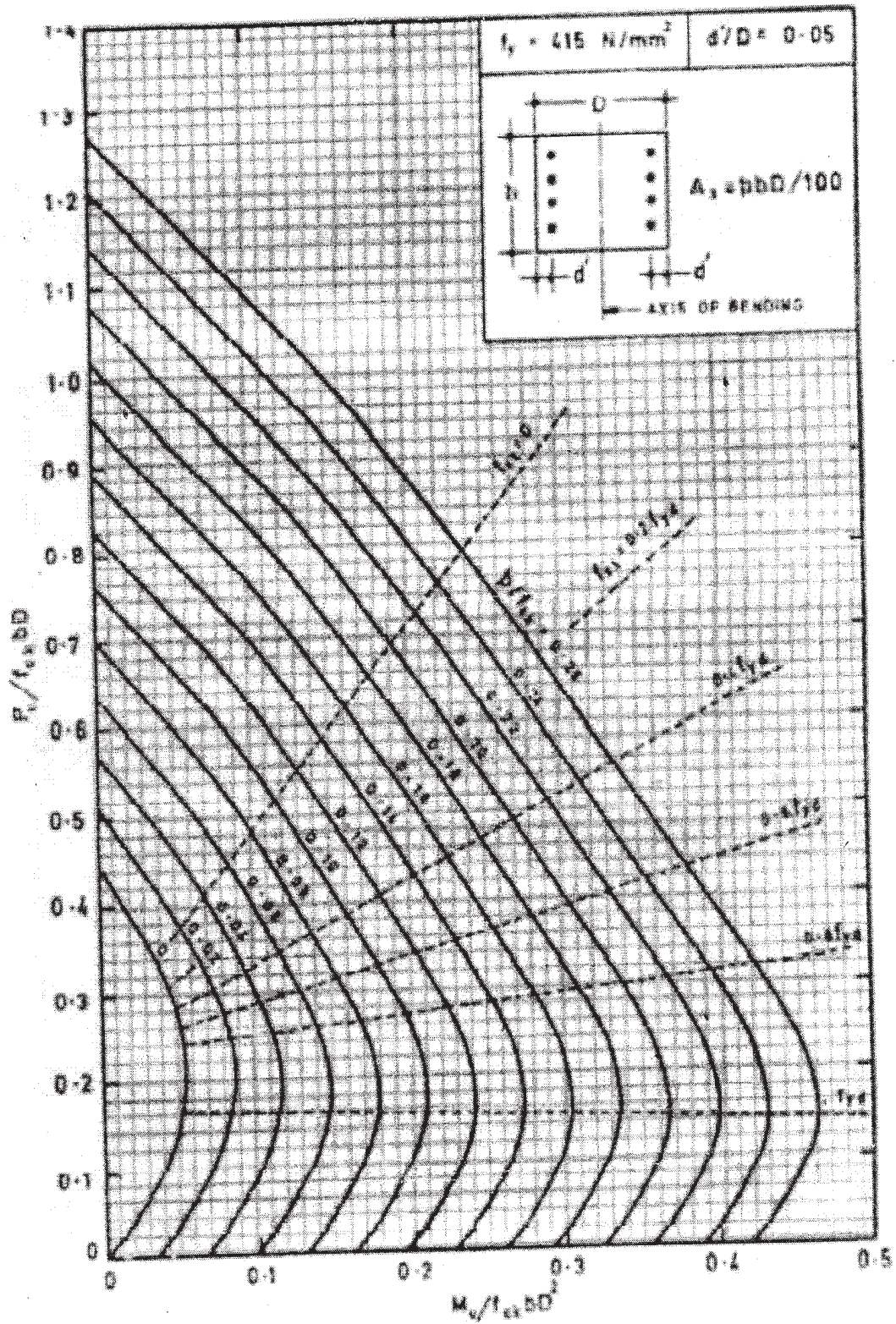
SP 16 Chart 32 COMPRESSIONS WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides
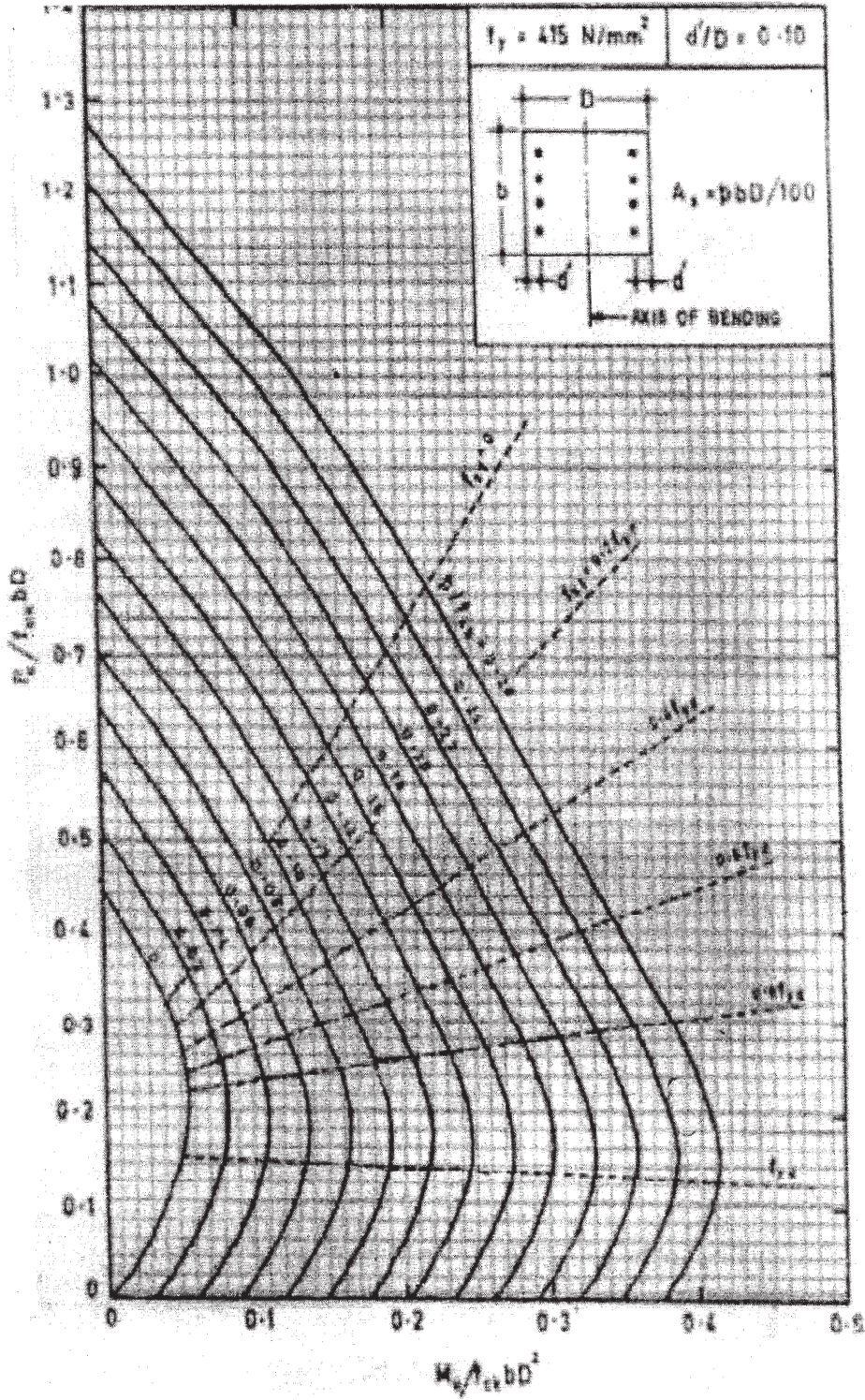
SP 16 Chart 33 COMPRESSIONS WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides

E E E
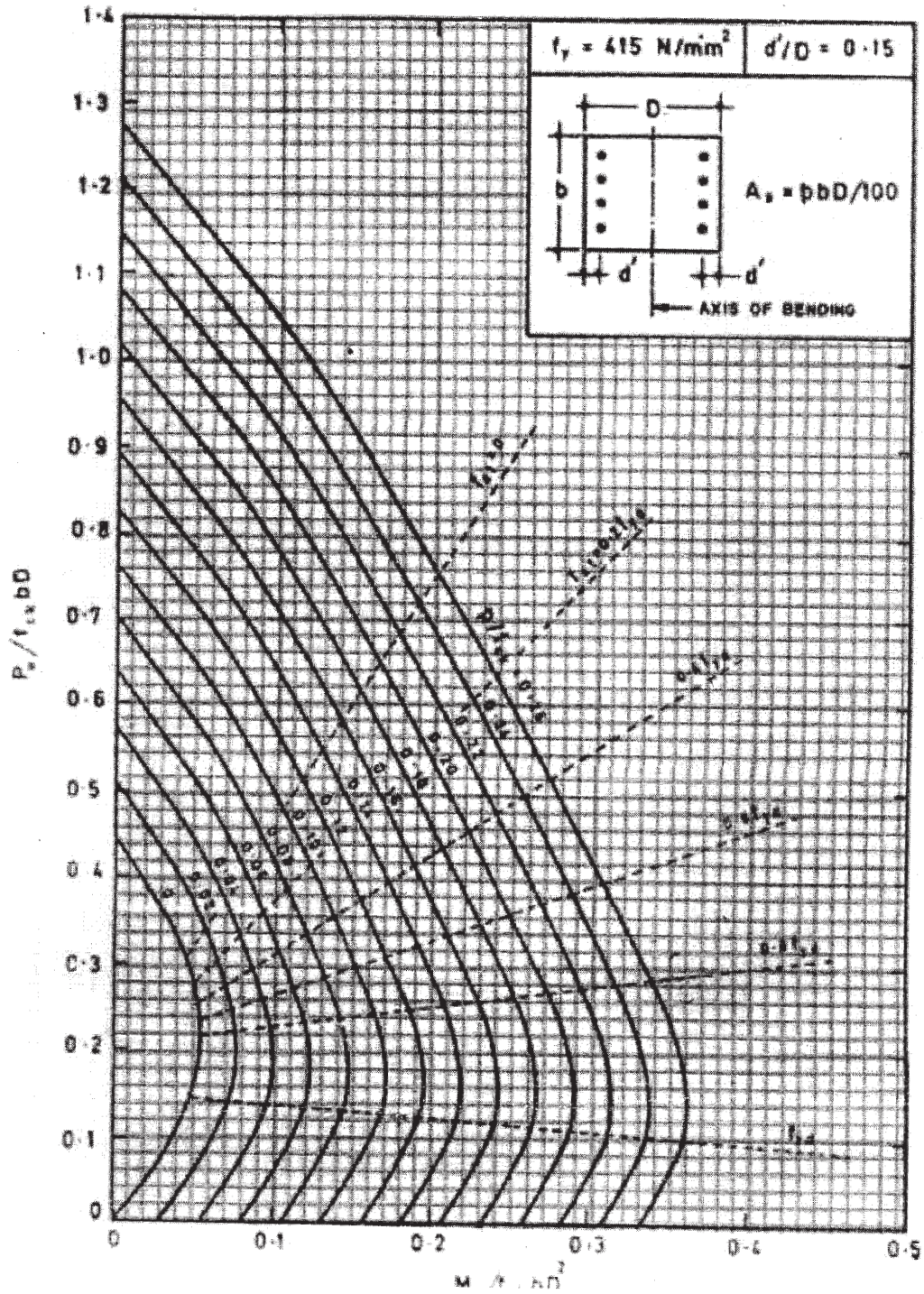
[4958] - 1010
T.E. (Civil)
PROJECT MANAGEMENT & ENGINEERING ECONOMICS
(2012 Pattern) (Semester - II)

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, 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.*

Q1) Discuss in detail importance of project management in construction industry.
[6]

OR

Q2) Explain in detail Evolution of scientific management. **[6]**

Q3) Draw AOA Network and Calculate total Project Duration. Show critical path. Calculate EST, EFT, LST, LFT **[8]**

Activity	Duration (Days)	Activity	Duration(Days)
1-2	4	4-7	Dummy
2-3	5	5-10	10
2-4	7	6-8	6
2-5	4	7-8	7
3-10	15	8-9	12
4-6	7	9-10	10

OR

Q4) Write short note on: **[8]**

    a) importance of planning and network techniques in civil engineering works.

    b) Bar chart & its limitation.

Q5) Explain the direct & indirect cost of an activity with example. **[6]**

OR

Q6) Explain Resource leveling and Resource smoothening by giving suitable examples. **[6]**

Q7) a) Give two definition of Economic quoted by different Economists. Explain the importance of Economics in construction industry. **[6]**

    b) Explain demand & supply with suitable example. **[6]**

    c) Define capital. Explain fixed and working capital. **[6]**

OR

Q8) a) What is Market Equilibrium. Explain in short Equilibrium Price and Equilibrium Quantity with an example? **[6]**

    b) Explain "Time value of money" with an example. **[6]**

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

       i) Annuity

       ii) Elasticity

Q9) a) What is ABC analysis? Write in details about the same giving examples. **[6]**

    b) Write down safety programme for road project. **[6]**

    c) Write short note on : Duties of store keeper. **[4]**

OR

*Q10)*a) Following table shows annual expenditure of the material used in a construction project. Classify them in A,B,C classes and plot the ABC Curve. **[6]**

Sr.No	Item	Cost in Rs
1	Cement	1,80,000
2	Sand	35,000
3	Steel	1,49,000
4	Aggregates	90,000
5	Nail	3,200
6	Water	2,500
7	Containers	1,200

b) Bring out the importance of material management in construction industry. **[6]**

c) Write short note on: Personal Protective Equipment **[4]**

*Q11)*a) What do you mean by project appraisal? Explain social & Environmental type of appraisal **[8]**

b) Write short note on: **[8]**
   i)   Cash flow
   ii) IRR method

<div align="center">OR</div>

*Q12)*a) A company wishes to invest in a new project. It has two alternatives A & B. Following data is available. Which project will the company select based on NPV and IRR **[8]**

Particulars	Project A	Project B
Initial Investment	10,50,000	12,75,000
Cash Inflows in Rs		
Year 1	5,50,000	7,50,000
2	7,00,000	5,00,000
Interest Rate	10%	10%

b) Write short note on : **[8]**
   i)   Detailed project report.
   ii) Role of project management consultant.

<div align="center">❖ ❖ ❖ ❖</div>

[4958]-1011

T.E.(Mechanical)

DESIGN OF MACHINE ELEMENTS - I

(2012 Course) (Semester - I) (302041)

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

Instructions to the candidates:

  1)   Neat diagram must be drawn wherever necessary.

  2)   Assume suitable data, if necessary.

  3)   Figures to the right indicate full marks.

Q1) a)   What is 'series of preferred numbers? In an industry, it is required to standardize 11 shafts from 100 mm to 1000 mm diameter. Specify the series to which they belong and calculate the diameters for the shaft.**[6]**

   b)   Show that the compressive stress induced in a square key due to torque transmitted is twice the shear stress.   **[4]**

OR

Q2) a)   What are splines?   **[4]**

   A standard splined connection ($8 \times 52 \times 60$ mm) is used for the gear and the shaft assembly of a gearbox. The splines transmit 20 kW power at 300 rpm. The dimensions of the splines are as below

   Major diameter   =   60 mm

   Minor diameter   =   52 mm

   Number of splines =   8

   Permissible normal pressure on the splines is limited to 6.5 MPa. And coefficient of friction is 0.06. Calculate

   i)   The length of hub of the gear.

   ii)   The force required for shifting the gear.

   b)   A component in a machine is subjected to two -dimensional stresses. the tensile stress in the X-direction varies from 40 MPa to 100 MPa, while the tensile stress in the Y-direction varies from 10 MPa to 80 MPa. The

frequency of variation of these stresses is equal. The corrected endurance limit of the component is 270 MPa. The ultimate tensile strength of the material of the component is 660 MPa. Evaluate the factor of safety. **[6]**

Q3) a) A right angled bell-crank lever is to be designed to raise a load of 5000 N at the short arm end. The lengths of short and long arms are 100 mm and 450 mm respectively. The material of construction for the lever and the pins is steel 30 C 8 (σ_{yt} = 400 MPa) and the factor of safety is 5. The permissible bearing pressure on the pin is 10 MPa. The lever has a rectangular cross-section and the ratio of width to the thickness is 3 : 1 the length to diameter ratio of the falcrum pin is 1.25 : 1. Calculate **[6]**

   i) The Diameter and the length of fulcrum pin

   ii) The shear stress in the pin

   iii) The dimensions of the cross-section of the lever.

   It is given that the arm of the bending moment on the lever extends up to the axis of the fulcrum.

b) State the theory of elastic failure on which ASME code is based. Discuss an importance of shock and fatigue factors in evaluating τ_{max} and σ. **[4]**

OR

Q4) a) Discuss the design of hollow shaft on torsional rigidity basis. Using this basis evaluate the inside and outside diameters of the shaft for following data **[4]**

   i) Power transmitted by shaft : 45 kW

   ii) Speed of shaft : 500 rpm

   iii) Ratio of inside diameter
   to outside diameter : 0.6

   iv) Material of shaft : Plain carbon steel with (τ_{all} = 84 mpa).

   where τ_{all} - permissible shear stress.

b) State Miner's Equation; state it's applicability. The work cycle of a mechanical component subjected to a completely reversed bending stresses consists of the following three elements

    i) $\pm$ 350 MPa for 85% of life

    ii) $\pm$ 400 MPa for 12% of life

    iii) $\pm$ 500 MPa for 3% of life

The material for the component is 50 C4 (σ_{ut} = 660 MPa) and the corrected endurance limit of the component is 280 MPa. Estimate the life of the component.   **[6]**

Q5) a) Explain the advantages of trapezoidal threads over square threads. State the meaning of each term involved in the designation.   **[5]**
       Tr 40 × 14 (p 7)

b) Derive an equation for the efficiency of the square threaded screw. Using this equation, show that the efficiency of a self locking square threaded power screw is less than 50%.   **[5]**

c) The lead screw of a lathe has single-start ISO metric trapezoidal threads of 52 mm nominal diameter and 8 mm pitch. The screw is required to exert an axial force of 2kN in order to drive the tool carriage during turning operation. The thrust is carried on a collar of 100 mm outer diameter and 60 mm inner diameter. The values of coefficient of friction at the screw threads and the collar are 0.15 and 0.12 respectively. The lead screw rotates at 30 rpm. Evaluate   **[8]**

    i)   the power required to drive the lead screw.

    ii)   the efficiency of the screw.

OR

Q6) a) Explain the following terms in brief   **[8]**

   i)   Collar friction torque

   ii) Self - locking screw

   iii) Overhauling screw

   iv) Ball screw

b) A C-clamp as shown in Fig. below, is used on the shop floor has single-start square threads of 22 mm nominal diameter and 5 mm pitch. The coefficient of friction at the threads and the collar is 0.15. The mean radius of the friction collar is 15 mm. The capacity of the clamp is 750 N. The handle is made of steel 30 C 8 ($\sigma_{yt} = 400$ MPa) It can be assumed that the operator exerts a force of 20 N on the handle.   **[10]**

   i)   Evaluate the torque required to tighten the clamp to its full capacity.

   ii) Determine the length and the diameter of the handle such that it will bend with a permanent set, when the rated capacity of the clamp is exceeded.

Fig. C- clamp
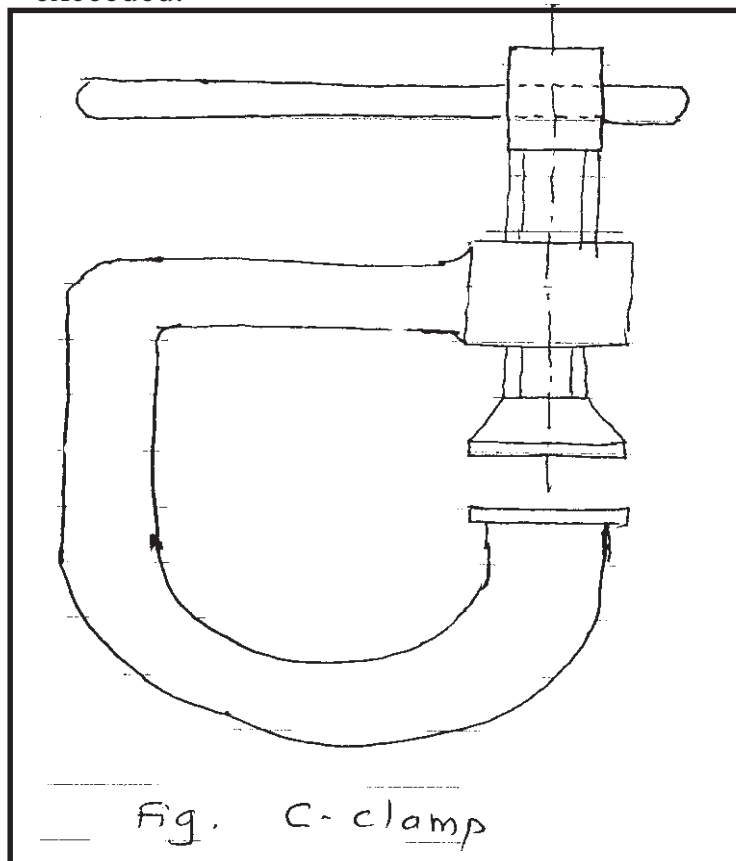
Q7) a) Enlist the materials used for the following [3]

     i)   Lightly loaded small bolts, studs & nuts

     ii)   High strength bolts

     iii)   Threaded fasteners where corrosion resistance is required.

   b) Discuss in brief strength of butt welds and strength of parallel fillet welds. [5]

   c) The bracket is fixed to wall as shown in fig. below, Following data is given for this bracket

        F = 25,000 N

        e = 100 mm

        l_1 = 150 mm

        l_2 = 25 mm

There is no pre-load in the bolts. The bolts are made of 45 C8 (σ_{yt} = 380 MPa) and factor of safety is 2.5. Use maximum shear stress theory to find area of cross-section of the bolt. [8]

$$\begin{bmatrix} \textbf{2 bolts at location 'A' \&} \\ \textbf{2 bolts at location 'B'} \end{bmatrix}$$

OR
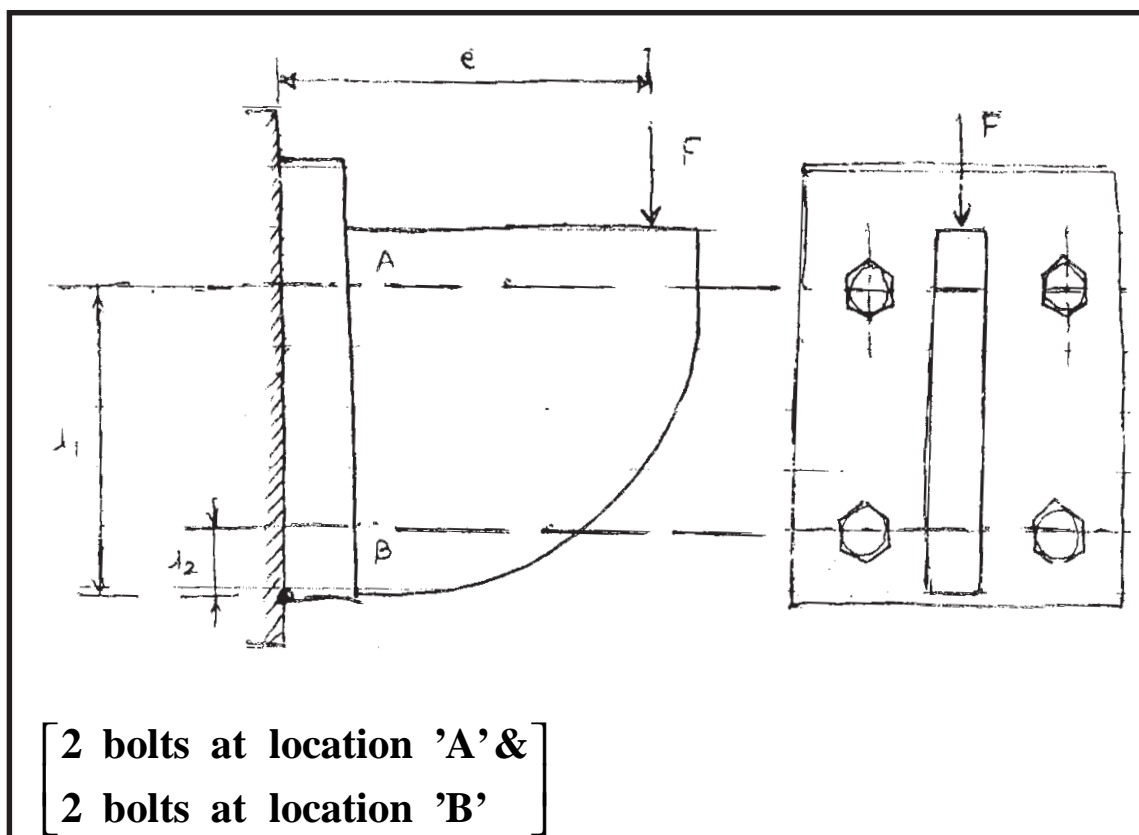
Q8) a) Discuss the term 'Bolt of uniform strength'. State the use of coarse threads and fine threads. **[4]**

b) Explain the procedure in the design of bolts for eccentrically loaded bolted joints in shear. **[4]**

c) A bracket is welded to the vertical plate by two fillet welds as shown in the fig. below. Determine the weld size, if permissible shear stress is limited to 70 MPa. **[8]**

Fig. Welded Joint
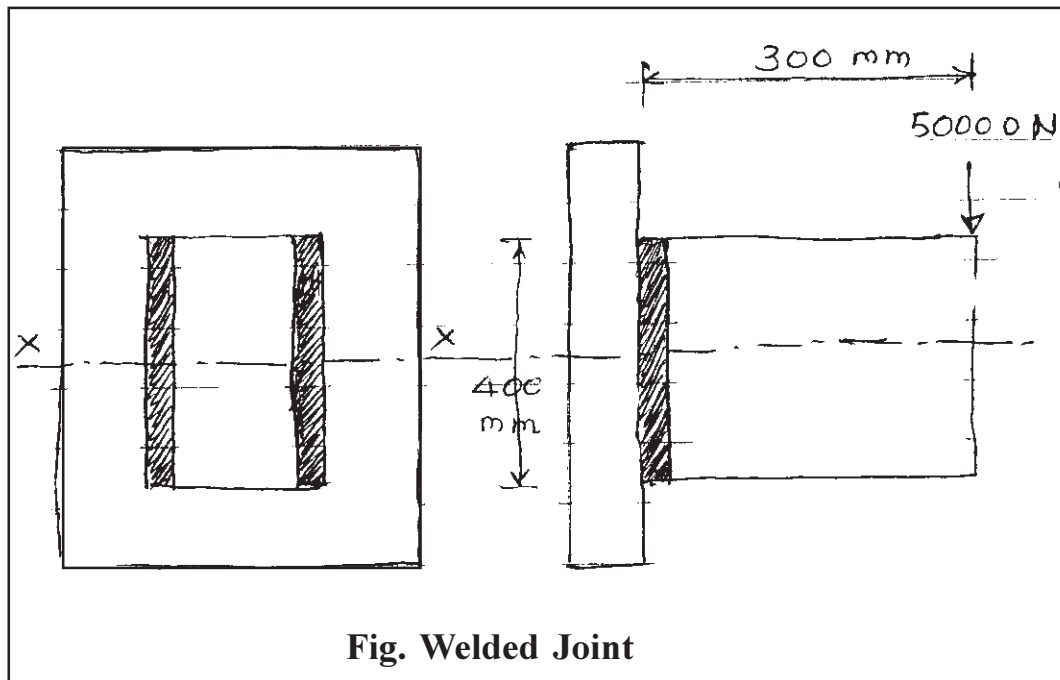
Q9) a) Derive an equation for the resultant t stress in the helical spring (of circular wire). State an importance of this equation in the design of helical spring. **[6]**

b) Enlist the materials used in constructing springs. **[2]**

c) It is required to design a helical compression spring of circular wire, subjected to an axial load, which varies from 2.5kN to 3.5kN. For this range of load, the deflection of the spring should be limited to 5mm. The spring index is 5 the spring has square and ground ends. For spring wire material, σ_{ut} = 1050 MPa and G = 81370 MPa. The permissible shear stress for the spring wire should be taken as 50% of the σ_{ut}. Calculate **[8]**

i) Wire diameter and mean coil diameter.

ii) Number of active coils & total number of coils.

iii) Solid length of spring.

iv) Free length of spring.

v) Required spring rate &

vi) actual spring rate.

OR

*Q10)*a) Explain the following terms (Any 2)   **[8]**

i) Surge in spring.

ii) Nipping of leaf springs.

iii) Style of ends of helical compressions springs

iv) Nested spring.

b) A safety valve operated by a helical tension spring through the lever mechanism is as shown in the figure below. The diameter of the valve is 50 mm. In normal operating conditions, The valve is closed and the pressure inside the chamber is 0.5 MPa. The valve is opened when the pressure inside the chamber increases to 0.6 MPa. The maximum lift of the valve is 5 mm. The spring index is 8. The spring wire material has ultimate tensile strength of 1200 MPa and modulus of rigidity of 81370 MPa. The permissible shear stress for the spring wire can be taken as 30% of the ultimate tensile strength.   **[8]**

Calculate:

i) Wire diameter.

ii) mean coil diameter and

iii) number of active coils.

Fig. Schematic of safety valve system
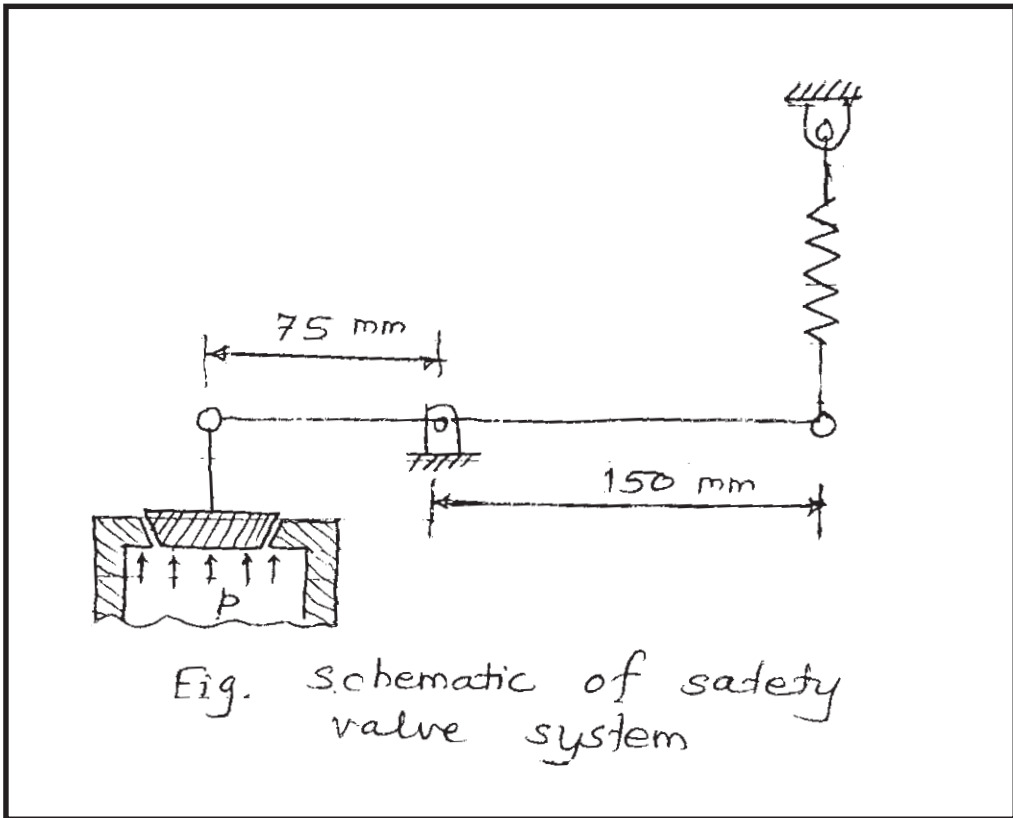
[4958]-1012

T.E.(Mechanical)
METROLOGY AND QUALITY CONTROL
(2012Course) (End Sem)

Time :2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Differentiate between systematic errors and random errors. **[5]**

b) State different types of comparators, explain sigma comparator in detail. **[5]**

OR

Q2) a) Describe with neat sketches of auto-collimator and sine bar. **[5]**

b) State different types of linear and angular measuring instruments, explain any two with example. **[5]**

Q3) a) State and explain Taylor's Principle of Gauge Design with example. **[5]**

b) Optical arrangement of interferometer for testing flatness of surfaces. **[5]**

OR

Q4) a) What is surface texture? State different methods to analyze surface trace **[5]**

b) A machine operator needs a gauge for checking the diameter of bores being machined to diameter 20 + 0.06 mm. What should be the dimensions (diameter) of the gauge if unilateral systems of tolerances are incorporated? Assume gauge tolerance and wear allowance each as 10% of work tolerance. **[5]**

Q5) a) Explain PDCA & PDSA Cycle. **[8]**

b) Describe different quality costs. **[8]**

OR

Q6) a) Write short note on: Juran's Trilogy. **[8]**

b) Differentiate between Quality Assurance & Quality control. **[8]**

Q7) a) Ten samples of parts were taken from a production line For 100% inspection,each sample containing 300 parts. The total number of defection was 350. Compute upper and lower control limit **[5]**

b) Explain analysis on out of control condition refering control charts. **[5]**

c) Explain in detail with flow chart single sampling and double sampling plan. **[8]**

OR

Q8) a) A new process is started , and the sum of sample standard deviation for 25 subgroups of size 4 is 750. If the specifications are 700 ± 80, what is process capability index? what action would you recommend take for four samples factor for centeline = c4 = 0.9213 **[6]**

b) Ten castings were inspected in order to locate defect in them after inspection total 37 defects were found. Compute control limit for c-Chart. **[4]**

c) Write note on PPAP and OC curve. **[8]**

Q9) Write short note on(any four) **[16]**

a) Cauuse & effect diagram   b) Pareto diagram

c) Kaizen   d) TPM

e) 5 s   f) J I T

◀▶ ◀▶ ◀▶

[4958]-1013

T.E.(Mechanical)

HEAT TRANSFER

(2012 Course) (Semester-I) (302042)(End Semester)

Time :2½Hours]   *[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 wherever necessary.*
5) *Figures to the right indicate full marks.*

Q1) a)   Derive an expression for critical radius of insulation of sphere.   **[6]**

   b)   A 2 kW resistance heater wire whose thermal conductivity is 15 W/m.
      °C has a diameter of 4 mm and length of 0.5 m. It is used for boiling
      water. If the outer surface temperature of wire is 105 °C, determine the
      temperature at the centre of the wire.   **[4]**

<div align="center">OR</div>

Q2) a)   Prove that $\dfrac{\theta}{\theta_i} = \dfrac{T - T_\infty}{T_i - T_\infty} = \exp\left[-\left(\dfrac{hA_s}{\rho V Cp}\right)t\right]$ with usual notations.   **[6]**

   b)   Explain the concept of Thermal Resistance.   **[4]**

Q3) a)   What is response and time constant of a thermocouple?   **[4]**

   b)   The temperature distribution across a wall of 1 m thick at a certain instant
      of time is given as $T(x)=a+bx+cx^2$ where T is in degrees Celsuis and x is
      in meters, while a =800 °C,b = -350 °C/m, and c=-60 °C/m^2. A uniform
      heat generation, = 1000 W/m^3, is present in the wall of area 10m^2 having
      the properties = 1600kg/m^3, k=40 W/m.K,and c_p=4kJ/kg.K. Determine:**[6]**

   i)   the rate of heat transfer entering the wall (x=0) and leaving the wall
      (x = 1m)

   ii)   the rate of change of energy storage in the wall.

<div align="center">OR</div>

Q4) a) Derive the three dimensional heat diffusion equation in Cartesian co-ordinates from first principles. **[6]**

b) Calculate the temperature at the tip of fin of a 3 mm diameter, 3 cm long fin if fin is made up of **[4]**

   i) Copper(k= 350 W/m.K) and

   ii) Teflon (k=0.35W/mK)

Take temperature at the fin base = 120°C, ambient temperature = 20°C h=10W/m².K

Q5) a) Define and give the significance of following dimensionless numbers used in Natural Convection. **[6]**

   i) Prandtl Number,

   ii) Grashof Number

b) Explain: Local and Average heat transfer coefficient. **[5]**

c) Consider a 0.6-m 3 0.6-m thin square plate in a room at 30°C. One side of the plate is maintained at a temperature of 90°C, while the other side is insulated. Determine the rate of heat transfer from the plate by natural convection if the plate is vertical.

Use following correlation.

Nu= 0.59 RaL¼

Properties of air at 60°C: k = 0.02808 W/m.K, Pr = 0.7202,

$v = 1.896 \times 10^{-5}$ m²/s **[6]**

<center>OR</center>

Q6) a) Differentiate : Natural convection and Forced convection. **[5]**

b) Explain concept of velocity and thermal boundary layer. **[6]**

c) A 25-cm-diameter stainless steel ball (ρ=8055 kg/m³, c_p= 480J/kg.K) is removed from the oven at a uniform temperature of 300°C. The ball is then subjected to the flow of air at 1atm pressure and 25°C with a velocity of 3m/s. The surface temperature of the ball eventually drops to 200°C.Determine the average convection heat transfer coefficient during this cooling process and estimate how long the process will take.

$$Nu=2+[0.4 \times Re^{½} + 0.06 \times Re^{2/3}] \, Pr^{0.4} \left(\mu_{\infty} / \mu_{s} \right)^{1/4}$$

The properties of air at the free-stream temperature of 25°C and 1 atm:

$k = 0.02551$ W/m.K, $v = 1.562 \times 10^{-5}$ m²/s, $\mu = 1.849 \times 10^{-5}$ kg/m.s Pr=0.7296

Take $\mu_s = 2.76 \times 10^{-5}$ kg/m.s **[6]**

Q7) a) Write a note on radiation shields. **[4]**

b) Write the statements and mathematical expressions of the following laws in radiation heat transfer: **[6]**

i) Planck's law   ii) Wien's law

c) Consider a 20- cm- diameter spherical ball at 800 k suspended in air. Assuming the ball closely approximates a blackbody, determine **[6]**

i) the total blackbody emissive power,

ii) the total amount of radiation emitted by the ball in 5 min.

iii) the spectral blackbody emissive power at a wavelength of 3mm.

Take $C_1 = 3.74177 \times 10^8$ W. $\mu m^4/m^2$, $C_1 = 1.43878 \times 10^4$ $\mu m.K$

OR

Q8) a) What is a gray body? How does it differ from a black body? **[4]**

b) Write the statements and mathematical expressions of the following laws in radiation heat tranfer: **[6]**

i) Kirchhoff's law   ii) Lambert's law

c) A thermocouple used to measure the temperature of hot air flowing in a duct whose walls are maintained at 400 K shows a temperature reading of 650 K. Assuming the emissivity of the thermocouple junction to be 0.6 and the convection heat transfer coefficient as 80 $W/m^2.°C$, determine the actual temperature of the air. **[4]**

d) Define: Radiosity **[2]**

Q9) a) Derive an expression for LMTD of counter flow heat exchanger. **[6]**

b) Explain working of a heat pipe with neat sketch. **[6]**

c) A counter-flow double -pipe heat exchanger is to heat water from 20°C to 80°C at a rate of 1.2 kg/s. The heating is to be accomplished by geothermal water available at 160°C at a mass flow rate of 2 kg/s. The inner tube is thin-walled and has a diameter of 1.5 cm. If the overall heat transfer coefficient of the heat exchanger is 640 $W/m^2.K$, determine the length of the heat exchanger required to achieve the desired heating. **[5]**

OR

[4958]-1013   3

Q10) a) Derive an expression for effectiveness of parallel flow heat exchanger.**[7]**

b) Compare: Film wise and drop wise condensation. **[4]**

c) Cold water enters a counter-flow heat exchanger at 10°C at a rate of 8 kg/s, where it is heated by a hot-water stream that enters the heat exchanger at 70°C at a rate of 2kg/s, Assuming the specific heat of water to remain constant at Cp=4.18kJ/kg.K, determine the maximum heat transfer rate and the outlet temperatures of the cold-and the hot-water streams for this limiting case. **[6]**

◆▶ ◆▶ ◆▶

[4958] - 1014

T. E. (Mechanical)
THEORY OF MACHINES - II
(End Semester) (2012 Course) (302043) (Semester - I)

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

Instructions to the candidates:

   1)   *Answer Q.1 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)   Obtain an expression for minimum number of teeth on a rack to avoid the interference.   **[6]**

    b)   A pair of involute gears is in mesh. The application restricts the space to accommodate these gears with a centre distance of 102 mm. If the gears have a module of 3 mm, and a ratio of speeds of driver to driven is limited to 2, 4:1, determine the number of teeth on these gears.   **[4]**

<div align="center">OR</div>

Q2) Two gear wheels having non standard involute teeth mesh externally giving velocity ratio 4:1. The pressure angle is 16 degrees. The arc of approach is not to exceed the circular pitch.   **[10]**

Determine

    a)   Minimum number of teeth on each wheel to avoid the interference.

    b)   Addendum of the wheel in terms of circular pitch.

    c)   Angle of action during approach on both the wheels, taking 2 mm module.

    Assume the smaller wheel to be driver.

Q3) a)   Explain with example the difference between gearbox and gear train.**[4]**

b)   In a reverted epicyclic train, the arm A carries two wheels B and C and a compound wheel D-E. The wheel B gears with wheel E and the wheel C gears with wheel D. The number of teeth on wheels B, C and D are 75, 30 and 90 respectively. Find the speed and direction of wheel C when the wheel B is fixed and arm A makes 110 r.p.m. clockwise.   **[6]**

OR

Q4) Derive an expression for efficiency of spiral gears and hence determine the expression for efficiency of worm and worm gear.   **[10]**

Q5) a)   Explain any three types of mechanical variators with their capacities.**[6]**

b)   A four wheeled trolley car has a total mass of 3000 kg. Each axle with its two wheels and gears have a total moment of inertia of 32 kg-m². Each wheel is of 500 mm radius. The centre distance between the two wheels on an axle is 1.4m. Each axle is driven by a motor with a speed ratio of 1:3. Each motor along with its gear has a moment of inertia of 16kg- m² and rotates in the opposite direction to that of the axle. The centre of mass of the car is 1.2 m above the rails. Calculate the limiting speed of the car when it has to travel around a curve of 20m radius without leaving the rails.   **[10]**

OR

Q6) a)   Compare stepped and stepless regulation of speed. What is self tightening effect in stepless drives?   **[6]**

b)   The turbine rotor of a ship has a mass of 2.2 tonnes and rotates at 200 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 320 mm. Determine the gyroscopic couple and its effect when the

i)   Ship turns right at a radius of 20 m at a speed of 20 km/h.

ii)   Ship pitches with bow rising at an angular velocity of 0.7 rad/s.

iii)   Ship rolls at an angular velocity of 0.1 rad/s.   **[10]**

Q7) a) Derive Freudenstein's equation for the four bar mechanism. **[8]**

b) Synthesize a slider crank mechanism to satisfy following data.Use relative pole method. **[8]**

$\theta_{12} = 30°;$ $S_{12} = 15mm;$

$\theta_{13} = 50°;$ $S_{13} = 25mm;$

                      $e = 100mm$

OR

Q8) a) Determine the four precision points and three angular positions for the following data **[8]**

$1 \le x \le 4;$ $20° \le \theta \le 55°;$

$$y = \left(\frac{x}{1.2}\right)^{0.6};$$ $40° \le \phi \le 105°;$

Use Chebychave spacing formula

b) Synthesize a four bar mechanism using inversion method for three precision positions using the following data. **[8]**

$\theta_{12} = 30°;$ $\psi_{12} = 40°;$

$\theta_{13} = 50°;$ $\psi_{13} = 100°;$

Take length of fixed link as 10 units and length of crank as 2 units. The crank has turned through 10° measured anticlockwise from horizontal in its first position.

Q9) a) Describe the following terms **[6]**

i) Undercutting of cam

ii) Significance of pressure angle

iii) 3-4-5 Polynomial cam.

b)   Draw a cam profile using following data   **[12]**

  ●   Radial roller follower with diameter 10 mm.

  ●   Minimum radius of the cam 40 mm.

  ●   Maximum displacement of the follower 50 mm.

  ●   Cam rotation angle during rise of follower 60°.

  ●   Type of follower motion during rise- Parabolic.

  ●   Cam rotation angle during return of follower 180°.

  ●   Type of follower motion during return- SHM.

  ●   Dwell at highest position of the follower 20°.

  ●   Cam rotates clockwise.

Also determine the maximum pressure angle during rise and return of the follower

OR

*Q10)*a)   Derive an expression for the jump speed of the eccentric cam.   **[6]**

b)   Draw a cam profile operating an offset roller follower of 12 mm diameter, rotating at 600 rpm counterclockwise direction. Take the following data.   **[12]**

  ●   Minimum radius of the cam 50 mm.

  ●   Outstroke with Cycloidal motion with cam rotation of 80°.

  ●   In stroke with uniform acceleration retardation with cam rotation of 120°.

  ●   Dwell at highest position of the follower 30°.

Locate the pitch point and pitch circle.

෴

[4958]-1015

T.E.(Mechanical)
HYDRAULICS AND PNEUMATICS
(2012 Pattern) (Semester - I) (End Semester) (302045)

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)   Draw ISO symbols for the following components: **[6]**

   i)   4×2 hydraulically pilot operated spring spring offset DCV

   ii) Gas charged accumulator

   iii) Pressure reducing valve

   iv) Bi-directional hydraulic motor

   v)   Pressure compensated flow control valve

   vi) Quick Exhaust valve

   b)   Explain what do you mean by: **[6]**

   i)   Positive displacement pump

   ii) Variable displacement pump

   c)   An 8 cm diameter hydraulic cylinder has a 4 cm diameter rod. If the
       cylinder receives flow at 100 LPM and 12 MPa, find: **[8]**

   i)   Extension and retraction speeds,

   ii) Extension and retraction load carrying capacities

OR

P.T.O.

Q2) a) Draw a simple hydraulic system showing all its essential components and explain the function of each. **[6]**

b) Draw an ISO symbol of a pressure intensifier. Explain its working. **[6]**

c) A hydraulic motor has displacement of 164 cm³ and operates with a pressure of 70 bar and speed of 2000 rpm. If the actual flow rate consumed by the motor is 0.006 m³/s and actual torque delivered by motor is 170 Nm, find: **[8]**

    i)   Volumetric efficiency,

    ii)   Mechanical efficiency,

    iii)   Overall efficiency,

    iv)   Actual power delivered by motor.

Q3) a) Explain the different methods of DCV actuation. **[6]**

b) Draw a neat sketch of Actuator locking circuit and explain its working.**[6]**

c) Explain regenerative circuit with a neat sketch. **[6]**

OR

Q4) a) Classify different types of control valves used in the hydraulic circuit.**[6]**

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

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

Q5) a) Draw and explain a throttle-in circuit used in pneumatics. **[6]**

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

c) Explain in short any two applications in industry requiring vacuum for their operation. **[4]**

OR

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

b) Explain the need of using FRL unit in pneumatic system. Also draw its ISO symbol. **[6]**

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

Q7) A machine tool cross slide is moved by means of a hydraulic system. The motion of the cylinder is as follows: **[16]**

a) Initially it moves through a distance of 250 mm against a load of 10 kN in about 5 sec.

b) It is followed by a working stroke of another 120 mm against an effective load of 25 kN. The feed rate during this part of the stroke is required to be 1m/min.

c) The return stroke is as fast as possible.

A meter-out circuit is used for speed control. Draw a circuit which will fulfill these requirements. Select different components used in the circuit from the data given. Mention ratings of components in case it is not available in the given data.

OR

Q8) a) Draw a simple hydraulic circuit which will operate a hydraulic cylinder of a machine. The load during the forward stroke is 20 kN and that during the return stroke is approx. 10kN. The forward and return speeds are about 3.0 m/min and 5.0 m/min. respectively. Total stroke of the cylinder is 300 mm. provision is required to hold the cylinder any where in between the end positions. Select different components from the data given. Specify ratings of the components in case it is not available. **[10]**

b) Label the components and analyze the circuit shown in Figure 8b. **[6]**
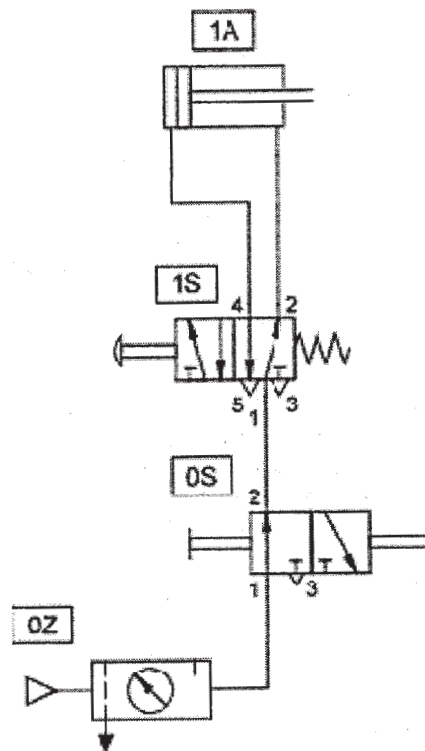
Figure 8b

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

✗   ✗   ✗

[4958] - 1016

T.E. (Mechanical)

DESIGN OF MECHINE ELEMENTS - II

(2012 Course) (End Semester) (302048) (Semester - II)

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

Instructions to the candidates:

1) *Answer five questions from following.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figure to the right indicate full marks.*
4) *Use of electronic calculator is allowed.*
5) *Assume suitable data if necessary.*

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

i) Hunting tooth

ii) Crowning of Gear tooth

b) Following data refers steel spur gear pair transmitting 5 kW power running at 3000 rpm to a machine at. 1500 rpm. Module - 4 mm, No. of teeth or pinion - 18 S_{ut} for pinion & Gear - 630 N/mm², face width - 10 m Surface Hardness - 400 BHN. Tooth system - 20° full dept involute. Deformation factor c = 171 N/mm. Assume dynamic load accounted by Buckingham's equation calculate **[6]**

i) Factor of safety in bending

ii) Factor of safety in pitling

Use following data-

- $Y = 0.484 - 2.87/z$

- $k = 0.16 [BHN/100]^2$

- $$Pd = \frac{21v\,(bc + pt\,\max)}{21v + \sqrt{bc + pt\,\max}}$$

OR

P.T.O.

Q2) a) Explain   **[6]**

   i)   Methods of estimation of dynamic load for spur gear.

   ii) Gear tooth failures

b) A helical gear pair 20° full depth tooth profile consists of 18 teeth pinion meshing with 36 teeth gear. The pinion & gear is made of with same material. With S_{ut} - 600 N/mm² module - 5 mm, face width - 10×module. helix angle 23°. BHN for pinion and gear - 280, factor of safety - 2. Pinion speed - 1440 rpm. Calculate   **[4]**

   i)   Beam strength

   ii) Wear strength

   use following data -

   $Y - 0.484 - 2.87/z^1$

   $V - 5.6/5.6 + \sqrt{v}$

Q3) a) Differentiate spiral bevel with hypord gear.   **[2]**

b) A cylindrical Rollar bearing is subjected to radial load of 5000 N. Life of bearing with 90% reliability is 15000 hrs. The application factor is 1.5 if the share rotates at 1440 rpm calculate the required basic dynamic load rating of bearing.   **[8]**

OR

Q4) a) Draw the free body diagram for components of gear tooth forces, when pinion rotates clockwise direction when seen from left. Assume pinion having right hand threads and is below the helical gear.   **[2]**

b) With neat sketch explain mounting of taper rollar bearing. Write designation of bearing no. - 6307.   **[8]**

Q5) a) Derive an expression for components of force acting on worm and worm gear. **[4]**

b) A worm transmits 3 kW power at 1440 rpm and drives a gear having 60 teeth. The pitch circle diameter of worm is 90 mm and triple threated the module of worm gear is 4 mm. The worm is right handed and rotates in clockwise direction when seen from left. Assume worm 1.5 above the worm wheel. Calculate

　　i) Components of tooth foreces

　　ii) Efficiency of drive

　Also sketch the arrangement showing the component of toothforces.**[10]**

c) Write a short note on thermal considertion in worm gear. **[4]**

<div align="center">OR</div>

Q6) a) Why worm and worm wheel are made of disimilar material? **[3]**

b) In design of worm gear, why worm gear governs the design. **[3]**

c) A pair of worm and worm wheel is designated as 2/72/10/6. The worm is transmitting 8 kW at 1800 rpm to a worm wheel. The permissible bending strength is 110 N/mm². The wear load factor is 0.83 N/mm². The coefficient of friction is 0.05 and normal pressure angle is 20°. Find **[12]**

　　i) Factor of safety in bending

　　ii) Factor of safety in wearing

　　iii) Factor of safety in heal dissipation.

　Use following data,

- $Y = 0.484 - \dfrac{2.85}{Z}$

- Barth Factor $Cv = \dfrac{6}{6+V}$

- Input $kW = \dfrac{a^{1.7}}{34.5\,(i+5)}$

　Where a - centre distance

　　　i - gear ratio.

Q7) a) A pulley of 1000 mm diameter is driven by an open type flat belt from 25 kW. at 1440 rpm. electric motor. The pulley on the motor shape is 250 mm diameter and center distance between two shapes is 2m. The alloweble tensile stress for belt material is 2 N/mm² and coeffiant of friction between belt and pulley is 0.28. The density of belt meterial is 900 kg/m³. If the width of belt is 125 mm determine, **[12]**

      i) Thickness of belt

      ii) Length of belt

      iii) Initial tension required in belt

    b) Discuss creep in belt with neat sketch. **[4]**

<div align="center">OR</div>

Q8) a) Discuss the stresses developed in wire rope. **[4]**

    b) Explain the procedure of selection of V - belt from manufacturing catalogue. **[6]**

    c) Discuss modes of failures for chain. **[6]**

Q9) a) Explain design variables and performance variables of hydrodynamic journal bearing. **[6]**

    b) The following data is given for a 360° hydrodynamic journal bearing, radial load - 6.5 kN, journal speed - 1200 rpm, journal diameter - 60 mm, bearing length - 69 mm. minimum oil film thickness 0.009 mm. The fit between journal and bearing is normal fit H_7e_7 for which hole diamter is $60^{+0.00}_{+0.03}$

    and shape diameter $60^{-0.06}_{-0.09}$

    specilty the viscosity of lulmicating oil for given journal bearing. **[10]**

<div align="center">OR</div>

Q10)a) With neat sketch show axial & radial pressure distribution in hydrodynamic journal bearing. **[5]**

b) A hydrodynamic journal bearing is to be designed to support a radial load of 5 kN. The l/d ratio to be considered is 0.4. The journal rotates at 5040 rpm. The eccentricity ratio is 0.6. If central lubrication supplies lubricating oil of viscosity 46 C. Poise (cP) at flow rate of 0.5 1it/min to bearing. Calculate **[11]**

  i) Diameter of journal

  ii) Radial clearence

  iii) Dimensions of Bearing

  iv) Minimum oil film thickness.

<p align="center">ೞೞ</p>

[4958]-1017

T.E. (Mechanical)
TURBO MACHINES
(2012 Course) (End Sem) (Semester - II)

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

Instructions to 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 whenever necessary and mention it.*
5) *Draw neat and suitable figures wherever necessary.*

Q1) a) State the advantages of using draft tube and justify not using it in Pelton wheel. **[4]**

b) A Pelton wheel operates with a jet of 15 cm in diameter under a head of 500 m. Its mean runner diameter is 2.25 m and it rotates with the speed of 375 rpm. The outlet angle of bucket tip is 15°, the coefficient of velocity as 0.98, Mechanical efficiency as 97% and buckets are smooth. Determine the shaft power, hydraulic efficiency and power lost in bucket. **[6]**

OR

Q2) a) How does the number of vanes, vane shape and hydraulic efficiency of any hydraulic machine vary with increasing specific speed? **[4]**

b) Following data is available related to Francis turbine: Shaft power = 14990 kW, runner speed = 275 rpm, net head = 110 m, diameter at inlet = 1.8 times diameter at outlet, axial length of the blade at inlet = 0.15 times diameter at inlet, flow ratio = 0.2, hydraulic efficiency = 90%, Overall efficiency = 85%, velocity of flow at inlet = velocity of flow at oultet determine: **[6]**

     i)   Inlet and Outlet diameters.

     ii)   Guide blade angles.

     iii)   Runner vane angles.

Assume radial flow at exit.

P.T.O.

Q3) a) Discuss main and operating characteristics curves for hydraulic turbine? **[4]**

b) In a De Laval turbine, steam is issued from the nozzle with a velocity of 1500 m/s whereas the mean blade velocity is 500 m/s. The nozzle angle is 20° and the inlet and outlet angles of blades are equal. The mass of the steam flowing through the turbine is at the rate of 1200 kg/hr. Assuming blade velocity coefficient k = 0.8, draw the velocity diagram and determine: **[6]**

    i) The blade angles.

    ii) The power developed by turbine.

    iii) The blade efficiency.

OR

Q4) a) Define angular momentum and explain how it is used to determine the torque and work done in case of radial flow turbine runner. **[4]**

b) A Parsons turbine runs at 400 rpm with 50% reaction and it develops 75 kW of power per unit mass of steam flow per second. The exit angle of the blades is 20° and the steam velocity is 1.4 times the blade velocity. Find **[6]**

    i) blade velocity and

    ii) inlet angle of the blades.

Q5) a) Define the maximum suction lift. State the expression to calculate it. What factors affect its values? **[6]**

b) Following data relates to centrifugal pump: Eye and rim diameter = 10 cm and 20 cm respectively, outer width = 1.25 cm, vane angle at outer rim = 25°, speed = 3000rpm, constant flow velocity = 3 m/s, manometric efficiency = 78% and overall efficiency = 72%. Determine: **[12]**

    i) Inlet vane angle.

    ii) Discharge.

    iii) Manometric head and

    iv) Shaft Power.

    v) Mechanical efficiency.

OR

Q6) a) Derive an expression for rise in pressure through impeller of a centrifugal pump. **[6]**

b) Power input to centrifugal pump is 50kW at the shaft while running the pump at 1440 rpm. The impeller tip diameter is 30 cm and the blade width at the tip is 1.5cm. The water flows rate is 110 lit/s. The vacuum gauge reading at the suction flange is - 20cm of mercury and at the delivery flange the pressure gauge reading is 370 kPa. The blade outlet angle is 65°. Calculate: **[12]**

   i) Theoretical head.

   ii) Ideal head.

   iii) Hydraulic efficiency.

   iv) Mechanical efficiency.

   v) Overall efficiecny.

   vi) Specific speed of the pump.

   Assume radial entry and constant flow velocity.

Q7) a) Describe surging and choking in a centrifugal compressor. **[6]**

b) The impeller of a centrifugal compressor has the inlet and outlet diameter of 0.3 and 0.6 m, respectively. The intake is from the atmosphere at 100 kPa and 300 K, without any whirl component. The outlet blade angle is 75°. The speed is 10000 rpm and the velocity of flow is constant at 120 m/s . If the blade width at intake is 6 cm, calculate: **[10]**

   i) Specific work.

   ii) Exit pressure.

   iii) Mass flow rate.

   iv) Power required to drive compressor if the overall efficiency can be assumed at 0.7.

<div align="center">OR</div>

Q8) a) Explain the stalling in centrifugal compressor. Also describe its effect on the compressor performance. **[6]**

b) A centrifugal compressor impeller admits 20 kg/s air at static state of 1 bar, 300 K and runs at 15000 rpm. Isentropic efficiency is 90% for the compression upto 5 bar total pressure. The air enters the impeller eye without prewhirl with the velocity of 120 m/s. Considering the ratio of whirl velocity to tip speed as 0.9 and the internal diameter of the impeller eye as 20 cm, determine: **[10]**

i) Rise in the total temperature in the compressor

ii) Impeller tip speed.

iii) Impeller tip diameter.

iv) Power required to drive compressor.

v) Outer diameter of the impeller eye.

Q9) a) Compare the effect of different factors affecting the stage pressure ratio in axial flow compressor. **[6]**

b) Determine the compressor speed, absolute velocity of the air leaving the stationary inlet guide vane for an axial flow compressor having following specifications: The first stage has a velocity diagram which is symmetric; the ratio of change of whirl velocity to axial velocity is 0.6; the first stage pressure ratio is 1.8; inlet pressure and temperature = 1.01 bar and 300 K, respectively; flow coefficient is 0.4; compressor efficiency = 85% and the mean radius is 30 cm. **[10]**

OR

Q10) a) Explain the construction and working of axial flow compressors. Also show it on h-s diagram. **[6]**

b) An axial flow compressor has the air entering at the pressure and temperature of 1.5 bar and 320 K, respectively. The degree of reaction is 50% and the compressor runs at 35000 rpm. Consider the blade height as 2.2 cm, blade angle at inlet =60°, change in the whirl velocity as 120 m/s, the mean blade radius of 6.5 cm and the turning angle of 30°. Find the pressure rise, mass of the air passing through the compressor, power input and air angle at inlet. Take Cp = 1.005 kJ/kgK and assume no losses in the compressor. **[10]**

🌢 🌢 🌢

[4958]-1018

T.E.(Mechanical)
MECHATRONICS
(2012Course) (Semester-II)(302050)(End Sem.)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:
   1)   Answer Q.1 or Q.2, Q.3or 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)   Flow inside a pipe is to be measured using a flow sensor. For this,draw
          the setup and explain the principle of working of the said sensor.   **[6]**

     b)   From the block diagram in Figure1, determine the transfer function:
          C/R.   **[4]**
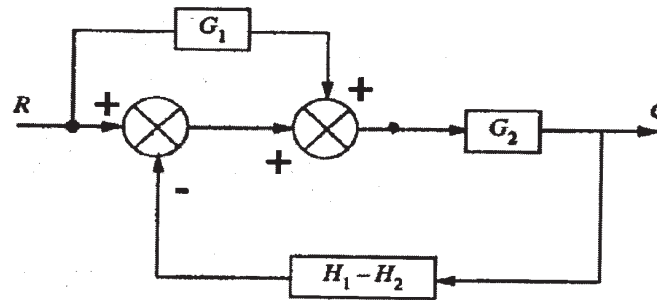
Figure 1

OR

Q2) a)   List any six Static Characteristics along with their definition.   **[6]**

     b)   Draw a suitable block diagram and list the key elements in a generic
          Mechatronics system.   **[4]**

Q3) a)   A 4-bit R-2R type DAC is supplied with 2.56 volts dc reference potential.
          Determine the full scale output potential and the Least significant Bit(LSB).
                                                                                 [8]

     b)   List two distinct benefits of closed loop control system over open loop
          control system.   **[2]**

OR

Q4) a) Draw suitable diagrams and explain the construction and working of a two stage current Amplifier **[8]**

b) List two distinct benefits of open loop control system over closed loop control system. **[2]**

Q5) a) Explain on Delayed, off Delayed Timers used in PLC programming with one application and corresponding ladder program. **[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) Draw a suitable ladder diagram and explain the application of counter in a PLC. **[8]**

b) Draw a suitable block diagram and explain the architecture of the SCADA system. **[8]**

Q7) a) For the system in figure 2, Assume M= mass = 1kg, k= stiffness=2 N/m and d= damping = 0.5 Ns/m. Also, F = force input in N and y=displacement output in m. **[10]**
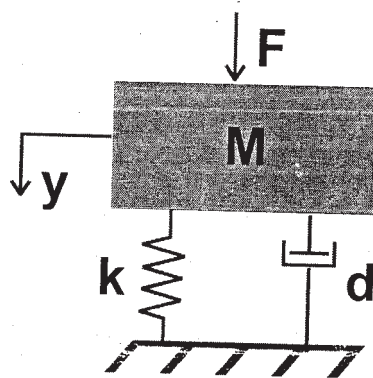
Figure 2

For this system:

i) Determine the transfer function: y(s)/F(s),

ii) Identify the location of the Poles and Zeros and

iii) Comment on the stability of the system.

b) Consider a second -order unity feedback system with damping factor=0.6 and natural frequency = 5 rad/sec. Calculate the rise time, maximum overshoot and settling time when a unit-step input is applied to the system. **[6]**

OR

Q8) a) Derive the transfer function between output θ and input τ for the single dof rotational system shown in Figure 3. **[10]**
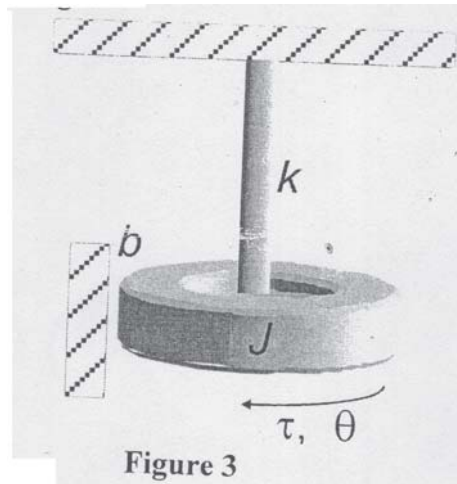
Figure 3

b) Define the following terms: **[6]**
i) Steady State Error
ii) Gain Margin
iii) Phase Margin
iv) Rise Time
v) Damping Frequency
vi) % Overshoot

Q9) a) Figure 4 shows an error time graph. Sketch the PID controller 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]**
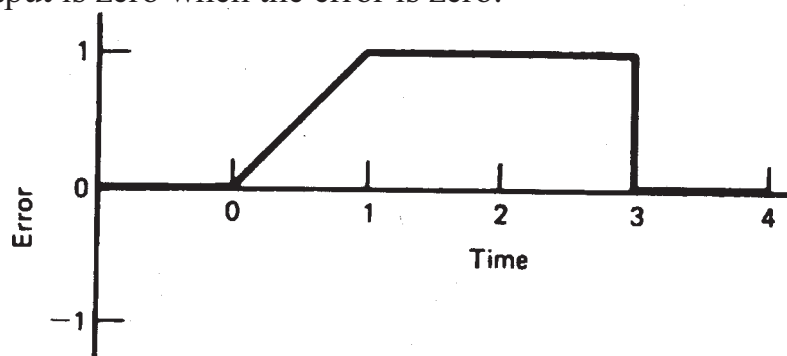
Figure 4

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) An integral controller is used for speed control with a setpoint of 12rpm within a range of 10 to 15 rpm. The controller output is 22% initially. The constant $K_I = -0.15\%$ 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) Derive the equation for the control signal, u, for the proportional Integral Derivative(PID) controller. Discuss, in detail, the advantages and disadvantages of adding Derivative term to the Proportional term. **[8]**

◄► ◄► ◄►

[4958]-1019

T.E. (Mechanical / Automobile)
NUMERICAL METHODS AND OPTIMIZATION
(2012 Course) (End Semester) (Semester - II) (302047)

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, Q.11 or Q.12.*
 2) *Neat diagrams must be drawn wherever necessary.*
 3) *Figures to the right indicate full marks.*
 4) *Use of programmable calculator is not permitted.*
 5) *Assume suitable data, if necessary.*

Q1) Volume of cylinder is calculated after measuring its diameter as (2.5 ± 0.02) m and its height as (4.8 ± 0.05) m respectively. Estimate the absolute error in calculation of volume.   **[6]**

OR

Q2) Determine the real root of the equation $e^x = 5x$ using method of successive approximation. Assume initial guess x = 0.15 and solve upto 5 iterations. **[6]**

Q3) Draw a flowchart for Gauss elimination method.   **[6]**

OR

Q4) Using Gauss Seidal method, solve the following set of equations up to 3 decimal places.   **[6]**

3x + y - z = 0,

x + 2y + z = 0,

x - y + 4z = 3

Q5) A company is manufacturing two different types of products A and B. Each product has to be processed on two machines M1 and M1. Product A requires 2 hours on machine M1 and 1 hour on machine M2. Product B

P.T.O.

requires 1 hour on machine M1 and 2 hours on machine M2. The available capacity of machine M1 is 104 hours and that of machine M2 is 76 hours Profit per unit for product A is Rs.6 and that for product B is Rs. 11. **[8]**

i)   Formulate the problem.

ii) Find the optimal solution by simplex method.

<center>OR</center>

Q6) a)   Determine the maximum value of root of equation. **[5]**

0.51 (x) - sin (x)

by Newton's method. Take initial guess as 2 and do 4 iterations.

b)   Write a short note on Genetic Algorithm. **[3]**

Q7) 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 values of x,Y and y' are given below. Use Hermit interpolation to find the value of y at x = 0.25. **[8]**

x	Y	y'
0	0	0
1	1	1

<center>OR</center>

Q8) a)   Using least square technique, fit the following curve $Nu = a. Re^b$ to the below mentioned data. Find the values of 'a' and 'b.' **[8]**

Re [x]	900	1500	2700	3000
Nu [y]	89	110	120	125

b) Using suitable interpolation formula to find a polynomial which passes the points (0,-12), (1,0,), (3, 6), (4, 12) **[8]**

Q9) a) The total mass of the variable density rod is given by. **[8]**

$$m = \int_0^L \rho(x).A_c(x).dx$$

Where m is mass, $\rho(x)$ is density, Ac (x) is cross- sectional area , x is distance along the rod and L is the total length of the rod. The following data is measured for a 10m length rod. Determine the mass in kg using trapezoidal rule to best possible accuracy.

x, m	0	2	3	4	6	8	10
ρ,g/cm^3	4.00	3.95	3.89	3.80	3.60	3.41	3.30
A_c, cm^2	100	103	106	110	120	133	150

b) Draw the flowchart to find integral. **[8]**

$$I = \int_{x1}^{xn} \int_{y1}^{yn} f(x,y).dxdy$$

Using Trapezoidal rule.

OR

Q10)a) Use three point Gauss-Legendre formula to solve. $\int_{0}^{3}\left(\dfrac{e^x}{2+x^2}\right)dx$ **[8]**

b) Using the following data to calculate the work done by stretching the spring that has a spring constant of k = 300 N/m to x = 0.30 m. Use simpson's 1/3rd and 3/8th rule. **[8]**

F (10^3N)	0	0.01	0.028	0.046	0.063	0.082	0.11
x, m	0	0.05	0.10	0.15	0.20	0.25	0.30

Q11)a) The edges of a stell plate of 750 × 750 mm has maintained at temperatures as shown in fig. What will be steady state temperatures at the interior points? **[12]**
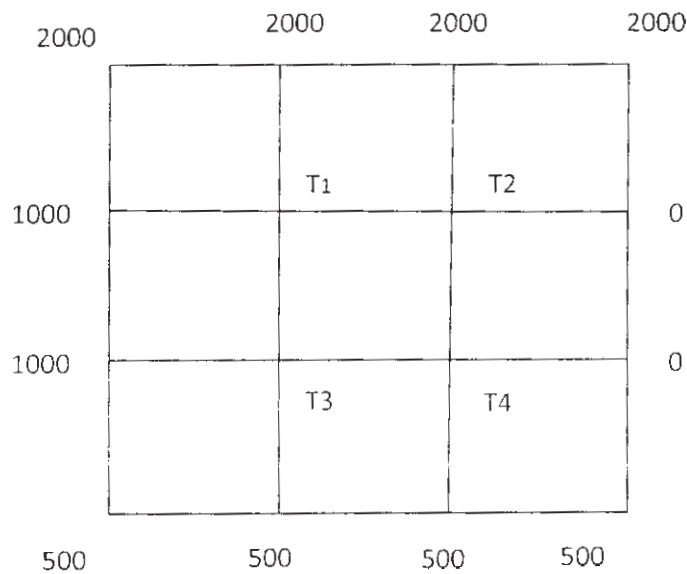
b) Draw the flowchart for Runge-Kutta fourth order method. **[6]**

OR

*Q12)*a) Solve the following set of differential equations using Runge-Kutta fourth order method for $x = 1$. Take x0 = 0, y0 = 4 and z0 = 6. Use step size of 0.5. **[10]**

$$\frac{dy}{dx} = -0.5\, y$$

$$\frac{dz}{dx} = 4 - 0.3z - 0.1\, y$$

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

$$\frac{dy}{dx} = yx^2 - 1.1y \qquad \text{Where y } (0)=1.$$

[4958]-1020

T.E.(Mechanical Engg.)
MANUFACTURING PROCESS-II
(2012 Course)(Semester-II)(302051)(End Sem)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) Solve Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10.
2) Figures to the right side indicate full marks.
3) Use of electronics pocket calculatar is allowed
4) Assume suitable data if necessary.

Q1) a) List the various types of chips produced during metal cutting.   **[4]**

   b) Discuss the geometry of Broach teeth with neat sketch.   **[6]**

<div align="center">OR</div>

Q2) a) Draw and explain in brief merchant's force diagram. State the assumptions made in development of such diagrams.   **[4]**

   b) List out the various operations carried out on milling machine. Explain any two with neat sketch.   **[6]**

Q3) a) What are the factors that affect tool life? Briefly describe their influence.**[4]**

   b) Explain the factors in the selection of grinding wheel.   **[6]**

<div align="center">OR</div>

Q4) a) Prove the relation between chip thickness ratio, rake angle & shear angle.   **[4]**

   b) Explain Honing process with neat sketch.   **[6]**

Q5) a) Explain with the help of a neat sketch Ultrasonic machining process& state its process characteristics.   **[8]**

   b) Draw a sketch and explain principle of AJM. Discuss various parameters that influnec the material removal rate of the process.   **[8]**

<div align="center">OR</div>

Q6) a) Explain with neat sketch LBM process. State its advantages, limitations and applications. **[8]**

b) Explain 'ECM' with neat sketch. Also explain effect of the following parameters on MRR. **[8]**

    i)   Tool feed rate

    ii)   Electrolyte concentration

Q7) a) What are basic components of CNC system? Explain the function of each. **[8]**

b) Write short notes on following. **[8]**

    i)   DNC System

    ii)   Types of machining centers

<div align="center">OR</div>

Q8) a) Describe between absolute& incremental positioning system in CNC.**[6]**

b) Write a note on "Automatic Tool Changer". **[6]**

c) What are G codes and M codes? Explain with an example **[4]**

Q9) a) Define Jigs and Fixtures. Differentiate between them. **[6]**

b) Explain with neat sketch any two "Indexing Methods" used in Jigs& Fixtures. **[6]**

c) State various types of clamping devices used in Jigs & Fixtures & explain any one. **[6]**

<div align="center">OR</div>

Q10) a) List types of Jigs. Explain any two with neat sketch **[6]**

b) Write short notes on. **[12]**

    i)   Milling Fixture

    ii)   3-2-1 Principle of location

    iii) Pokayoke concept in Jigs and Fixtures

<div align="center">◀▶ ◀▶ ◀▶</div>

[4958]-1021

T.E. (Mechanical Sandwich Engineering)
MACHINE DESIGN
(2012 Course) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 70*
Instructions to the candidates:
1) *Answer questions Q1 or Q2, Q3 or Q4 and 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) *Use of electronic pocket calculator is allowed.*
5) *Assume suitable data, if necessary.*

Q1) a) What is Machine Design? Explain the traditional design procedure? **[6]**

    b) Explain with neat sketch Goodman approach? **[4]**

OR

Q2) a) Explain design of flat and square key? **[6]**

    b) What are the causes of stress concentration? **[4]**

Q3) a) Write equations to raise and lower the load? **[4]**

    b) Derive an expression for Springs in parallel? **[6]**

OR

Q4) a) What are stresses in butt and fillet welds? **[4]**

    b) A double threaded power screw with ISO metric trapezoidal threads is used to raise a load of 550KN. The nominal diameter is 120mm and pitch is12mm. The coefficient of friction at screw threads is 0.25. Neglecting collar friction. Calculate Torques to lower the load. **[6]**

Q5) a) A helical pinion having 14 teeth made of alloy steel (Sut = 800 N/mm²) is mesh gear made of plain carbon steel 55 C8 (Sut = 700 N/mm²). The gear pair is required to transmit 40 kW power from an electric motor running at 720 rpm to machine at 225 rpm. The application factor and load concentration factor are 1.3 and 1.1 respectively while the factor of safety is 2. The face width is 10 × normal module (10 M_n) and tooth system is 20° full depth involute. Deformation factor for gear pair is 11000 e, N/mm. design the gear pair by using the velocity factor and Buckingham's equation for dynamic load. **[12]**

b) Explain different types of gear lubrication methods? **[6]**

OR

Q6) a) The following data is given for a pair of spur gear with 20 degree of full depth involute teeth. Number of teeth on pinion = 24, Number of teeth on gear = 56, Speed of pinion = 1200 rpm Module 3 mm, Service factor = 1.5, Face width = 30mm, factor of safety = 2. Both the gears made up of steel with an Ultimate tensile strength = 600 N/mm². Using the velocity factor to account for the dynamic load calculate Beam strength, Velocity Factor. **[12]**

b) With neat sketch explain force analysis of spur gear? **[6]**

Q7) a) Derive Stribeck's equation for the basic static capacity of bearing. **[6]**

b) A single row deep groove ball bearing has a dynamic load capacity of 70000N and operates on following work cycle.

   i)   Radial load 7500 N at 500 rpm for 25% of the time. **[10]**

   ii) Radial load 19000 N at 600 rpm for 50% of the time.

   iii) Radial load 8000N at 400 rpm for 25% of the time.

   Determine life of bearing in hours.

OR

Q8) a) Why there is need of rolling contact bearings? Write its application. **[6]**

b) Derive an expression for load life relationship? **[10]**

Q9) a) Write construction of V belt? **[4]**

b) A pulley of 1000 diameter is driven by an open type of flat belt from 20 KW at 1400 rpm electric motor. The pulley on motor shaft is 200 mm diameter and centre distance between the two shafts is 2m. The allowable tensile stress for the belt material is 2 N/mm² and coefficient of friction between belt and pulley is 150 mm. Determine

   i) The thickness of the belt

   ii) The length of the belt

   iii) The initial tension required in belt. **[12]**

OR

Q10) a) Explain the lubrication in chain drive? **[4]**

b) Design a chain drive to actuate a compressor from 15kW electric motor running at 1,400 rpm, the compressor speed being 450 rpm. The minimum centre distance is 500 mm. The compressor operates 16 hours per day. The chain tension may be adjusted by shifting the motor. **[12]**

✦ ✦ ✦

[4958]-1022

T.E.(Mechanical - SW)
NUMERICAL METHODS & COMPUTATIONAL TECHNIQUES
(2012Course) (Semester-I) (302061)(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) *Assume suitable data if necessary and mention it clearly.*

Q1) a) Find the root of the equation $3x + \sin x - e^x = 0$ by the False Position Method correct to 2 decimal places. **[6]**

 b) Explain Cubic Spline interpolation method. **[4]**

OR

Q2) a) Use Simpson's 3/8 rule to evaluate. **[6]**

$$I = \int_{0.5}^{0.7} \sqrt{x}e^x dx$$

 b) Prepare Newton's Backward Difference interpolation table for the following data. **[4]**

x	100	150	200	250	300
y	10.63	13.03	15.04	16.81	18.42

Q3) a) Explain Inverse Interpolation and Extrapolation. **[2]**

 b) Solve following set of equations using Gauss Elimination Method. **[8]**

$$3X + 6Y + Z = 16$$

$$2X + 4Y + 3Z = 13$$

$$X + 3Y + 2Z = 9$$

OR

Q4) a)   Explain Hermit Interpolation.   **[2]**

b)   Solve following set of equations using Gauss Siedel Method   **[8]**

$$27 X + 6Y - Z = 85$$

$$X + Y + 54 Z = 110$$

$$6X + 15Y + 2Z = 72$$

Q5) a)   Explain :   **[8]**

Round of error, Truncation error, and error propagation with example.

b)   Fit an exponential model $y = ae^{bx}$ to the given tabulated data   **[8]**

x	1.2	2.8	4.3	5.4	6.8	7.9
y	7.5	16.1	38.9	67.0	146.6	266.2

OR

Q6) a)   An object is suspended in a wind tunnel and the force measured for various levels of wind velocity. The results are tabulated below. Use least square regression to fit the straight to this data.   **[8]**

v,m/s	10	20	30	40	50	60	70	80
F, N	25	70	380	550	610	830	1220	1450

b)   Draw the flowchart to fit straight line for given data(x_i,y_i).   **[8]**

Q7) a)   Use Runge Kutta second order and fourth order method to find the value of y when x=1 given that y=1 when x = 0 and that   **[12]**

$$\frac{dy}{dx} = \frac{y - x}{y + x}$$

Use h= 0.5. Comment on the answer.

b)   Explain predictor corrector method to solve ODEs.   **[4]**

OR

Q8) a) population growth of any species is frequently modeled by an ODE of the form **[8]**

$$\frac{dN}{dt} = aN - bN^2 \qquad N(0) = N_0$$

where N is the population, aN represents the birthrate, and bN^2 represents the death rate due to all causes, such as disease, competition for food supplies and so on.

If $N_0 = 100000$, a $= 0.1$, and b $= 0.0000008$, calculate N(t) after every 4.0 years form t $= 0.0$ to 20.0 years.

Use Euler's method.

b) Draw the flowchart for modified Euler method. **[8]**

Q9) a) Th edges of a stell plate of 1m × 1m has maintained at temperatures as shown in fig. What will be steady state temperatures at the interior points? **[10]**
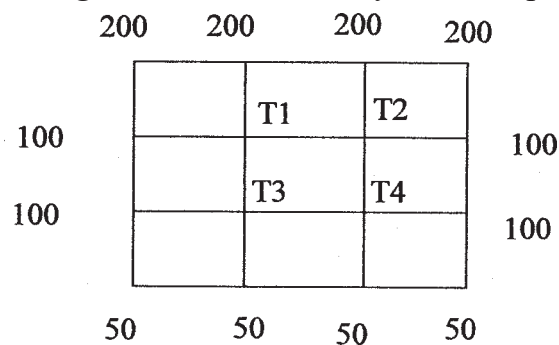
b) Explain the numerical technique to solve parabolic equation. **[8]**

OR

Q10)a) Solve $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial^2 t}$ 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 $= 0.03$. **[10]**

b) Draw the flowchart for solving Laplace equation. **[8]**

◆▶ ◆▶ ◆▶

[4958] - 1023

T.E. (Mechanical S/W)

MECHATRONICS

(Semester - I) (2012 Course) (End Sem.) (302050)

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 side indicate full marks.*

　　4)　*Assume Suitable data if necessary.*

Q1) a)　List and discuss, in brief, any four criterions for selection of a stepper motor.　**[6]**

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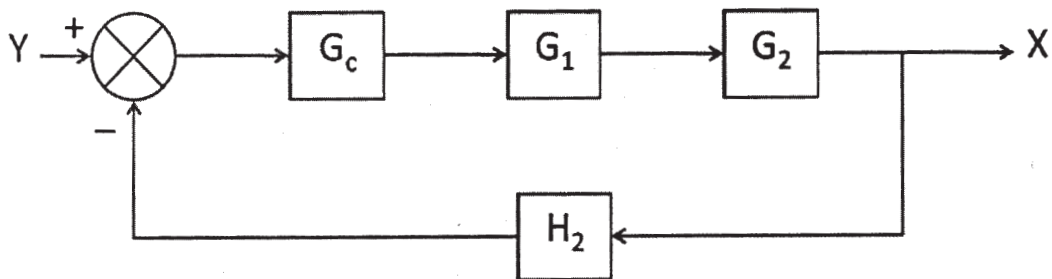
Figure 1

OR

Q2) a)　A potentiometer is to be used for measurement of speed of a dc motor. Draw a suitable schematic and explain the working of the said sensor.**[6]**

　　b)　Write four distinct points of comparison between closed loop control and open loop control.　**[4]**

P.T.O.

Q3) a) For a 4 bit ADC with a V_{ref} = 1 volts, find the digital equivalent of V_{in} = 0.6 volts. **[8]**

b) List two assumptions mode while deriving a transfer function. **[2]**

OR

Q4) a) Draw a suitable circuit diagram and explain the working of a SHA, Also, list its application. **[8]**

b) List any two reasons to justify the need of an OPAMP in a mechatronic system. **[2]**

Q5) a) Explain any five criterions for selection of a Programmable Logic Controller. **[10]**

b) A traffic light controller is supposed to execute following sequence of operations. Draw a ladder diagram for implementation of the said sequence. **[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) Devise a ladder program that can be used with a solenoid valve controlled double-acting cylinder, i.e. a cylinder with a piston which can be moved either way by means of solenoids for each of its two positions, and which moves the piston to the right, holds it there for 2 s and then returns it to the left. **[10]**

b) Draw a suitable diagram and discuss the application of SCADA in mechatronics. **[8]**

Q7) a) For the system in Figure 2, derive the transfer function: $y(s)/f(s)$. **[10]**
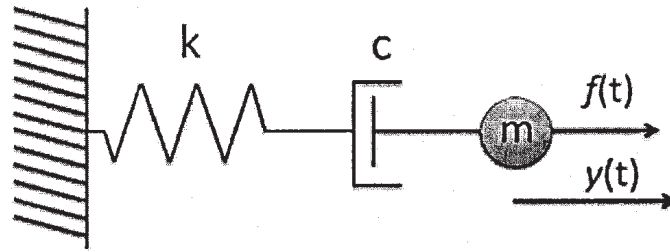
Figure 2

b) Draw a suitable diagram and explain time domain response. **[6]**

OR

Q8) a) Draw a suitable diagram and explain frequency domain analysis. Also, discuss the advantages and dis-advantages of the frequency domain analysis. **[10]**

b) Determine the rise time maximum over shoot and settling time of a second order system subject to a unit-step input. Assume the damping factor = 0.8 and natural frequency = 10 rad/sec. **[6]**

Q9) a) Derive the transfer function of the PID controller in parallel form. Also, discuss the significance of adding the derivative term to the controller.**[10]**

b) Discuss the role of transient specifications W.R.T the analysis of performance of the PID controller. **[6]**

OR

*Q10)*a) Figure 3 shows an error time graph. Sketch the PD controller output w.r.t time. Assume $K_P = 10$, $K_D = 0.5$ and $P_0 = 0$. **[10]**

Figure 3
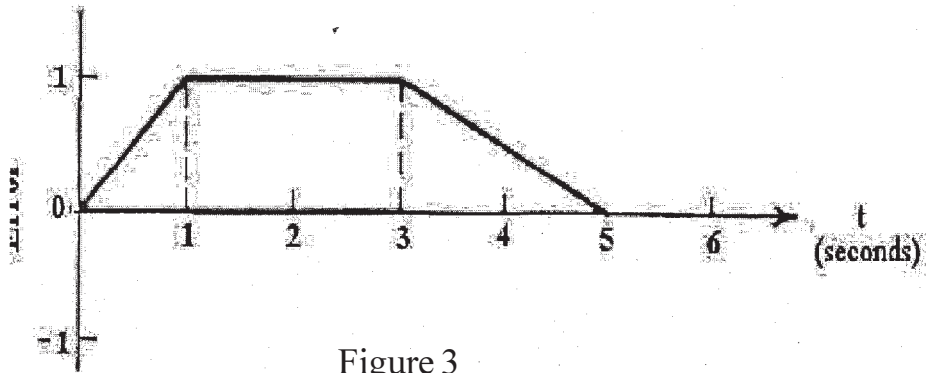
b) Draw the block diagram of the PID controller in series form and discuss the significance of proportional term in the controller. **[6]**

ೞಀೞಀ

[4958] - 1024

T. E. (Mechanical Sandwich)

MATERIALS AND MANUFACTURING ENGINEERING

(End Semester) (2012 Course) (Self Study - I) (302066) (Semester - II)

Time : 2½ Hours]   *[Max. Marks :100*

Instructions to the candidates:

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

SECTION - I

Q1) a)   What do you understand by the word 'polymer'? Classify *polymers.* **[8]**

    b)   Differentiate between thermoplastic polymers and thermosetting polymers. Give minimum two examples of each type.   **[8]**

OR

Q2) a)   Which are the factors affecting the properties of a polymer? Discuss. **[8]**

    b)   Explain in brief about composite materials and their applications?   **[8]**

Q3) a)   Discuss the properties of nano-materials and their applications.   **[8]**

    b)   Classify biomaterials. Give any five applications of biomaterials.   **[8]**

OR

Q4) a) What is carbon Nanotubes? Discuss the technological advantages of nano materials. **[8]**

b) Discuss the role of advanced materials in modern manufacturing. **[8]**

Q5) a) List some common inhibitors and their applications. **[6]**

b) Compare and contrast the nature of protection given to steel by: **[12]**

    i) Cadmium coating

    ii) Zinc coating

    iii) Tin coating

<p align="center">OR</p>

Q6) Write short notes on **[18]**

    a) Galvanic corrosion

    b) Pitting corrosion

    c) Corrosion prevention methods

<p align="center">**SECTION - II**</p>

Q7) a) Describe the various steps involved in powder metallurgy process. **[8]**

b) Discuss oil impregnated porous bearings. **[8]**

<p align="center">OR</p>

Q8) a) Describe the various methods used for the manufacture of metal powder. **[8]**

b) Explain detailed process of manufacturing cemented carbine cutting tools. **[8]**

Q9) a) Draw a neat block diagram of CNC machine system. Compare NC and CNC system. **[8]**

b) Differentiate between absolute and incremental positioning system in CNC with a suitable example. **[8]**

OR

Q10) a) Explain linear and circular interpolation with neat sketch. **[8]**

b) Write the function of following codes. **[8]**

    i)   G01

    ii)   G02

    iii) M00

    iv) G08

    v)   G70

    vi) G71

    vii) M03

    viii) M08

Q11) a) List various types of broaching machines and explain any one of them. **[6]**

b) Discuss various gear finishing methods **[6]**

c) Write a note on - Thread Rolling. **[6]**

OR

Q12) a) Draw a neat sketch of a broach and name its parts. **[6]**

b) Differentiate between gear hobbing and gear shaping. **[6]**

c) Write a note on - Die threading. **[6]**

૮૪૪૦૮૪૪૦

P2849

Total No. of Questions :12]

[4958]-1025

T.E. (Mechanical Sandwich)

Industrial Engineering & Production Management (Self Study - II)

(2012 Course) (Semester - II) (302067)

Time : 2½ Hours]   *[Max. Marks :100*

Instructions to the candidates:

    1)   *Answer 03 questions from Section I and 03 questions from Section II.*

    2)   *Answer to the two section should be written in separate books.*

    3)   *Neat diagrams must be drawn wherever necessary.*

    4)   *Figures to the right indicate full marks.*

SECTION - I

Q1) a)   Explain briefly role of Industrial Engineering in management with a suitable examples. **[8]**

    b)   Briefly mention contribution of F W Taylor & Gilberth to industrial engineering. **[8]**

OR

Q2) a)   What are the various approaches to management? **[8]**

    b)   What are various stages of evolution of management. **[8]**

Q3) a)   Explain the objective and scope of method study. Also explain briefly the steps involved in Method study. **[8]**

    b)   Write short note on. **[8]**

       i)   Selection of Job for method study.

       ii)   Use of motion pictures

OR

Q4) a)   Explain the objectives of Time study state briefly the steps in time study. **[8]**

    b)   Write a short note on Performance rating and allowances. **[8]**

P.T.O.

Q5) Write short notes on. [18]

    a) Qualities of Production manager.

    b) Objectives of good plant layout.

    c) Principles of material handling.

<div align="center">OR</div>

Q6) a) Explain the responsibilities and qualities of a production manager? [9]

    b) Explain procedure of selection of plant location & layout for three wheeler automobile plant. [9]

<div align="center">

SECTION - II

</div>

Q7) a) Discuss moving average method in detail. [8]

    b) Explain objectives and basic of EOQ. [8]

<div align="center">OR</div>

Q8) a) Explain Bill of materials and discuss its importance in production management [8]

    b) Compare CPM and PERT. [8]

Q9) a) Write short note on factors affecting process design. [8]

    b) Explain VED analysis in detail. [8]

<div align="center">OR</div>

Q10) a) Discuss general consideration in selecting machining methods. [8]

    b) Explain principles and phases of process planning in detail. [8]

Q11) Write short notes on. [18]

    a) TPM.

    b) Poka Yoke.

    c) Muda elimination.

<div align="center">OR</div>

Q12) a) Write short note JIT and lean manufacturing. [10]

    b) Explain in detail Master Production schedule. [8]

<div align="center">

♦ ♦ ♦

</div>

[4958]-1031

T.E. (Automobile Engineering)
DESIGN OF MACHINE ELEMENTS
(2012 Pattern) (Semester - I) (316481)

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 indicate full marks.*
   4)   *Use of electronic pocket calculator is allowed.*
   5)   *Assume suitable data, if necessary.*

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

     b)   How do you classify shafts?   **[4]**

OR

Q2) a)   A knuckle joint is to connect two members of 50 mm diameter. If the shear stress in the pin is 20 MPa, what is the axial load and the torque transmitting capacity?   **[4]**

     b)   Differentiate between straight beam and curved beam.   **[4]**

     c)   Define factor of safety.   **[2]**

Q3) a)   What are the different types of keys?   **[2]**

     b)   A machine slide weighing 3 kN is elevated by a double start Acme threaded screw at the rate of 0.84m/min. If the coefficient of friction is 0.12, calculate the power to drive the slide. The end of the screw carries a thrust collar of 32 mm inside diameter and 58 mm outside diameter. Pitch of the screw thread is 7 mm and outside diameter is 44 mm. Take coefficient of friction as 0.09.   **[8]**

OR

Q4) a) Prove that a square key is strong in shear and compression. **[2]**

b) Derive an expression for torque required to raise the load in power screws. **[8]**

Q5) A cold drawn steel rod of circular section is subjected to a variable bending moment of 565 Nm to 1130 Nm as axial load varies from 4500 to 13500 N. the maximum bending moment occurs at the same extent that of axial load is maximum. Determine the diameter of rod for factor of safety 2. Assume Ultimate stress as 550 MPa, yield point stress as 470 MPa, K_{ft} as 1, A as 1 for bending and 0.7 for axial, B as 0.85 and C as 0.89. **[16]**

OR

Q6) A hot rolled steel rod is subjected to torsional load varying from - 110 Nm to 440 Nm and an axial load varies from 4500 to 13500 N. Assume factor of safety 8, ultimate stress as 550 MPa, yield point stress as 470 MPa, K_{ft} as 1, A as 1 for torsion and 0.7 for axial, B as 1 and C as 0.89. Calculate the diameter of rod. **[16]**

Q7) a) How do you classify bearings. **[6]**

b) The following data is given for full hydrodynamic bearing used for electric motor. Radial load = 1200N, Journal speed = 1440 rpm, journal diameter = 50mm, static load on the bearing = 350 N. The values of surface roughness of the journal and the bearing are 2 and 1 micron respectively. The maximum oil film thickness should be 5 times the sum of surface roughness of the journal and the bearings. Determine length of the bearing, radial clearance, minimum oil film thickness, viscosity of lubricant and flow of lubricant. Select suitable oil for this application assuming the operating temperature as 65°C and bearing pressure as 1 MPa. **[10]**

l/d	S	(h_o/c)	Q/rcnl
1	0.121	0.4	4.33
0.5	0.779	0.6	4.29

OR

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

b) The bearing of a system carries a radial load of 3000N and axial load 1000N. The angular speed of shaft is 60 rad/sec. The bearing has to operate 8 hrs/day. The diameter of shaft is 50 mm. Check the design for safety. Take C = 27070N, C_0 = 20595N, X = 0.56, Y = 1.71 and v = 1. **[10]**

Q9) a) What are the standard systems of gear tooth? **[4]**

b) Design spur gear set to transmit 20 KW at 900rpm of pinion. The transmission ratio is 3. Take 20° FDI, Z_1 = 18, σ_d = 193.2Mpa, BHN = 250 for pinion and σ_d = 47.1 MPa, BHN = 200 for gear. Check only tangential tooth load. Take Form factor Y = π (0.154-0.912/Z) and C_v = 3.05/3.05 + V. **[14]**

OR

Q10) a) Draw the spur gear nomenclature. **[4]**

b) Design a pair of helical gears are to transmit 15KW at 10,000 rpm of the pinion with PCD 80 mm. The transmission ratio is 3:1 Assume α = 20°FDI, β = 45°. σ_d = 193.2MPa, BHN = 250 for pinion and gear. Check only tangential tooth load.

Y = π (0.154-0.912/Z_e), C_v = 5.55/5.55 + $V^{0.5}$. **[14]**

✦ ✦ ✦

[4958]-1032

T.E. (Automobile)
AUTOMOTIVE ELECTRICAL AND ELECTRONICS (316482)
(2012 Course) (Semester - I)

Time : 2½ 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 and explain the comparision between

    i) Positive eart & negative earth

    ii) Earth Return & Insulated return system. **[5]**

  b) How are the following defects used in lead acid batteries.

    i) Sulphation

    ii) Self. discharge

    iii) Internal short circuiting **[5]**

OR

Q2) a) Explain the necessity of the drive mechanism. What types of drives are employed on cranking motor. **[5]**

  b) Explain constructional details of distributors

    i) With contact point   ii) With magnetic pick-ups **[5]**

Q3) a) Discuss following as clearly as possible giving neat sketchs:

    i) The plate group

    ii) The seperator

    iii) Battery container **[5]**

  b) Discuss in detail with neat sketch spark advance mechanism. **[5]**

OR

Q4) a) Describe with the help of a neat diagram working of balancing coiltype of fuel gauge. **[5]**

b) What is the purpose of indicating & warning devices provided in vehicles? Enlist reasons in support of their use fulness. **[5]**

Q5) a) Describe what is Engine Management system. Draw a black diagram of an EMS showing all inputs and o/p. **[8]**

b) With neat sketch explain Electronic Ignition system. **[8]**

OR

Q6) a) Write a short note on

i) Fuel control Maps   ii) Spark timing control   **[8]**

b) Describe fuel system and it's components with neat sketches. **[8]**

Q7) a) Explain in detail with the help of neat sketch:

i) Air flow rate sensor   ii) Angular Position sensor   **[8]**

b) Explain solenoid actuator with the help of neat sketch and give any four automobile application. **[8]**

OR

Q8) a) Explain sensor feedback control system with neat sketch. **[8]**

b) Explain the principle of actuators & types of actuators in detail. **[8]**

Q9) a) Write a short note on

i) Vehicle tracking system

ii) Radar warning system

iii) GPS **[9]**

b) With neat sketch explain electronically operated suspension system by using damper. **[9]**

OR

Q10) a) With neat sketch explain Adaptive cruise control system. **[9]**

b) With neat sketch explain Anti lock Braking system (ABS) with EBD. Also state its advantages. **[9]**

✘ ✘ ✘

[4958] - 1033

T. E. (Automobile)

DESIGN OF ENGINE COMPONENTS

(Semester - II) (2012 Pattern) (316484)

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

Instructions to the candidates:

1) *Answer any five questions from the following.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Use of Logarithmic tables, slide rule, electronic pocket calculator is allowed.*
5) *Assume suitable data if necessary.*

Q1) a)   Write design considerations for combustion chamber.   **[4]**

b)   A 42.5 kW engine has mechanical efficiency 85%. Find indicated and frictional power. If frictional power is assumed to be constant with load, what will be the mechanical efficiency at 60% of load?   **[6]**

OR

Q2) a)   Write note on water pump used in IC engine.   **[4]**

b)   Write note on engine balancing.   **[6]**

Q3) a)   What will be the criteria for selecting the lubricating oil for an IC engine?**[2]**

b)   Determine the dimensions of cross-section of connecting rod for a diesel engine with following data.   **[8]**

Cylinder bore = 100 mm

Maximum gas pressure = 4MPa

Factor of safety = 6, Length of con.rod = 350 mm.

OR

P.T.O.

Q4) a) Write properties of lubricating oil. **[2]**

b) The following data is given for pistion of a four stroke diesel engine. Cylinder bore 250 mm, material of piston ring = gray cast iron, allowable tensile stress 100 n/mm², allowable radial pressure on cylinder wall = 0.03MPa, Thickness piston head = 42 mm, no. of piston rings = 4. **[8]**

Calculate:

i) Radial width of piston ring

ii) Axial thickness of piston ring

iii) Gap between free ends of piston ring before assembly

iv) Gap between free ends of piston ring after assembly

v) Width of top land

vi) Width of ring grooves

vii) Thickness of piston barrel and

viii) Thickness of piston barrel at open end.

Q5) a) What are the functions of cylinder head and cylinder liner? **[4]**

b) Write the design procedure for center crankshaft at top dead center position? **[12]**

OR

Q6) a) The cyclinder of four stroke diesel engine has following specification:**[8]**

Brake power = 3.75 kW

Speed = 1000rpm

Indicated mean effective pressure = 0.35 MPa

Mechanical Efficiency = 80%

Determine the bore and length of cylinder liner.

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

Length of Stroke = 275mm

Cylinder bore = 150mm

Engine speed = 500rpm

Maximum gas pressure = 3.5 MPa

Seat angle 45°

Calculate:-

i) The Diameter of Valve port,

ii) Diameter of valve head,

iii) Thickness of valve head,

iv) Diameter of valve steam,

v) Maximum lift of the valve.

Q7) a) How will you measure HC and CO emission of IC engine? **[8]**

b) Explain cylinder leakage test. **[8]**

OR

Q8) Write short note on (any four) **[16]**

a) Vacuum gauge test.

b) Cylinder power balance

c) Cylinder compression test

d) HC and CO analyzer

e) Selection of ignition timing

Q9) a) What is Digital Twin Spark - ignition (DTS-i) engine explain with advantages and disadvantages. **[9]**

b) Give application, advantages and disadvantages of four valve engine and dual fuel engine? **[9]**

OR

Q10) a) Write note on Wankel engine. **[9]**

b) What is homogenous charge compression ignition engine (HCCI)? **[9]**

തൽൽൽ

[4958]-1034

T.E. (Automobile)
Automotive Transmission
(2012 Course) (Semester - II)

Time : 2½ Hours   *[Max. Marks :70]*
Instructions to candidates:
   1)   Questions Nos.1,2 and 3 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 types of chassis with reference to power plant location.   **[3]**

   b)   Sketch a chassis layout of Truck or Bus. Explain the function of each
        part.   **[3]**

Q2) a)   Explain the types of Clutches and its application.   **[3]**

   b)   What do you mean by Gear selector mechanism? Explain any one of it.

                                                                                [3]

Q3) a)   Enlist the different types of driveline. Explain any one.   **[4]**

   b)   Explain constant velocity universal joint.   **[4]**

Q4) a)   What is need of final drive? Explain different types of final drives.   **[8]**

   b)   Explain differential unit with neat sketch with all nomenclatures.   **[8]**

                                   OR

Q5) a)   Explain briefly, with neat sketches.   **[8]**
        i)   Half floating rear axle.
        ii)   Three quarter floating rear axle

   b)   What are the types of rear axle? Explain function of rear axle in brief.**[8]**

Q6) a) Explain with neat sketch operating principle, construction and working of torque convertor. **[10]**

b) Write note on- Clutches and brakes in Epicyclie gear train. **[8]**

OR

Q7) a) Explain construction and working of Wilson Epicyclic gear train. **[10]**

b) Explain with neat sketch operating principle construction and working of Fluid flywheel.

[8]

Q8) a) Differentiate between Hydramatic transmission and Continuous variable Transmission (CVT) **[8]**

b) Draw a layout of any one Transmission system and explain its function. **[8]**

OR

Q9) a) Compare Manual and Semi automatic transmission. **[8]**

b) Explain with neat sketch construction and operating principle of Continuous variable transmission (CVT). **[8]**

🌢 🌢 🌢

[4958]-1035

T.E.(Automobile)

AUTOMOTIVE AERODYNAMICS AND BODY ENGINEERING
(2012 Pattern)(Semester-II)(End Sem)

Time :2½Hours]   *[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 should be drawn wherever necessary.*
   3)   *Figures to the right indicate full marks.*
   4)   *Assume suitable data if necessary.*

Q1) a)   How down force make impact on racing vehicle performance?   **[4]**

     b)   Introduce CFD as a helping tool for aerodynamic study of vehicles. **[6]**

<div align="center">OR</div>

Q2) a)   Explain in brief about gap configuration.   **[4]**

     b)   Write in brief about any two flow visualisation technique in wind tunnel.**[6]**

Q3) a)   What are methods to do front end modification?   **[4]**

     b)   Write a short note on resistances offered to vehicle while running.   **[6]**

<div align="center">OR</div>

Q4) a)   What is the difference between hatch back and sedan car?   **[4]**

     b)   Write a short note on open and close wind tunnel.   **[6]**

Q5) a)   Explain in brief any 4 methods to improve driver's visibility.   **[8]**

     b)   Write a short notes on   **[8]**

        i)   Front assembly of car

        ii)   Roof assembly of car

<div align="center">OR</div>

Q6) a)   Sketch and explain in details any 4 types of bus body.   **[8]**

     b)   Write a short note on types of metal section used for bus body construction.   **[8]**

Q7) a) Explain the basic truck body with flat platform, drop side, fixed side layout. **[8]**

b) Write constructional details of tanker body. **[8]**

OR

Q8) a) Write constructional details of tipper body. **[8]**

b) Write a short note on dimensions of driver seat in relation to control. **[8]**

Q9) a) Write a short note on symmetric & asymmetric vertical loads in car. **[9]**

b) Explain working of airbags and its type according to location. **[9]**

OR

Q10) a) Write a brief note on Idealized structure and structural surfaces. **[9]**

b) Write any 3 energy absorbing systems used in vehicles in brief. **[9]**

◄► ◄► ◄►

[4958]-1041

T.E. (E & T.C.)

SYSTEM PROGRAMMING AND OPERATING SYSTEM

(2012 Course) (Semester - I) (304185) (End Semester)

Time : 2 ½ 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)   Explain Analysis phase of compiler.   **[7]**

    b)   Explain nested macros with example. Explain the difference between macro and a function.   **[7]**

    c)   Explain in brief assembler directives with examples.   **[6]**

OR

Q2) a)   What is parsing. Explain the language processor development tools.**[7]**

    b)   Discuss the terminologies Translated origin, Link origin, Load origin, Relocation factor.   **[7]**

    c)   Explain in brief compile & go loader.   **[6]**

Q3) a)   Find out the safe sequence for execution of 3 processes using Bankers algorithm Maximum Resources: R1 = 7, R2 = 7, R3 = 10   **[6]**

	Allocation Matrix				Maximum Requirement Matrix		
	R1	R2	R3		R1	R2	R3
P1	2	2	3	P1	3	6	8
P2	2	0	3	P2	4	3	3
P3	1	2	4	P3	3	4	4

b) Explain inter process communication. Explain "Dining Philosophers Problem" and "Readers & Writers Problem". **[6]**

c) List the different categories of system calls and explain in brief any two of them. **[6]**

OR

Q4) a) Define deadlock. Explain the methods for deadlock prevention. **[6]**

b) Explain various states of a processes in process scheduling with neat diagram. **[6]**

c) Consider the following processes where Arrival and Burst time (in seconds) are as shown below **[6]**

Process	Burst Time	Arrival Time
P1	06	1
P2	04	4
P3	03	2
P4	06	5

Calculate the Average Waiting Time and Average turn-around Time if the processes are scheduled using FCFS.

Q5) a) Consider the following Page reference string : 9, 1, 3, 1, 3, 6, 4, 6, 8, 4, 8, 7, 1, 2. The number of page frames = 4, calculate the page faults and the hit ratio for First In First Out Page replacement algorithm. **[6]**

b) List the design issues for paging systems and explain any 2. **[6]**

c) Explain segmentation and its advantages. **[4]**

OR

Q6) a) List the page replacement algorithms. Explain LRU in detail. **[6]**

b) Consider memory partitions as 100K, 500K, 200K, 300K and 600K in order. How would each of the First fit, Best fit and Worst fit algorithms place the processes of 212K, 417K, 112K and 426K are to be allocated (in order)? Which algorithm makes the most efficient use of memory.**[6]**

c) What is internal fragmentation and external fragmentation? **[4]**

Q7) a) Explain file access methods and the file operations. **[6]**

b) Explain Linux Ext 2 file system with diagram. **[6]**

c) Explain I/O software layers. **[4]**

OR

Q8) a) Write short note on RAID disk and magnetic disk. **[6]**

b) Explain the directory system with diagram and directory operations. **[6]**

c) Explain the need of EXT 3 over EXT 2 file system of Linux. **[4]**

✦ ✦ ✦

[4958]-1042

T.E.(E&Tc)

DIGITAL COMMUNICATION

(2012Pattern) (End Semester)(Semester-I)

Time :2 ½Hours]   *[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.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) What are the limitations of Delta modulation? How are they overcomed in Delta sigma modulation and Adaptive Delta modulation? Explain with necessary diagrams. **[7]**

b) What is Equalizer? Explain Adaptive equalizers. **[7]**

c) Write short note on

   i) Thermal Noise or Johnson Noise

   ii) White Gaussian Noise **[6]**

OR

Q2) a) Consider a sinusoidal signal $X(t) = A \cos(\omega_m t)$ applied to a delta modulator with a step size δ. Show that the slope overload distortion will occur if $A > \dfrac{\delta}{\omega_m T_s}$ where T_s is the sampling period. **[7]**

b) Draw and explain CCIT hierarchy of multiplexing. **[7]**

c) Explain in detail about stationary, wide sense stationary and ergodic process with suitable mathematical expressions. **[6]**

Q3) a) Derive the expression for signal to noise ratio of integrates and dump receives **[8]**

b) A bipolar signal $\rho_i(t)$ is a + 1V or −1V pulse during the interval (0,T). Additive white Gaussian noise of $\eta/2=10^{-5}$ w/Hz is added to the signal. Determine the maximum bit rate which can be sent with $p_e \le 10^{-4}$. Take Q[3.71]=10^{-4} **[8]**

<div align="center">OR</div>

Q4) a) Explain Gram- Schmidt Procedure. **[8]**

b) State the various properties of matched filter. Explain the impulse response in detail. **[8]**

Q5) a) Derive the expression for error probability of BPSK system. **[8]**

b) If the digital message input data rate is 24 kbps and average energy/ bit is 0.05 unit. Find Bandwidth and Euclidean distance for the following modulation schemes.

i) BPSK   ii) 8-PSK

iii) MSK   iv) 16QAM **[8]**

<div align="center">OR</div>

Q6) a) Explain with the help of block diagram and waveforms DPSK modulation. **[8]**

b) Compare the performance of BPSK,FSK M-ary PSK, M-ary FSK with respect to following parameters.

i) Bandwidth

ii) PSD

iii) Probability of error **[8]**

Q7) a) The bit duration in DS·SS BPSK Communication system is 4ms and the chiping rate is 1 Mbps. Considering average error probability of 10^{-5} for detecting the message signal, calculate the processing gain and Jamming margin Given Q (4.25)=10^{-5}. **[9]**

b) Write short note on.

   i) Wireless standards

   ii) Personal communication system. **[9]**

OR

Q8) a) Generate the PN sequence for transmitting message through FHSS system. The period of PN sequence is $2^4-1=15$. The initial content of shift register are assumed to be 1 1 0 0

   Draw PN sequence generator with waveform. **[9]**

   b) i) Compare DSSS with FHSS

   ii) What is need of spread spectrum modulation technique. **[9]**

◀▶ ◀▶ ◀▶

[4958]-1043

T.E.(Electronics & Telecommunication)
ELECTROMAGNETICS & TRANSMISSION LINES
(2012 Pattern) (Semester-I) (End semester)(304184)

Time :2½Hours]   *[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 diagram must be drawn wherever required.*
4) *Use of Electronic Pocket calculator 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 expression for electric field intensity due sheet charge using Gauss law. **[6]**

     b) Explain polarization in dielectrics. **[4]**

Q3) a) Explain the physical significance of Curl. **[4]**

     b) Given the potential function V= 4x + 2y V in free space, find the stored energy in 1 m^3 volume centered at the origin. **[6]**

OR

Q4) a) Define conduction current and conduction current density and hence derive current Continuity Equation. **[6]**

     b) State and explain Biot and Savart law. **[4]**

Q5) a) Write Maxwell's equations for static and time varying fields in point and integral forms. **[8]**

b) In the material for which $\sigma = 6$S/m, $\in_r = 2.5$. The electric field intensity. $E = 250 \sin(10^{10} t)$ V/m. Find the conduction and displacement current densities and the frequency at which both have equal magnitudes. **[8]**

OR

Q6) 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]**

Q7) a) State primary and secondary constants of a transmission line and hence derive relationship between primary and secondary constants of transmission line. **[8]**

b) What are the various types of distortions in transmission line, Derive condition for Distortion less line. **[8]**

OR

Q8) a) Explain the phenomenon of reflection on transmission line and reflection coefficient. **[8]**

b) Write the equations for voltage and current at any point along the length of transmission line and hence explain physical significance of general solution of transmission line **[8]**

Q9) a) What do you mean by distortion less line.? Derive the expressions for characteristic impedance and propagation constant for distortion less line. **[8]**

b) A loss less transmission line with characteristic impedance 50 ohm is 30 m long and operates at 2MHz. The line is terminated with a load of (60+j40). If phase velocity is 0.6C where C is speed of light then find.

   i) Reflection Coefficient   ii) The standing wave ratio

   iii) The input impedance **[10]**

OR

Q10) a) Explain what do you understand by standing waves and standing wave voltage ratio and hence derive the expression for input impedance of line in terms of characteristic impedance. **[10]**

b) A transmission line has a characteristic impedance of 300ohm and terminated in a load $Z_L = 150+j150\Omega$. Find the following using smith chart. **[8]**

    i) VSWR

    ii) Reflection coefficient

    iii) Input impedance at a distance 0.1λ from the load

    iv) input admittance from 0.1λ from load

◄► ◄► ◄►

[4958] - 1044

T.E. (E&TC)

DIGITAL SIGNAL PROCESSING

(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 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)   Consider the Analog signal   **[4]**

$x_a(t) = 3 \cos 2000\pi t + 5 \sin 6000\pi t + 10 \cos 12000t$.

  i)   Find the sampling frequency.

  ii)   What is the discrete time signal obtained after sampling?

 b)   List the advantages of digital signal processing over analog signal processing.   **[3]**

OR

Q2) a)   A continuous time sinusoid $x_a(t)$ with fundamental period $T_m = \dfrac{1}{t_m}$ is sampled at rate $t_s = 1/T$ to produce discrete time signal $x(n) = x_a(nT)$. Show that $x(n)$ is periodic if $T/T_m = K/N$, where K & N are integers.   **[4]**

 b)   Explain the basic elements of a DSP system.   **[3]**

Q3) a)   Compute the DFT of following sequence using DFT equation (formula), for N = 4 $x(n) = (-1)^n$.   **[4]**

 b)   Discuss the computational requirement of the N-point FFT algorithm.   **[3]**

OR

P.T.O.

Q4) a) Perform the circular convolution of two sequences given below. **[4]**

$x_1(n) = \{2, 1, 2, 1\}$

$x_2(n) = \{4, 3, 2, 1\}$

b) List any six properties of DFT. **[3]**

Q5) a) What is the need of transform? What is relation between Laplace transform & Z-transform & its mapping. **[3]**

b) Find out the system function H(Z) and difference equation for $y(n)$, if impulse response of a system $h(n) = 2(0.5)^n$. **[3]**

OR

Q6) a) Find the Z-transform & define its ROC for the following signals. **[4]**

i) $x(n) = \delta(n - 3)$

ii) $x(n) = 2^n u(n - 2)$

b) Explain conditions in Z domain for a system to be stable and for a causal system to be stable. **[2]**

Q7) a) Design the complete Digital Butterworth filter using BLT for T = 1, for following specifications. **[10]**

$$0.8 \leq |H(e^{j\omega})| \leq 1 \qquad 0 \leq \omega \leq 0.2\pi$$

$$|H(e^{j\omega})| \leq 0.2 \qquad 0.6\pi \leq \omega \leq \pi$$

b) Explain the impulse invariance technique in detail. What is drawback of it? How Bilinear Transformation removes it? **[8]**

OR

Q8) a) Given the difference equation **[10]**

$y(n) = -0.1y(n - 1) + 0.2\ y(n–2) + 3x(n) + 3.6\ x(n–1) + 0.6\ x(n–2)$.

Obtain the direct form I & II, cascade and parallel realization of the system.

b) Draw & compare the characteristics of Butterworth filter, Chebyshev filters and elliptic filter. **[8]**

Q9) a) Explain FIR filter design using Windowing technique. Compare the different window functions w.r.t. transition band, main lobe, and peak side lobe width. Justify the role of kaiser window in FIR filter design. **[8]**

b) Design an FIR filter with Hamming window for following specification. **[8]**

$$H_d(\omega) = e^{-j3\omega} \qquad -\frac{\pi}{4} \le \omega \le \frac{\pi}{4}$$
$$= 0 \qquad \pi/4 < \omega \le \pi$$

OR

Q10) a) What are the characteristics of FIR filters. Explain frequency sampling technique of FIR filter design. **[8]**

b) Draw & explain the characteristics of ideal filters & its requirements. Why the ideal filters are not realizable. Explain the Gibbs phenomenon & why it occurs? **[8]**

Q11) a) What is the principle of down sampling? What is importance of antialiasing filter? Derive the expression for decimated output signal y(m). **[8]**

b) Draw the functional block diagram of TMS 320C67XX & explain any five salient features of TMS 320C67XX. **[8]**

OR

Q12) a) With the aid of block diagram & waveform explain sampling rate conversion by Non-integer factor. **[8]**

b) Explain following applications of DSP. **[8]**
   i) Voice processing.
   ii) Image processing.

❖ ❖ ❖ ❖

[4958]-1045

T.E. (E & TC)

MICROCONTROLLER AND APPLICATIONS

(End-Sem) (Semester - I) (2012 Course) (304183)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer to the two sections should be written in separate answer books.*
2) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 Q7 or Q8.*
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)   Compare RISC and CISC microcontroller with Example.   **[6]**

b)   Draw and explain the Flag structure of 8051 with bank 2 selection.   **[6]**

c)   Explain in detail Data memory MAP of PIC18F with GPR and SFRS.**[8]**

OR

Q2) a)   Differentiate between RS232 and RS 485, Comment on serial communication rate.   **[6]**

b)   Draw and explain the interrupt structure of 8051 in detail.   **[6]**

c)   Draw and explain the PIC18F architecture in detail.   **[8]**

Q3) a)   Write a program for 1KHz, 10% duty cycle PWM waveform.   **[8]**

b)   Draw an interfacing diagram for 4*4 matrix key board and display the Key pressed on LED write a code.   **[8]**

OR

Q4) a)   Draw and explain the interfacing of LCD with port D and port E of PIC18XXXL micro controller without Busy flag. Write C code to display 'S.P.P.U Pune'.   **[8]**

b)   Explain function the port structure of PIC in detail.   **[8]**

P.T.O.

Q5) a) Explain the MSSP structure of PIC 18F in detail. **[8]**

b) Compare the SPI and 12C protocol. **[8]**

OR

Q6) a) What are the features of RTC Draw an interfacing diagram to interface with PIC. **[8]**

b) Draw an interfacing of temp Sensor to PIC using Serial ADC and indicate excess temp when exceed the set pont by LED. **[8]**

Q7) a) Design a frequency counter for counting number of pulses and display same on LCD. **[10]**

b) Draw an interfacing diagram and write a algorithm for DC motor speed control using PIC. **[8]**

OR

Q8) a) Design of DAS system for pressure monitoring system [use any suitable sensor]. **[10]**

b) State and explain with generalized Data acquisition system. **[8]**

✗ ✗ ✗

[4958] - 1046

T. E. (E & TC)

INFORMATION THEORY & CODING TECHNIQUES

(2012 Pattern) (End - Sem) (Semester - II)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

    1)   Solve Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8.

    2)   Use of calculator is allowed.

    3)   Assume suitable data if necessary.

Q1) a)   Find entropy to a guassian source X having mean Mx and variance σ_x^2.**[6]**

    b)   Find capacity of a channel having bandwidth 1MHz and signal to noise ratio of 10dB.   **[7]**

    c)   What are cyclic codes? How are the cyclic codes represented? What is requirement of generator polynomial for cyclic codes?   **[7]**

<div align="center">OR</div>

Q2) a)   Compare shannon - Fano- and Huffman coding techniques.   **[6]**

    b)   What is standard array decoding? Explain with suitable example.   **[7]**

    c)   For a (5, 1) cyclic code, the generator polynomial used is $g(x) = x^4 + x^3 + x^2 + x + 1$. Draw the encoder & decoder circuit for the cylic code.   **[7]**

Q3) a) Outline the procedure for encoding of RS codes. **[8]**

b) Explain the features of following codes. **[8]**

   i) BCH codes

   ii) Cyclic hamming codes

   iii) CRC Codes

OR

Q4) a) A (7, 4) single error correcting BCH code is generated using generator polynomial $g(x) = x^3 + x + 1$. If received code polynomial is $r(x) = x^6 + x^4$, find the corrected code polynomial. **[8]**

b) What is stop - and - wait ARQ? Explain. **[8]**

Q5) a) "Convolutional coding can be alternative to block coding when block length is large". Justify. **[4]**

b) Draw the state diagram for convolutional encoder whose generators are given as **[8]**

   $g_{11} = [1\ 0\ 1]$ $g_{12} = [1\ 1\ 0]$

c) Using polynomial description of convolutional codes, find the codeword generated for input [1 0 1]. Use the encoder given in Q. 5 (b). **[6]**

OR

Q6) a) Draw the steady state trellis for the convolutional encoder whose generators are given as **[6]**

   $g_{11} = [1\ 0\ 1]$ $g_{12} = [1\ 1\ 0]$

b) What is sequential decoding of convolutional codes? Explain in brief. What is its disadvantage? **[8]**

c) Write short note on Turbo cocks. **[4]**

Q7) a) What are the goals & limitation of a communication system designer? Justify with example that some of these goals are conflicting with each other. **[8]**

b) What is mapping by set partitioning in TCM? Explain with suitable example. **[8]**

OR

Q8) a) For the following TCM encoder draw the trellis diagram (Steady state). **[8]**
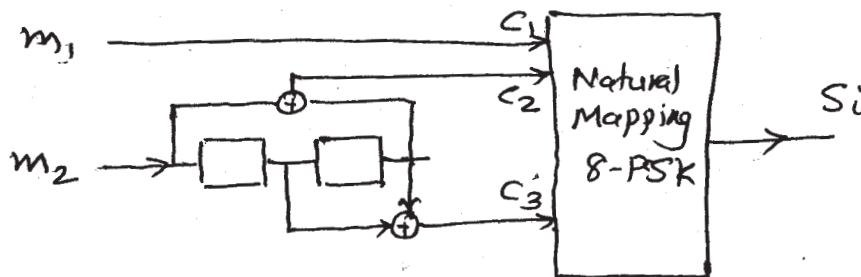
b) Using error probability curves of MPSK modulation explain the various trade offs between pe, Eb/No and Bandwidth. **[8]**

⚬⚬⚬⚬⚬⚬

[4958]-1047

T.E. (E & TC)
EMBEDDED PROCESSORS
(2012 Course) (304191) (End Semester) (Semester - II)

Time : 3 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) *Assume suitable data if necessary.*

Q1) a) Explain programmer's model of ARM processor. **[6]**

b) Draw interfacing diagram to interface LED bank to port pins P 0.12 to P 0.15 of LPC 2148. State algorithm to blink the LEDs. **[4]**

OR

Q2) a) What is the need of Pin connect Block in LPC 2148? Explain the role of PIN SELX registers. **[6]**

b) Explain following ARM instructions (any two). **[4]**

   i)   ADDEQ R_0, R_1, R_2.

   ii) MVN R_2, R_3, ASR # 2.

   iii) STR R_0, [R_1, # 4]

   iv) ANDS R_0, R_1, R_2.

Q3) a) Explain SPI protocol with suitable diagram. **[6]**

b) What is meant by TDMI with respect to ARM 7 core. Compare THUMB and ARM instruction set. **[4]**

OR

Q4) a) Explain the following bits in ADOCR register. **[6]**

      i)   SEL.

      ii) CLKDIV.

      iii) CLKS.

   b) Draw and explain the interfacing diagram of SD card with LPC 2148.**[4]**

Q5) a) Compare Cortex - A, cortex - R, cortex - M series processor. **[8]**

   b) Enlist need and desired features of operating systems in developing complex applications in Embedded system. **[8]**

OR

Q6) a) Explain CMSIS standard for firm wave development in ARM cortex based system. **[6]**

   b) Compare Cortex processors over ARM 7 for embedded system design. **[6]**

   c) Why Nested vector Interrupt controller is necessary in ARM cortex?**[4]**

Q7) a) Explain four reset sources under system control block of LPC 1768 in detail. **[8]**

   b) Explain the following power saving modes. [Any three]. **[6]**

      i)   Sleep mode.

      ii) Deep sleep mode.

      iii) Power down mode.

      iv) Deep power-down mode.

   c) Explain significance of PLL0 and PLL1 in LPC 1768. **[4]**

OR

Q8) a) Draw interfacing diagram of motor control using PWM with LPC 1768. & write down algorithm to control the speed of motor. **[8]**

b) Explain three clock sources (oscillators) for LPC 1768. **[6]**

c) Describe any two registers with reference to ARM M3 micro controllers (LPC 1768). **[4]**

    i) FIOMASK.

    ii) FIOPIN.

    iii) FIOSET.

    iv) FIODIR.

Q9) a) Explain the CAN protocol and frame structure with reference to ARM M3 microcontroller. **[8]**

b) Explain the following with respect to USB controller in LPC 1768. **[8]**

    i) Features of USB.

    ii) USB frame structure.

OR

Q10) a) Explain the architecture and operation of Ethernet bus with reference to ARM M3 microcontroller. **[8]**

b) How in and out data transactions take place in USB? Give operational overview. **[8]**

🌢   🌢   🌢

T.E.(E&TC Engineering)
POWER ELECTRONICS
(2012Pattern) (Semester-II) (End Sem)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2,Q.3or Q. 4, Q.5 or Q. 6 , Q .7 or Q. 8.*
2) *Neat diagrams and waveforms 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) Draw & Explain a gate drive circuit for IGBT.   **[7]**

   b) Draw & explain single phase half controlled rectifier(semi converter) for R-L load with o/p voltage & current waveforms. What is inherent free wheeling in semi converter for R-L load.   **[7]**

   c) Single phase full bridge inverter is operated from 50V dc supply, it has a resistive load of R= 5Ω . Find: **[6]**

   i)   rms o/p voltage at fundamental frequency(V_{01})

   ii) rms o/p power

   iii) rms o/p Voltages at second & third harmonic(V_{02}&V_{03})

<div align="center">OR</div>

Q2) a) Compare SCR with MOSFET   **[7]**

   b) What are PWM techniques in inverter? Explain Multiple PWM technique with waveforms.   **[6]**

   c) Draw & explain three phase half controlled bridge converter for R load with o/p voltage waveforms.   **[7]**

Q3) a) Explain operation of step down chopper with R load and derive expressions for average output voltage & rms output voltage. **[8]**

b) Explain operation of step up chopper with circuit diagram and derive an expression for its o/p voltage: $V_0 = \dfrac{Vs}{(1-D)}$ where D is duty cycle. **[6]**

c) A step down DC chopper has a resistive load of R=15Ω and input voltage Edc=200V. When the chopper remains ON, its voltage drop is 2.5V. The chopper frequency is 1KHz. If the duty cycle is 50% ,determine

   i) Average output voltage **[4]**

   ii) rms output voltage

<p align="center">OR</p>

Q4) a) A step up chopper is used to deliver load voltage is 660V from 220V DC source. If the blocking period of thyristor is 500 μs, compute the turn on time. **[5]**

b) A single phase full wave ac voltage controller has a resistive load of R=10Ω and the input voltage is Vs=230V(rms),50 Hz. The delay angles of thyristors T1 and T2 are equal: α1= α2 =π /3. Determine **[5]**

   i) the rms output voltage

   ii) the rms output current

c) Draw & explain single phase full wave ac voltage controller has a resistive load with following waveforms: **[8]**

   i) Gate signals for T1 and T2

   ii) o/p rms voltage & current

   iii) Voltage across T1

Q5) a) Explain various modes of operation in DC motor with neat diagrams.**[8]**

b) Explain operation of On-line & off-line UPS with block schematic. **[8]**

<p align="center">OR</p>

Q6) a) Explain stepper motor drives. **[8]**

b) What are advantags of electronic ballast over conventional ballast? Explain working of electronic ballast with block schematic. **[8]**

Q7) a) What are different over voltage protection techniques in power electronics? Explain any one in with circuit diagram. **[8]**

b) What is EMI? Explain various sources& minimizing techniques of EMI. **[8]**

<div align="center">OR</div>

Q8) a) Explain the role of heat sink. **[4]**

b) What is the need of resonant converter? Explain ZCS resonant converter with circuit & waveforms. **[8]**

c) For a thyristor, Maximum junction temperature is 110°C. The thermal resistances are $\phi_{JC} = 0.16$, $\phi_{CS} = 0.08$°C/W. for heat sink temperature of 60°C, calculate total average power loss in thryistor-sink combination.

If heat sink temperature is reduced to 50°C, find new total average power loss in thryistor - sink combination. **[4]**

◆▶ ◆▶ ◆▶

[4958]-1049

T.E. (E & TC)

INDUSTRIAL MANAGEMENT

(2012 Course) (End - Semester) (304192)

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 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. 12,00,000, variance cost is Rs.50/Unit, Estimated sales for current year is Rs.50,00,000 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. 45,00,000.

   iii)   Sales turnover if profit target is Rs.15,00,000.

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

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

ΕΕΕ

[4958]-1050

T.E.(E&TC)

ANTENNA & WAVE PROPAGATION

(2012 Pattern)(Semester-II) (End Sem.)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer any one Question 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? **[8]**

b) Derive vector potential A for an magnetic current source J. **[6]**

c) Calculate the skip distance for flat earth with MUF of 10MHz.If wave is reflected from a height of 300 Km where maximum value of refractive index(n) is 0.9. **[6]**

OR

Q2) a) Explain antenna radiation mechanism in detail. **[6]**

b) What is polarization of wave? Explain the polarization of three types of wave with the help of relevant diagram? **[6]**

c) A lossless resonant $\lambda/2$ dipole antenna with input impedance of 73Ω is to be connected to a transmission line whose characteristics impedance is 50Ω. Assuming that the pattern of the antenna is given approximately by U=Bosin³θ . Fnd the overall maximum gain of this antenna . **[8]**

Q3) a) Find the following terms for small Dipole antenna: **[18]**

i) Specify the current

ii) Vector magnetic potential

iii) Far field components of Electric & Magnetic fields

iv) Radiation density, radiation intensity

v) Radiated power, radiation resistance

vi) Directivity

vii) 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 λ/10 and the medium is free space. Calculate its efficiency if loss resistance is 25Ω . **[8]**

b) Derive mathematical expression for power density and radiation intensity of half wave dipole antenna and draw radiation pattern of half wave dipole antenna in E an H plane. **[10]**

Q5) a) Write a short notes on **[8]**

   i) Pattern Multiplication

   ii) Binomial Array

b) For an array of four isotropic sources along Z-axis separated by a distance λ/2 and progressive phase shift α= 0 find **[8]**

   i) Nulls direction

   ii) Direction of maxima

   iii) Direction side lobes

   iv) Half power Beam width

   v) Draw neat radiation pattern.

<p style="text-align:center">OR</p>

Q6) a) Explain planar array. State its advantages and applications. **[6]**

b) 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. **[5]**

c) Give the comparison of broadside and End fire antenna array. **[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

<p style="text-align:center">OR</p>

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]

◀▶   ◀▶   ◀▶

[4958]-1051

T.E. (Electronics)
ELECTRICAL MACHINES & POWER DEVICES
(2012 Course) (304201) (End sem)

Time : 2½ 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) Draw and Explain the basic structure and Steady state characteristics of power diode. **[6]**

   b) Why SCR is called a latching type device? Derive an expression for anode current IA. **[7]**

   c) Write in detail note on protection circuit for power devices. **[7]**

OR

Q2) a) Draw and explain switching characteristics of MOSFET in detail. **[6]**

   b) Explain various cooling methods for power devices. Compare liquid cooling and vapour phase cooling. **[7]**

   c) With the help of neat diagram explain the turn-off mechanism of GTO.**[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 (PMDC) in detail.**[6]**

   c) A 25 kW, 250 V, DC shunt generator has armature and field resistance of 0.6Ω and 100Ω respectively. Determine the total armature power developed when working as a motor taking 2kW input. **[4]**

OR

Q4) a) What are the drawbacks of three-point starter? Describe four-point starter with neat diagram? **[6]**

b) Distinguish between self excited and separately excited DC generator.**[6]**

c) A 4 pole, lap wound dc motor has 540 conductors. Its speed is found to be 1000 rpm when it is made to run light. The flux per pole is 25mWb. It is connected to 230V dcsupply. The armature resistance is 0.8Ω. Calculate **[4]**

   i) induced emf

   ii) Armature current

   iii) Stray losses

   iv) Lost torque.

Q5) a) Explain the principle of operation of a 3-phase induction motor in detail.**[8]**

b) A 1000V, 50Hz, 3-phase induction motor has star connected stator. the ratio of stator to rotor is 3 : 6. The standstill impedance of rotor per phase is $0.01 + j0.2Ω$. Calculate **[10]**

   i) Rotor current at start

   ii) Rotor P.F. at start

   iii) Rotor current at slip of 3%,

   iv) External resistance per phase in the rotor to limit starting rotor current to 200A.

OR

Q6) a) Explain the working principle of synchronous generator with the help of neat diagram. **[8]**

b) A 400V, 4 pole, 3 phase, 50Hz star connected induction motor has a rotor resistance and reactance per phase equal to 0.01Ω and 0.1Ω respectively. Determine

   i) Starting torque

   ii) Slip at which maximum torque will occur

   iii) Speed at which maximum torque will occur

   iv) Maximum torque

   v) Full load torque if full load slip is 4%. Assume ratio of stator to rotor turns as 4. **[10]**

Q7) a) Write a short note on AC servomotor. **[8]**

   b) Explain the construction and working principle of SRM in detail. **[8]**

OR

Q8) a) Write a short note on BLDC. **[8]**

   b) Explain the operation of a variable reluctance motor. **[8]**

✦ ✦ ✦

[4958]-1053

T.E.(Electronics)
NETWORK SYNTHESIS
(2012 Course) (Semester-I)

Time :2½Hours]   *[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 electronic pocket calculator is allowed.*
   4) *Assume suitable data, if necessary.*

Q1) a) State the properties of positive real function and check the following

function for positive real function. $Z(s) = \dfrac{(s+2)}{s^2 + 3s + 2}$.   **[6]**

b) Synthesize the following function into Foster- I and Cauer-I form.

$$Z(s) = \frac{s(s^2 + 9)}{(s^2 + 1)(s^2 + 16)}.$$ **[6]**

c) Define zeros of transmission and synthesize the following transfer function
into a ladder network with 1ohm termination.

$$Z_{21}(s) = \frac{s^3}{s^3 + 3s^2 + 4s + 2}$$ **[8]**

OR

Q2) a) When is the network said to be causal and stable. State and explain
conditions for stability and causality of a network function.   **[6]**

b) State the properties of RC driving point admittance function and realize
the following function into Cauer- I form

$$Y(s) = \frac{8s^2 + 10s}{s + 1}$$ **[6]**

c) State the poperties of transfer function and realize the following voltage transfer function.

$$\frac{V_2}{V_1} = \frac{(s-1)(s^2 - 2s + 2)}{(s+1)(s^2 + 2s + 2)}$$ **[8]**

Q3) a) State the properties of Butterworth approximated filter. **[4]**

b) Realize the transfer function of a third order low pass Butterworth filter as a transfer impedance function. **[6]**

c) Consider the low pass filter of Figure①and convert it into a band pass filter with $1\,\Omega$ termination and bandwidth 6×10^4 rad/sec with band pass center frequency 4×10^4 rad/sec. **[6]**
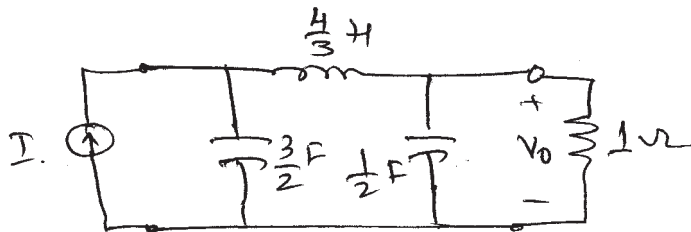
Figure①

OR

Q4) a) Explain the need and concept of impedance and frequency scaling as used in filter designing. **[6]**

b) State the properties of Chebyshev approximation technique. **[4]**

c) Obtain a system function H(s) that exhibits the Chebyshev characteristics with not more than 1 dB ripple in passband and attenuation of 20 dB at $\omega = 2$ rad/sec. **[6]**

Q5) a) Compare active and passive filters. **[4]**

b) Synthesize the second order low pass fiter to have a pole frequency of 10 kHz and a pole Q of 5 using saraga design of salten-key circuit. **[6]**

c) What is cascade approach in active filter synthesis. List the advantages of the cascade approach. **[6]**

OR

Q6) a) Explain the different biquad feedback topologies used in active filter designing and important considerations. **[6]**

b) Design a first order active RC low pass Butterworth filter with cut off frequency 20kHz and pass band gain of 3.6. (use positive feedback topology) **[4]**

c) Synthesize the following high pass filter function using RC - CR transformation.

$$T_{HP}(s) = k \cdot \frac{s^2}{s^2 + s + 16}$$ **[6]**

Q7) a) What is sensitivity. Write the properties of sensitivity function. **[4]**

b) For R-L-C circuit shown in Figure② find the transfer function $\dfrac{V_o}{I_{in}}$ and compute the sensitivities of gain constant K, resonant frequency (ω_p) and quality factor (Q_p) with respect to R,L and C. **[6]**
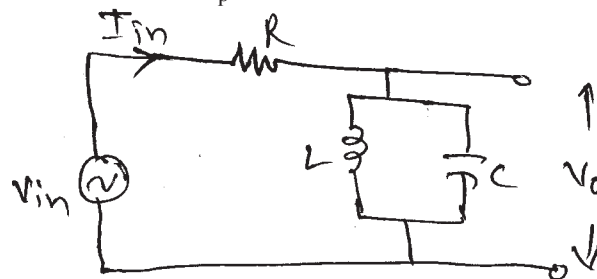
Figure②

c) Explain the effect of following op-amp parameters on active filter response. **[8]**

i) Input offset voltage

ii) Slew rate

iii) Input offset current

iv) Dynamic range

OR

Q8) a) Prove the following sensitivity relationships. [6]

i) $S_x^{p_1+p_2} = \dfrac{p_1 S_x^{p_1} + p_2 S_x^{p_2}}{p_1 + p_2}$

ii) $S_x^{p^n} = n S_x^p$

iii) $S_{x^2}^p = \dfrac{1}{2} S_x^p$

b) Explain the concept of gain sensitivity. Also explain the various factors affecting gain sensitivity. [6]

c) The input to the inverting amplifier shown in Figure 3 is a sine wave of amplitude 5 volts. If slew rate of op-amp is 1 V/μsec, find the frequency at which slew rate limiting occurs. [6]

Figure 3

◀▶ ◀▶ ◀▶
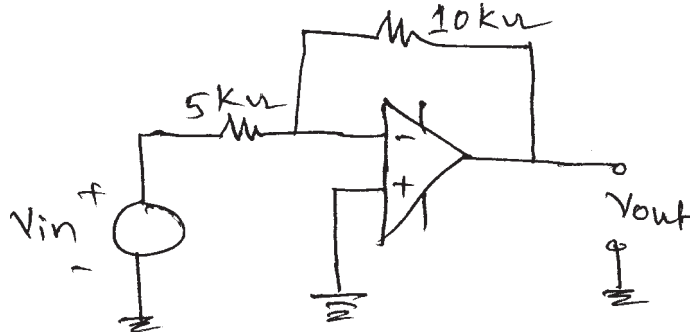
[4958] - 1054

T. E. (Electronics)

MICROCONTROLLERS AND APPLICATION

(2012 Pattern) (304203)

Time : 2½ *Hours]*   *[Max. Marks :70*

Instructions to the candidates:

1) *Answer the Q.1 OR Q.2 and Q.3 OR Q.4 and Q.5 OR Q.6 and Q.7 OR Q.8.*
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)   Describe in detail. Assembler and compiler and emulator.   **[8]**

   b)   Explain different branch instructions of 8051 microcontroller.   **[6]**

   c)   Write features of PICI 18FXX Microcontroller over PICI6FXXX.   **[6]**

OR

Q2) a)   What is the role of microcontroller in embedded System?   **[4]**

   b)   Draw and explain port structure of PIC 18FXXX Microcontroller.   **[8]**

   c)   Explain Counter operation in 8051 microcontroller.   **[8]**

Q3) a)   What is peripheral interrupt, IVT and ISR? Draw and Explain the interrupt structure for the PIC 18FXX microcontroller.   **[8]**

   b)   Write a Embedded C program for blinking LED's interfaced to PORTD of PIC18FXXX.   **[8]**

OR

Q4) a) Draw an interfacing diagram and write an Embedded C program to interface 16×2 LCD with PIC 18FXX Microcontroller to display the "SPPU PUNE" message. Use 4 bit interface mode with busy flag. **[8]**

b) Explain Timer0 control register in details. Also calculate the TMRCON0, TMR0H, TMR0L value to generate 1 second delay using Timer0? Assume that XTAL = 8MHZ. **[8]**

Q5) a) Explain the UART operation in PIC 18FXX with example. **[8]**

b) What are the advantages of SPI BUS over 12C BUS? Draw the RTC interfacing with PIC18FXXX. **[8]**

OR

Q6) a) Explain the 12C protocol with the help of MSSP module used in master mode. **[8]**

b) Write a Embedded C program for reading single analog input (range 0 to 5V) and display it on LCD. **[8]**

Q7) a) Draw interfacing diagram and write a program to read frequency (range 0-500KHz). **[10]**

b) Describe the algorithm for voltmeter with interfacing diagram. **[8]**

OR

Q8) a) Design Speed control of DC motor with the help of variable register as input using a PWM. **[10]**

b) Explain different steps involved in designing of data acquisition system.**[8]**

ഇരുൟഇരുൟ

[4958]-1055

T.E. (Electronics Engg.)
ELECTROMAGNETIC AND WAVE PROPAGATION
(2012 Pattern) (End Semester) (Semester - I) (304204)

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 diagram 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.*

Q1) a) State and prove Gauss's law. **[6]**

b) Two dipoles with momentum $-6a_z^-$ nC/m and $9a_z^-$ nC/m are located at point $(0,0,2)$ & $(0,0,3)$ respectively. Find the potential at the origin. **[8]**

c) State and derive Biot-Savart's law. **[6]**

OR

Q2) a) Define and derive Electric potential and potential difference. **[6]**

b) An infinite long current filament is placed along Z-axis. The magnetic field intensity at point P $(3,4,0)$ *is* $10(-0.8\overrightarrow{a_x}+0.6\overrightarrow{a_y})$ A/m. find the current through the filament. **[8]**

c) State and explain the scalar and vector magnetic potential. **[6]**

Q3) a) Write Maxwell's equations in point form and integral form. **[9]**

b) In free space E = $20\cos(\omega t - 50x)$ a_y determine **[9]**

   i) J_d ii) H   iii) ω

OR

P.T.O.

Q4) a) State and derive Poynting theorem. **[9]**

b) In non magnetic medium E=4sin (2π107t-0.8x)az V/m. Find the following things.

    i)   εr,η

    ii)   The time-average power carried by the wave.

    iii) The total power crossing 100cm² of plane 2x+y=5. **[9]**

Q5) a) Define polarization and explain all types of polarization with expression. **[8]**

b) Explain and derive the plane wave equation in lossless dielectrics. **[8]**

<div align="center">OR</div>

Q6) a) Explain the reflected wave, Transmitted wave, incident wave. **[6]**

b) In lossless dielectric for which $\mu=60\pi$, μ_r =1, and

$H = -0.1 \cos(\omega t - z)a_{x+} 0.5\sin (\omega t - z)a_y$A/m, calculate ε_r,ω,and **E.[10]**

Q7) a) Explain the different types of wave propagation in detail. **[8]**

b) Define following terms: **[8]**

    i)   Virtual height

    ii)   Maximum Usable Frequency (MUF)

    iii) Skip distance

    iv) Critical Frequency

<div align="center">OR</div>

Q8) a) Derive and explain the Friis Transmission equation. **[8]**

b) Explain the characteristics of wireless channel in details. **[8]**

<div align="center">✗   ✗   ✗</div>

[4958] - 1056

T. E. (Electronics)

INSTRUMENTATION SYSTEMS

(304209) (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.*

    2)   *Neat diagram must be drawn whenever necessary.*

    3)   *Figures to the right side indicate full marks.*

    4)   *Assume suitable data if necessary.*

Q1) a)   Differentiate between active and passive transducers.   **[4]**

    b)   Explain Bourdon tube and Diaphragms for pressure measurement. **[6]**

    c)   An RTD has $\alpha = 0.004/°C$. 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]**

<div align="center">OR</div>

Q2) a)   Define the following terms: **[6]**

        i)   Reliability

        ii)   Linearity

        iii)   Hysteresis

        iv)   Drift

    b)   Explain the different fundamental standards and units for common physical parameters.   **[7]**

    c)   Write a short note Load cells.   **[7]**

Q3) a) Explain general architecture of SMART sensors. [6]

b) Explain the working of piezoelectric sensors for measurement of accelerometer. [6]

c) Explain MEMS magnetic field sensors. [4]

OR

Q4) a) Explain the working principle of Hall Effect sensors. [6]

b) Explain Bulk Micromachining technique regarding MEMS. [6]

c) Draw LM 75 block diagram and give its specification. [4]

Q5) a) How data logger is different than DAS? [7]

b) Explain I to P converter. [6]

c) Write a short note on RS 232 standards. [5]

OR

Q6) a) Explain HART communication protocol. [7]

b) Explain Data Acquisition system in detailed. [6]

c) Write a short note on IEEE -488 standard Bus. [5]

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: **[4]**

   i) Spool valve

   ii) Poppet valve

OR

Q8) a) Explain with neat diagram Pressure control valves. **[6]**

b) Explain the role of Relays and solenoid valves with any one application. **[6]**

c) What are pneumatic actuators? Explain. **[4]**

છ૪૪છ૪૪

[4958]-1057

T.E. (Electronics)
EMBEDDED PROCESSORS
(2012 Course) (End Semester) (304211) (Semester - II)

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

Instructions to candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

Q1) a)   State and Explain of ARM 7, ARM 9 and ARM 11.   **[6]**

    b)   Describe CPSR and SPSR of ARM 7.   **[4]**

OR

Q2) a)   Explain following instruction (Any three).   **[6]**

       i)   AND

       ii)   ORR

       iii)   EOR

       iv)   BIC instruction

    b)   Draw and Explain 3 stage pipeline in ARM 7.   **[4]**

Q3) a)   Draw and Explain Memory map of LPC 2148.   **[4]**

    b)   Draw interfacing diagram of GLCD with LPC 2148 and write algorithm for same.   **[6]**

OR

Q4) a)   Explain Timer control register (TCR) and Timer counter register.   **[6]**

    b)   Draw and Explain Timing diagram of SPL Protocol.   **[4]**

Q5) a) Write a feature and application of cortex A, cortex R, cortex M processor. **[8]**

b) Compare the cortex M$_3$ with ARM 7 TDMI. **[8]**

OR

Q6) a) Draw and Explain block diagram of ARM cortex M$_3$. **[8]**

b) Explain CMSIS standard with structure in detail. **[8]**

Q7) a) What is TET LCD. **[8]**

b) Draw and Explain architectural diagram of LPC 1768 Microcontroller. **[8]**

OR

Q8) a) Draw and Explain interfacing of 7 segment display with cortex 1768. **[8]**

b) Explain in detail clock and power control. **[8]**

Q9) Write a short node on following block in LPC 1768. **[18]**

a) CAN.

b) Ethernet.

c) USA.

OR

Q10) a) Draw and Explain interfacing diagram of DC motor using PWM of LPC 1768 also write Embedded C program for same. **[10]**

b) Draw and Explain block diagram of CAN controller. **[8]**

🌢 🌢 🌢

[4958]-1058

T.E.(Electronics)

POWER ELECTRONICS AND APPLICATIONS

(2012Course) (Semester-II) (End Sem)(304212)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) Answer Q.1 or Q.2,Q.3or 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) Assume suitable data, if necessary.

Q1) a) What are converters? With the help of neat circuit diagram and relevant waveform, explain the operation of 3Φ semi controlled bridge converter. **[7]**

   b) Draw circuit diagram of half bridge inverter. Obtain expression for the output voltage of half bridge inverter. Derive expression for the rms value of the fundamental component of output voltage. **[7]**

   c) The step down chopper is operating with a resistive load of 10Ω and input voltage of 220 V DC. When the chopper switch remains on, its voltage drop Vch is 2 V. The chopper frequency is 1 kHz, If the duty cycle is 50%, determine the average output voltage and RMS output voltage and chopper efficiency. **[6]**

OR

Q2) a) Draw 3Φ fully controlled bridge converter. Obtain an expression for average output voltage. **[7]**

   b) Compare 120° and 180° modes of conduction for a 3Φ with star connected resistive load. **[6]**

   c) Explain with circuit diagram, the operation of step up chopper. **[7]**

Q3) a) What is need of resonant converters? Explain hard and soft switching.**[6]**

   b) Explain the operation of zero voltage switching(ZVS) resonant dc-dc converter with the help of equivalent diagrams and waveforms. **[6]**

   c) Explain types of power line disturbances with sources and preventive techniques. **[4]**

OR

Q4) a) Explain converter with circuit diagram, waveforms the operation of SLR dc-dc resonant converter. **[8]**

b) Draw the waveforms and circuit diagram of 12 pulse converter used in HVDC transmission. Explain its operation. **[8]**

Q5) a) Write short notes on Electronic Ballast and Power electronics in capacitor charging applications. **[8]**

b) Compare ON-line UPS with OFF-line UPS with typical block diagram. Justify why ON-Line UPS is better than OFF-line UPS. **[8]**

OR

Q6) a) Explain with block schematic working of OFF-line UPS. State its specification and applications. **[8]**

b) Explain working principle of Universal motor and compare with BLDC motor. **[8]**

Q7) a) Explain with block diagram grid connected PV system. **[6]**

b) Explain wind energy system and control of wind turbines. **[6]**

c) Distinguish between horizontal axis wind turbine generator and vertical axis wind turbine generator. **[6]**

OR

Q8) a) Explain the need of renewable energy sources. Explain any one in detail. **[6]**

b) Compare stand alone PV system and grid connected PV system. **[6]**

c) Explain in brief isolated grid supply system with multiple wind turbines. **[6]**

◆▶ ◆▶ ◆▶

[4958]-1059

T.E. (Electronics Engineering)
INDUSTRIAL MANAGEMENT
(2012 Pattern) (Semester - II) (304213)

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, Q11 or Q12.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Assume suitable data, if necessary.*

Q1) a) Justify how "Management is the combination of Art & Science". **[3]**

    b) Differentiate between Administration & Management. **[5]**

OR

Q2) a) Explain Kaizen. State the benefits of Kaizen. **[6]**

    b) State the advantages of partnerships. **[2]**

Q3) a) State & explain different definitions of Quality with example. **[5]**

    b) Explain 5s Quality management standards. **[3]**

OR

Q4) a) State three quality management tools. Explain any one in detail. **[5]**

    b) Explain types of quality. **[3]**

Q5) a) Explain Break Even Analysis with neat labeled diagram. **[4]**

    b) Write a short note on Capital Structure. **[2]**

OR

Q6) a) Write a short note on Resource Leveling. **[2]**

    b) What are difference types of Capital? Explain it in detail. **[4]**

P.T.O.

Q7) a) Explain HRM. What are roles & challenges in front of HR professionals? **[10]**

b) Explain how carrier planning plays an important role in organizational development. **[6]**

OR

Q8) a) Explain the term HRIS in detail. **[8]**

b) What are objectives of human resource management? **[8]**

Q9) Write a short note on: **[16]**

a) Cooperative Society

b) Proprietorship

c) Private Limited Company

d) Women Entrepreneurship.

OR

*Q10)*a) What are different types of business? **[10]**

b) Explain different sources of finance in detail. **[6]**

*Q11)*a) Define MIS. What is the need of MIS? **[8]**

b) What is E commerce? Explain the types of E commerce. **[8]**

OR

*Q12)*a) What is ERP & BPR. Explain in detail. **[8]**

b) Differentiate MIS & DSS. **[8]**

ε ε ε

[4958]-1060

T.E.(Electronics)
DISCRETE TIME SIGNAL PROCESSING
(2012 Course) (End Sem) (304210)(Semester-II)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Neat diagrams must be drawn wherever necessary*

   2)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

   3)   *Assume suitable data if necessary.*

Q1) a)   An analog signal in represented as x(t) = 5 cos (2π 2000t) +cos (2π5000t) **[6]**

       i)   What is the Nyquist rate for this signal?

       ii)   If we sample this signal at a rate of 8KHz, what is the folding frequency?

       iii)   Write the equation for the sampled signal

   b)   Compute the 4 point DFT of the sequence x(n) = {1 2 3 4} using linear transformation method. **[4]**

<div align="center">OR</div>

Q2) a)   Compute the linear convolution of following sequences using Z-transform. **[6]**

      $x_1(n) = \{1\ 2\ 1\ 1\}$

      $x_2(n) = \{2\ 1\ 2\ 1\}$

   b)   Compute the circular convolution of following sequences. **[4]**

      $x_1(n) = \{4\ 3\ 2\ 1\}$

      $x_2(n) = \{1\ 2\ 1\ 2\ \}$

Q3) a)   Compute the Z-transform of following sequences. **[6]**

       i)   x(n) = n u(n)

       ii) $x(n) = \left(\dfrac{1}{2}\right)^n u(n) + (3)^n u(-n-1)$

<div align="right">*P.T.O.*</div>

b) H(z) is a cascade combination of $H_1(z)$ & $H_2(z)$ where **[4]**

$$H_1(z) = \frac{1}{1 - 0.2z^{-1}} \qquad H_2(z) = \frac{1}{1 - 0.3z^{-1}}$$ write the overall system function.

OR

Q4) a) Compute the IDFT of the following sequence x(k)={7 –2–j 1 –2+j}**[4]**

b) If the output of the system is given by y(n) = 1.5 y(n-1) – 0.5y (n–2) + x (n) + 2x(n–1)

Find the system function & inpulse response **[6]**

Q5) a) Show that the sysmetric FIR filter has linear phase response. **[6]**

b) Write a note on window functions **[4]**

c) Design a bandpass FIR using hamming window for M = 11. **[7]**

$$H(e^{jw}) = 1 \quad \pi/4 \le w \le 3\pi/4$$

$$= 0 \quad \text{otherwise.}$$

OR

Q6) a) What is Gibb's Phenomenon? How it is reduced? **[6]**

b) Using frequency sampling method, design FIR filter for N=7 **[11]**

$$H(e^{jw}) = 1 \quad 0 \le w \le \pi/2$$

$$= 0 \quad \pi/2 \le w < \pi$$

Q7) a) Realize the following system in direct form I & direct form II **[6]**

y(n) = 0.3 y(n–1)–0.2y(n–2)+x(n)–2x(n–1)+ 0.2x(n–2)

b) What is frequency warping in Bilinear Transformation? How is it overcome? **[5]**

c) Convert the analog filter with system function **[6]**

$$H(s) = \frac{s+0.2}{(s+0.2)^2 + 9}$$

into a digital filter by means of impulse Invariant technique. Assume T = 1sec

OR

Q8) a) Design digital butterworth filter that satisfies the following specification using Bilinear Transformation **[12]**

Sampling frequency = 8 KHz

Passband = 0 – 500 Hz

Stopband = 2– 4 KHz

δ_p = 3dB

δ_s = 20dB

Assume 2/T = 1

b) Explain direct form II structure for realization of LTI system **[5]**

Q9) a) With the help of block diagram, explain the sampling rate conversion by a non-integer factor **[8]**

b) Discuss the desirable features of a digital signal processor **[8]**

OR

Q10) a) Explain the polyphase structure used for interpolation. **[7]**

b) Write note on **[9]**

    i) MAC unit

    ii) Barrel shifter

    iii) Pipelining

◀▶ ◀▶ ◀▶

[4958]-1061

T.E. (Electrical)

ADVANCED MICROCONTROLLER AND ITS APPLICATIONS

(2012 Course) (Semester - I) (303141) (End - Semester)

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)   Explain the status register of PIC 18F458.   **[6]**

   b)   Explain the concept of Pipe lining used in PIC 18 microcontroller.   **[4]**

                                   OR

Q2) a)   Compare RISC and CISC architectures.   **[6]**

   b)   Write an instruction sequence in assembly language to add a number
        0x05 to the contents of memory location 0x06 H and store the result at
        the same location.   **[4]**

Q3) a)   Using Timer0 in 16-bit mode, write a C language program to obtain a
        time delay of 1ms. Assume 8-MHz crystal, leading edge clock, and a
        prescale value of 1 : 128.   **[6]**

   b)   Explain the instruction

        BTFSC f,b,a

        MOVLW 0x04   **[4]**

                                   OR

Q4) a) Explain the following control structures used in embedded C **[6]**

    i) if then else construct

    ii) while construct

    iii) switch construct

   b) Write a program in C to configure Port B as input port and the most significant 4 bits of Port D as input bits and the least significant 4 bits of the same port as output bits. **[4]**

Q5) a) Draw a neat diagram of interfacing of 16x2 LCD with PIC18F458 microcontroller in 8 bit mode. Assume suitable port pins for interfacing. Explain the function of following pins in detail RS, R/W, and EN. **[8]**

   b) Write short note on SPI protocol. **[8]**

OR

Q6) a) Write a program for PIC 18 microcontroller to transfer a letter 'A' serially and continuously at a baud rate of 9600. Use BRGH = 0. **[8]**

   b) With a neat diagram of interfacing of 4x4 keypad with PIC18F458. Using a flow chart explain the method of key press detection. **[8]**

Q7) a) Using capture mode, write a program to measure the period of pulse which is fed to CCP1 pin (RC2). Output the count corresponding to the period of pulse on Port B and Port D. Use timer 1 without a pre-scalar for capture mode. **[9]**

   b) Write a short note on PWM control DC motor using CCP mode. **[8]**

OR

Q8) a) A stepper motor is interfaced with PIC18 microcontroller through lower nibble of Port B(RD0-RD3). Write program to rotate the stepper motor in anti-clock wise direction continuously. Assume the 4 step sequence is stored from locations 0x10 to 0x13 H. **[9]**

b) Explain the steps involved in PWM programming using CCP module in PIC 18F458 microcontroller. **[8]**

Q9) a) Explain the steps involved in programming of A/D converter in PIC18F458 microcontroller using method of polling. **[9]**

b) Explain with a neat diagram, interfacing of DAC 0808 with PIC microcontroller and write a program for ramp waveform generation using DAC interfaced with PIC microcontroller through Port D. Assume the crystal frequency to be 10MHz. **[8]**

OR

*Q10)*a) Draw interfacing of LM35 with PIC 18F458. Write a program to measure the temperature and display the 10 bit digital equivalent value of the temperature on Port C and Port D. **[9]**

b) Explain in detail the functions of the following special function registers ADCON0, ADCON1 ADRESH and ADRESL of PIC18 microcontroller. **[8]**

✦ ✦ ✦

[4958]-1062

T.E.(Electrical)

ELECTRICAL MACHINES-II

(2012 Pattern) (End Semester)(Semester-I)

Time :2 ½Hours]   *[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 rotor construction with nonsalient pole type construction in case of 3 phase alternator.   **[4]**

     b)   A 1000 kVA star connected, 3 phase 2300 volts salient pole alternator has direct axis reactance of 1.95 Ω and quadrature axis reactance of 1.40 Ω. Calculate excitation voltage & voltage regulation at rated kVA, 0.6 pf lag. Neglect armature resistance.   **[6]**

<p align="center">OR</p>

Q2) a)   Explain one dark & two equally bright lamp method of synchronizing 3 phase alternators.   **[4]**

     b)   A 3 phase star connected, 1000 kVA, 11000 V alternator has rated current of 52.5 A .The armature resistance per phase is 0.45Ω. The test results are given below

        O.C. Test - field current = 12.5A, volt. bet^n lines = 422 V.

        S.C. Test - field current = 12.5 A, line current = 52.5 A

        Determine the full load voltage regulation of alternator at 0.8 pf lag.   **[6]**

Q3) a)   Explain any one method of starting three phase synchronous motor. **[4]**

     b)   A 10 HP, 400V star connected 3 phase synchronous motor has synchronous reactance of 10Ω /phase & armature resistance of negligible value. Calculate the minimum current and corresponding induced emf at full load. Assume efficiency = 85%   **[6]**

<p align="center">OR</p>

Q4) a) With neat diagram explain the slip test to determine direct & quadrature axis reactance. **[6]**

b) Compare 3 phase synchronous motor with 3 phase induction motor. **[4]**

Q5) a) State different methods of controlling speed of 3 phase induction motor. Explain v/f method. **[8]**

b) Explain the operation of 3 phase induction motor as induction generator. State advantages & applications of 3 ph. induction generator. **[8]**

OR

Q6) a) Explain construction & working of linear induction motor. State its applications. **[8]**

b) Explain construction & working of permanent magnet D.C. motor. State its applications. **[8]**

Q7) a) Compare compensated a.c. series motor with noncompensated a.c. series motor. **[4]**

b) Draw & explain briefly phasor diagram of noncompensated a.c. series motor. **[4]**

c) What are the problems experienced by d.c. series motor operated on a.c. supply. Explain the remedies for a.c. operation. **[8]**

OR

Q8) a) A blocked rotor test is conducted on 1 phase, 50Hz, 230V, 6.2A, 0.75kW, 6000rpm series motor. The test results are as below.

Vsc	Isc	Wsc
130V	4A	160W

Taking voltage scale of 1 cm = 20V. Draw circle diagram. Determine full load efficiency, full load power factor torque scale. **[10]**

b) Explain briefly-

    i)   Transformer emf

    ii)   Rotational emf

in case of a.c. series motor. **[6]**

Q9) a) A 220 V single phase induction motor gives following test results.

Blocked rotor test 110 V, 10A, 400 W

No load test 220 V, 4A, 100 W

The stator winding resistance is 2Ω. Neglecting R_0 find the parameters of equivalent circuit. Also find core, frictional & windage losses. **[8]**

b) With neat diagram explain the construction & working of capacitor start induction motor. Draw its torque-speed characteristics & phasor diagram. **[10]**

OR

Q10) a) The following data pertains to a 230V, 50Hz capacitor start single phase induction motor at stand still.

Main winding excited = 100V, 2A, 40 W

Auxiliary winding excited alone = 80V, 1A, 50W.

Determine the value of capacitance for determining the maximum starting torque. **[8]**

b) With neat diagram explain the construction and working of shaded pole induction motor. Draw torque speed characteristics. State its applications. **[10]**

◀▶ ◀▶ ◀▶

[4958]-1063

T.E.(Electrical)
POWER ELECTRONICS
(2012 Course)(Semester-I)(303143)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Solve Q1 or 2,Q3or 4, Q5 or 6 , Q 7 or 8, Q 9 or 10.*

   2)   *Assume suitable data if necessary.*

   3)   *Neat diagrams must be drawn wherever necessary.*

   4)   *Figures to the right indicate full marks.*

   5)   *Use of electronic calculator is allowed.*

Q1) a)   Draw and explain static characteristic of SCR.   **[5]**

    b)   Explain single phase ac voltage regulator feeding R load. Draw output voltage waveform.   **[5]**

OR

Q2) a)   Describe working of single phase two pulse SCR controlled converter with R load Draw waveforms of load voltage, load current.   **[5]**

    b)   Explain V-I Characteristic of TRIAC in 1st and IIIrd quadrant.   **[5]**

Q3) a)   Explain method adopted for the protection of SCR against-dv/dt rate.**[3]**

    b)   Explain working of three phase fully controlled converter with output waveforms for firing angle of 60° with R load   **[7]**

OR

Q4) a)   Draw and explain single phase semi converter with output waveforms for RL load.   **[5]**

    b)   A three phase half wave controlled converter is fed from 3 phase, 400V, and 50Hz source and is connected to a load taking a constant current. Calculate average value of load voltage for a firing angle of 30°&60°.**[5]**

Q5) a) Explain four quadrant chopper feeding RLE load in detail with neat diagram. **[12]**

b) Give a comparison between MOSFET and IGBT **[4]**

OR

Q6) a) Explain Turn on and turn off process in MCT. State its merits. **[8]**

b) Draw a power circuit diagram for a type-A chopper. Show load voltage waveforms for α= 0.3 and α =0.8. For both these duty cycles, calculate:

i) the average value of output voltage in terms of source voltage. **[8]**

Q7) a) Explain single phase full bridge inverter with necessary waveforms for R - L load. **[8]**

b) What is pulse width modulation? Explain sinusoidal PWM technique in detail. **[8]**

OR

Q8) a) Explain with circuit diagram and waveforms operation of single phase current source inverter. **[8]**

b) What are different voltage control methods for inverter? Explain any one type of control method. **[8]**

Q9) a) Explain working of three phase six step voltage source inverter in 180° mode of operation. For star connected balanced load draw output voltage waveforms. Show devices conducting in each step. **[12]**

b) What are different harmonic reduction techniques? Explain any two techniques. **[6]**

OR

Q10) a) What is multilevel inverter? Explain any one type in detail. **[6]**

b) Explain working of three phase six step voltage source inverter in 120°mode of operation. For star connected balanced load draw output voltage waveforms. Show devices conducting in each step. **[12]**

◀▶ ◀▶ ◀▶

[4958] - 1064

T. E. (Electrical)

ELECTRICAL INSTALLATION, MAINTAINANCE & TESTING (EIMT)

(2012 Course) (Semester - I)

Time : 2½ 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)   Neat diagrams must be drawn wherever necessary.

   3)   Figures to the right indicate full marks.

Q1) a)   Explain breakdown maintainance and condition based maintainance. Give one example of each.   **[8]**

   b)   Explain the factors that reduce the breakdown strength of transformer oil.   **[6]**

   c)   Explain the abnormal operating conditions in induction motor.   **[6]**

OR

Q2) a)   Describe induction motor fault monitoring methods and remedies.   **[8]**

   b)   Enlist various failure modes of transformer. Explain failure due to structural defects.   **[6]**

   c)   What are the activities performed in preventive maintainance of induction motor.   **[6]**

Q3) a)   Enlist the methods of locating cable faults. Explain murray loop test with the help of neat diagram.   **[8]**

   b)   Explain type test of transformer.   **[8]**

OR

Q4) a) Describe various abnormal conditions in induction motor. **[8]**

b) Write short note on testing of capacitor bank. **[8]**

Q5) a) Differentiate between: **[8]**

  i) Volume required for conductors in overhead system and volume of two wire d.c. system.

  ii) Feeder and distributor

b) The loads on 'R' phase distributor are as under: **[10]**

  i) 200A, p.f. 0.707 lag, load at 100 mt:

  ii) 150A, unity p.f, load at 250mt

  iii) 80A, p.f. 0.8 lag, load at 400 mt.

  All the loads are from feeding point. The resistance and inductive reactance are 0.5 ohm and 0.325 ohm per km, length respectively. Neglecting voltage drop in neutral wire, find the voltage across the load at far end. The voltage at feeding point is 240V.

<div align="center">OR</div>

Q6) a) Explain the types of primary distribution. **[8]**

b) The cost of overhead transmission line is Rs (35000a + 3500) per km, where 'a' is the area of cross section of each conductor in cm^2. The line is supplying the load of 6mw at 33kv and p.f. 0.8 lagging. The average working working hours are 20 hours per day in the year. Energy cost is Rs 2.00 per kwh. The cost of interest and depreciation is 10% per annum. Using kelvin's law find the most economical size of conductor. Specific resistance of conductor material is 10^{-6} ohm - cm. **[10]**

  Also state the limitations of Kelvin's law.

Q7) a) Explain the types of substations. **[8]**

 b) Explain the function of the following equipment used in substations and state their locations. **[8]**

   i) Shunt capacitor

   ii) Series capacitor

   iii) Shunt reactor

   iv) Surge arrestor

OR

Q8) a) Why earthing is necessary? Explain the types of earthing. **[8]**

 b) Explain various residential wiring methods. **[8]**

[4958]-1065

T.E. (Electrical)
INDUSTRIAL & TECHNOLOGY MANAGEMENT
(2012 Course) (End Sem) (311121)

Time : 2½ Hours]   *[Max. Marks : 70*
Instructions to candidates:
    1)   *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, 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.*

UNIT - I

Q1) a)   Define Management. What are the different functions of Management? State the importance of Management.   **[5]**

    b)   What are the different types of organization? Explain functional organization.   **[5]**

OR

Q2) a)   Define Micro Economics. Explain the concept of supply and elasticity of supply.   **[5]**

    b)   Differentiate between Proprietary firm and Partnership firm.   **[5]**

UNIT - II

Q3) a)   Explain in brief following: **[5]**

    i)   Quality circle

    ii)   Pareto Analysis

    b)   Explain the contribution of F.W. Taylor in the field of Management. **[5]**

OR

Q4) a) Explain in brief following: [6]

        i) Ethics in technology management

        ii) Pokka Yoke

        iii) Classification of technology

    b) Differentiate between Administration and Management. [4]

UNIT - III

Q5) a) What is sales promotion? State its significance along with the advantages and its disadvantages. [5]

    b) What is marketing research? State and explain methods of marketing research. [5]

OR

Q6) a) State different types of costs. Explain the same. [6]

    b) Define the concept of Financial Management. Elaborate the scope of financial management in a business organization. [4]

UNIT - IV

Q7) a) Define leadership. Describe its types. What are their importances? [6]

    b) Define Motivation. Distinguish between X & Y Theory. [6]

OR

Q8) a) State group dynamics theories. What are different types of conflicts?[6]

    b) Define Entrepreneur. Explain the different traits of Entrepreneur. [6]

Q9) a) Explain in brief following: **[7]**

    i) HR Planning

    ii) Training and Development

    iii) Time Management

  b) What are the provisions of Labour Welfare as per Factories Act 1948?**[7]**

<div align="center">OR</div>

Q10) a) What is performance appraisal? State the objectives and types of performance appraisal. **[7]**

  b) Explain in brief following: **[7]**

    i) Halo effect

    ii) Professional and Business ethics

UNIT - VI

Q11) a) State the Patent Laws, Trade mark and Copy Right Laws. **[7]**

  b) Explain the Patent format and structure. **[7]**

<div align="center">OR</div>

Q12) a) What is the intellectual Property Rights (IPR)? Explain all its types. **[7]**

  b) State the criteria for securing Patents. What are the guidelines of the common IPR policy on patents? **[7]**

<div align="center">✗   ✗   ✗</div>

[4958] - 1066

T.E. (Electrical)

ENERGY AUDIT AND MANAGEMENT

(2012 Pattern) (End - Sem) (303150) (Semester - II)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

    1)   *Solve 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)   *Use of Calculator is allowed.*

    5)   *Assume suitable data, if necessary.*

Q1) a)   Give salient features of Electricity Act 2003.   **[5]**

     b)   What are the responsibilities of energy manager under EC act 2001? **[5]**

OR

Q2) a)   Explain green building concept.   **[5]**

     b)   Define supply side management (SSM). What is its barrier?   **[5]**

Q3) a)   Explain the principles of successful energy management.   **[5]**

     b)   Explain structure of power factor penalties and incentives in tariff for demand control.   **[5]**

OR

Q4) a)   What is forced field analysis concept in Energy Management?   **[5]**

     b)   Explain utility side management avenues for management of power network.   **[5]**

P.T.O.

Q5) a) Define energy audit? Why energy audit is necessary? Describe two methods used in energy audit. **[9]**

b) Enlist and explain various instrumentation used for energy audit. **[9]**

OR

Q6) a) What are Energy-Production, Specific energy consumption-production relationship? Explain least square method used for plotting these relationships. **[9]**

b) Explain action plans for implementation of energy conservation options.**[9]**

Q7) a) Explain energy conservation measures in transmission and distribution system. **[8]**

b) What is co-generation? Explain energy conservation measures in waste heat recovery system. **[8]**

OR

Q8) a) Explain various energy conservation measures in motor and drive systems. **[8]**

b) Explain energy conservation measures in agriculture pumping system.**[8]**

Q9) a) Explain discounted cash flow methods of financial appraisal. **[10]**

b) Explain energy audit case study of an educational institute. **[6]**

OR

*Q10)*a) What is sensitivity analysis? Discuss the main objectives of carrying out sensitivity analysis. What are the factors to be considered while carrying out sensitivity analysis? **[10]**

b) Explain energy audit case study in municipal corporations. **[6]**

೦೫೦೦೫೦

[4958]-1067

T.E. Electrical

Power System - II

(2012 Course) (Semester - II)

Time : 2½ Hours   *[Max. Marks :70]*

Instructions to the candidates:

    1)   *All question are compulsory.*

    2)   *Figures to the indicates full marks.*

Q1) a)   Derive power flow equation for receiving end side of transmission line.

                                                                                       [6]

    b)   Write short note on "HVDC lines in India"   **[4]**

<div align="center">OR</div>

Q2) a)   Explain constant current control in HVDC transmission system.   **[6]**

    b)   Explain interference of radio and television signals in EHVAC transmission line.   **[4]**

Q3) a)   Derive ABCD constant in case of long transmission lines.   **[6]**

    b)   Explain phenomena of corona in EHVAC power transmission.   **[4]**

<div align="center">OR</div>

Q4) a)   Derive the formula for critical disruptive voltage in corona.   **[6]**

    b)   Compare bipolar and mono polar HVDC system.   **[4]**

Q5) a)   Derive Y_{BUS} matrix using singular transformation method for 'n' bus system.   **[8]**

    b)   Draw per unit reactance diagram of following system assuming base of 30MVA, 11kV on generator.   **[9]**

11/110kV.
11kV. 30MVA. 35MVA.   110/11.8kV,   11kV,
15%   10%   35MVA,   (M) 10MVA,
              80 ohm   10%   10%
G   Transmission Line

                                          11kV,
                                     (M) 5MVA,
                                          10%
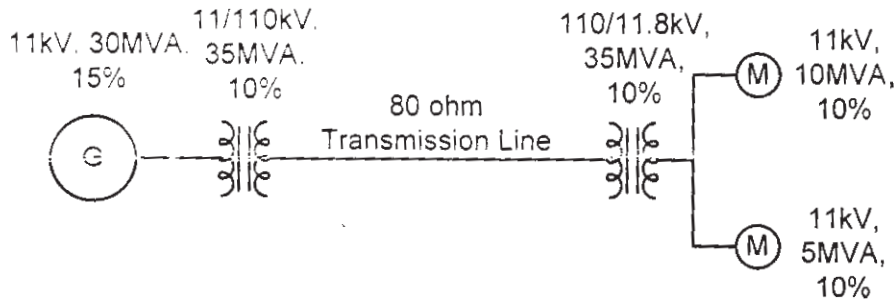
OR

Q6) a) What are the advantages of per unit system? How the base impedance is converted to per unit system? What formula is to be used if base of per unit values is to be changed? **[8]**

b) Derive power flow equation for 'n' bus system. **[9]**

Q7) a) Write a short note on Selection of Circuit breakers. **[8]**

b) A three phase 11kV, 5MVA generator has a direct axis steady state reactance of 20%. It is connected to a 3MVA transformer having 5% leakage reactance and ratio of 11/33kV. The 33kV side is connected to a transmission line having 30ohm reactance. A three phase fault occurs at other end of transmission line. Calculate steady state fault MVA and current assuming no load prior to the fault. Take base of 11kV,5MVA on generator. **[9]**

OR

Q8) a) Draw and explain sub-transient, transient and steady state impedance of an alternator. **[8]**

b) For the following system if the three phase fault is occurred at point F Determine fault current supplied by each generator. All impedances are given on their individual rating. Take base of 11kV , 30MVA on generator side. **[9]**

11/110kV,
20MVA,
8%

11kV,
20MVA, G1
20%

5.16%
Line1

F

11kV,
30MVA, G2
20%

Line2
5.16%

11/110kV,
30MVA,
10%
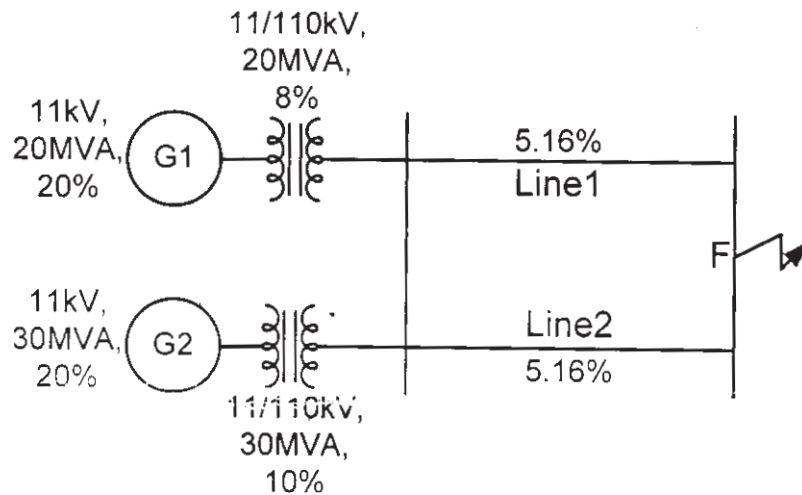
Q9) a) A delta connected load is connected to three phase supply. Oneline of supply is open. The current in other two lines is 20<0° A and 20<180° A Find symmetrical components of the line currents. **[8]**

b) Derive formula for fault current in case of LL fault. **[8]**

OR

Q10) a) A 3-phase 11kV, 10MVA alternator have $X_0 = 0.05$ pu, $X_1 = X_2 = 0.15$pu. It is on no load and rated terminal voltage. Find the ratio of the line currents for a single line to ground fault to three phase fault if (a) neutral is solidly grounded (b) neutral is grounded through $X_n = 0.062$pu. **[8]**

b) Derive formula for fault current in case of LLG fault. **[8]**

🌢 🌢 🌢

[4958]-1068

T.E. (Electrical Engineering)
DESIGN OF ELECTRICAL MACHINES
(2012 Course) (End - Semester) (303149) (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.*

   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)   What are different types of winding used in a transformer? Explain any one. **[6]**

    b)   Derive the output equation of a three phase transformer with usual notation. **[6]**

    c)   A 200 KVA, 6600/400V, three phase transformer, delta/star connected, 50Hz, core type transformer has the following particulars: Maximum flux density = 1.3 Wb/m^2, current density = 2.5 A/mm^2, window space factor = 0.3, Overall height = overall width and use three stepped core, stacking factor = 0.9, emf per turn = 10 volts. Width of largest stamping = 0.9d and net iron area = 0.6d^2. Calculate overall core dimensions. **[8]**

<center>OR</center>

Q2) a)   Discuss mechanical forces developed under short circuit condition in a transformer and measures to overcome this effect. **[6]**

    b)   Define and explain short time rating and continuous time rating. **[6]**

    c)   Calculate the percentage regulation at full load 0.8pf lag for a 300 kVA, 6600/440V, delta-star, three phase, 50Hz, core type transformer having cylindrical coils of equal length with the following data. Height of coils = 4.7cm, thickness of HV coil = 1.6 cm, thickness of LV coil = 2.5 cm, insulation between LV & HV coils = 1.4 cm, Mean diameter of the coils = 27 cm, volt/turns = 7.9 V, full load copper loss = 3.75 kW. **[8]**

Q3) a) Discuss the various factors to be considered for selection specific magnetic loading (B_{av}) and specific electric loading (ac). **[10]**

b) Explain the factors should be considered when estimating the length of air gap of three phase induction motor. Why the air gaps should be as small as possible? **[8]**

OR

Q4) a) Derive the output equation of a three phase induction motor in terms of its specific loadings. Also indicate the significance of terms involved.**[8]**

b) Estimate the main dimensions for three phase, 50Hz, 10kW, 400V, 4 pole squirrel cage induction motor. Assume full load efficiency of 0.85, full load power factor of 0.9 and winding factor 0.96. The specific magnetic loading is 0.6 Wb/m² and the specific electric loading = 22000A/m. Take rotor peripheral speed as 25 m/s at synchronous speed. **[10]**

Q5) a) Discuss the various factors which decide selection of number of stator slots in case of three phase induction motor. **[8]**

b) Explain the concept of 'Unbalance Magnetic Pull (UMP)' and its estimation. Why is UMP high when three phase induction motor is designed with small air gap? **[8]**

OR

Q6) a) Derive the equation for end ring current for the rotor of squirrel cage induction motor along with the necessary diagram. **[8]**

b) A 15kW, three phase, 50Hz, 400V, 4 pole, star connected squirrel cage induction motor has 60 slots, each containing 7 conductors. The rotor slots are 50. Assume full load efficiency as 0.85, full load power factor as 0.9 and rotor mmf is 80% of stator mmf. Calculate the value of bar and end ring current. Also find the area of each bar and each end ring, if current density is 5/mm². **[8]**

Q7) a) Derive the equation for No Load Current of three phase induction motor. **[8]**

b) A 20 kW, three phase, 50Hz, 400V, 8 pole, star connected squirrel cage induction motor has magnetizing current of 30% of the full load current. Calculate the value of stator turns per phase, if the mmf required for the flux density at 60° from pole axis is 600A. Assume full load efficiency as 0.9, full load power factor as 0.85 and winding factor as 0.955. **[8]**

OR

Q8) a) Explain the effect of ducts on the calculation of magnetizing current of three phase induction motor. **[8]**

b) Discuss the performance calculation of three phase induction motor from circle diagram. **[8]**

𝓔 𝓔 𝓔

[4958]-1069

T.E. (Electrical)
CONTROL SYSTEM - I
(2012 Course) (303147) (Semester - II)

Time : 2½ 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 open loop system with close loop system. Give one example of each.   **[6]**

b)   Derive transfer function of lead network.   **[7]**

c)   Explain different static error coefficients and steady state error in each case.   **[7]**

OR

Q2) a)   Explain Force - voltage analogy and find transfer function of   **[7]**
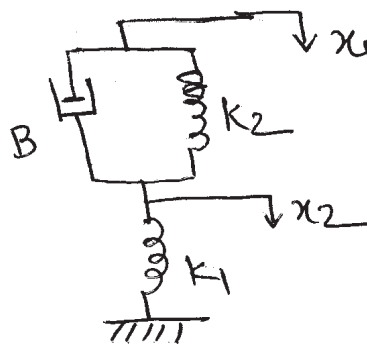
b)   Derive transfer function of DC servomotor.   **[6]**

c)   Find damping ratio, settling time and peak overshoot for system with close loop transfer function given by $T(S) = \dfrac{10}{s^2 + 7s + 20}$.   **[7]**

Q3) a) Explain Routh Hurwitz stability criterion. **[6]**

b) Draw root locus for following system. Also find range of values of K for which system is stable. $G(S) = \dfrac{K}{s(s+2)(s^2+s+1)}$ **[10]**

OR

Q4) a) Using Routh Harvitz criterion determine whether the given close loop system is unstable. If unstable how many poles are on right halfs plane or imaginary axis. **[8]**

$$G(S) = \dfrac{10}{s^5+7s^4+6s^3+42s^2+8s+56}$$

b) Explain rules for construction of root locus. **[8]**

Q5) a) Draw bode plot for following system $G(S) = \dfrac{1000}{s(1+0.1s)(1+0.001s)}$ Find gain margin and phase margin comment on stability. **[12]**

b) Define Gain margin and phase margin. Explain how it is to be found using bode plot. **[6]**

OR

Q6) a) Draw polar plot for $G(S) = \dfrac{10}{s(s+1)(s+4)}$. **[9]**

b) Explain Nyquist stability criterion. Explain procedure for drawing nyquist plot and how to determine stability. **[9]**

Q7) a) Explain P and PI controllers. Explain their effect on damping ratio and steady state error. **[8]**

b) Design a PID controller for system with unity feedback and **[8]**

$$G(S) = \dfrac{K}{(s+3)(s^2+s+1)}$$

OR

Q8) a) Explain Ziegler Nichols method of tuning PID controller. **[8]**

b) Explain procedure for designing PID controller using root locus. **[8]**

$\mathcal{EEE}$

[4958]-1070

T.E.(Electrical.)
UTILIZATION OF ELECTRICAL ENERGY
(2012 Pattern)(Semester-II) (End sem)

Time :2½Hours]   *[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 logarithmic tables,slide rule, Mollier charts, electronics pocket calculator is and steam table is allowed.*
4) *Assume suitable data if necessary.*

Q1) a) Define: **[6]**

     i) Solid Angle

     ii) Reflection factor

     iii) Coefficient of Utilization

   b) Write a note on Anodizing.   **[6]**

   c) A piece of an insulating material is to be heated by dielectric heating. The size of the piece is 12 cm X 12 cm X 3 cm. A frequency of 30 MHz is used and the power absorbed is 500 watt. If material has relative permittivity of 5 and power factor of 0.05. Calculate.   **[8]**

     i) The voltage necessary for heating

     ii) Current flowing through the material

     iii) Frequency to get the same loss if voltage were limited to 1700 V.

<div align="center">OR</div>

Q2) a) Explain construction and working of

     i) Push button

     ii) Contactor   **[6]**

   b) With suitable diagram explain mercury vapour lamp.   **[6]**

   c) An electric furnace consuming 5 KW takes 15 minutes to just melt 4lbs of aluminium, the initial temperature being 15°C. Find the efficiency of the furnace. Specific heat of Aluminium is 0.212, melting point is 658°C and latent heat of fusion is 76.8 cal per gram. 860 K cal = 1KWH. **[8]**

Q3) a) Compare steam engine drive and electric drive. **[8]**

b) Describe composite system. **[8]**

OR

Q4) a) Draw and explain block diagram of electric locomotive. **[8]**

b) Explain functions of following equipments in traction substation. **[8]**

    i) Circuit breaker.

    ii) Interrupter

Q5) a) Define: **[8]**

    i) Average Speed

    ii) Schedule speed

    iii) Coefficient of adhesion

    iv) Tractive effort

b) A train is required to run between two stations 1.6 km apart at an average speed of 40 kmph. The run is to be made to a simplified quadrilateral speed-time curve. If the maximum speed is to be limited to 64 kmph, acceleration to 2 kmphps and coasting and breaking retardation to 0.16 kmphps and 3.2 kmphps respectively. Determine the duration of acceleration, coasting and breaking periods. Also draw speed- time curve.
[8]

OR

Q6) a) Derive the expression for simplified quadrilateral speed time curve. **[8]**

b) An electric train weighing 200 tonne has eight motors geared to driving wheel, each wheel is 90 cm diameter. Determine the torque developed by each motor to accelerate the train to a speed of 48 kmph in 30 seconds up a gradient of 1 in 200. The tractive resistance is of 50 N/tonne. The effect of rotational inertia is 10% of the train weight, the gear ratio is 4 to 1 and gearing efficiency is 80%. **[8]**

Q7) a) Explain French method of Regenerative braking. **[6]**

b) What are the desirable characteristics of motor for traction purpose.**[6]**

c) A motor coach weighing 150 tonne is equipped with 4,600 V motors for series parallel control. The current per motor is 300 A. Calculate **[6]**

   i) Duration of starting period

   ii) Speed of the train at transition

   At 300 A, 600 V, tractive effort is 15000 N per motor and the train speed is 30 kmph. Assume that train is started up a gradient of 1% and train resistance is 10N per tonne. Allow 10% for the effect of rotational inertia. Each motor has a resistance of 0.1 ohm.

<div align="center">OR</div>

Q8) a) How A.C series motor is suitable for traction. **[6]**

   b) Explain transition methods with neat diagram. **[6]**

   c) Derive the expression for energy lost and efficiency for series parallel control of two DC series motor. **[6]**

<div align="center">◄► ◄► ◄►</div>

[4958]-1071

T.E. (Instrumentation & Control)
INSTRUMENTAL METHODS FOR CHEMICAL ANALYSIS
(2012 Course) (Semester - I) (End-Sem.)

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 to 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)   Compare classical and Instrumental methods of chemical analysis.   **[4]**

   b)   Explain principal and experimental setup of Potentiometry.   **[6]**

OR

Q2) a)   Explain principal and experimental setup of coulometey (any one).   **[6]**

   b)   Define the concept Back Ground Correction.   **[4]**

Q3) a)   Explain with neat sketch Filter photometer.   **[5]**

   b)   Explain with neat sketch UV-Visible Spectrophotometer.   **[5]**

OR

Q4) a)   State the Laws of Photometery (Beer's Law & Lambert's Law).   **[4]**

   b)   Explain the Instrumentation of Atomic Absorption Spectrophotometer (AAS).   **[6]**

Q5) a)   Explain the Instrumentation of Flame Photometer. List the applications of Flame photometer.   **[8]**

   b)   Write a short note on Direct Coupled Plasma.   **[8]**

OR

P.T.O.

Q6) a) What is Fluorescence? Explain the working of double beam fluoriometer. **[8]**

b) Explain the principle and working of Fourier Transform Infrared Spectrophotometer (FTIR) with the help of suitable block diagram. **[8]**

Q7) a) Explain the Principle of Mass Spectrometer. And explain any one type of Mass Spectrometer. **[10]**

b) Explain Fourier Transform Nuclear Magnetic Resonance Spectrometer (FTNMR) with a neat sketch. **[8]**

OR

Q8) a) Explain the block diagram of Gas Chromatography. List the GC detectors. **[8]**

b) Write a short note on

i) NO_X Gas Analyzer

ii) CO Gas Analyzer **[2 × 5]**

Q9) a) Explain the Instrumentation of High Pressure Liquid Chromatography (HPLC). Explain any one detector. **[8]**

b) What is ESCA? Explain Auger Emission Spectroscopy? **[8]**

OR

Q10) a) Explain the Instrumentation for X-ray spectrometry. **[8]**

b) Write short notes on Ionization Chamber. **[8]**

✦ ✦ ✦

T.E.(Instrumentation and Control)
EMBEDDED SYSTEM DESIGN
(2012 Pattern) (Semester - I) (306261)

Time : 2½ 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)   Draw and explain power on reset circuit of 8051 μC.   **[7]**

    b)   Explain the function RS0 and RS1 bits of PSW register of 8051 μC.**[3]**

<div align="center">OR</div>

Q2) a)   Explain different addressing modes of 8051 μC.   **[7]**

    b)   Explain the following flags of 8051 μC.   **[3]**

      i)   Carry   ii)   Auxiliary Carry   iii)   Parity

Q3) a)   With neat sketch explain interfacing of three digit common cathode multiplexed LED display with 8051 μC.   **[7]**

    b)   Explain RS-232 communication protocol of serial communication.   **[3]**

<div align="center">OR</div>

Q4) a)   With neat sketch explain interfacing of 4×4 matrix keyboard with 8051 μC.   **[7]**

    b)   Explain Port-1 structure of 8051 μC.   **[3]**

Q5) a) Explain the interfacing of serial ADC with 89C51 µC. **[8]**

b) Explain the interfacing of serial RTC with 89C51 µC. **[8]**

OR

Q6) Discuss the design of traffic light controller using 89C51 µC based on following points.

a) Block diagram. **[6]**

b) Circuit explanation. **[10]**

Q7) a) Explain register file structure of AT8535 AVR µC. **[8]**

b) Explain the stack operation of AT8535 AVR µC. **[8]**

OR

Q8) a) Explain following instructions of AT8535 AVR µC. **[8]**

i)   LPM   ii)   SBRS Rd,b   iii)   BREQ k   iv)   SLEEP

b) What is watchdog timer? Explain watchdog timer of AT8535 AVR µC.**[8]**

Q9) a) Explain timer-0 operation of AT8535 AVR microcontroller. **[9]**

b) Explain UART of AT8535 AVR microcontroller. **[9]**

OR

Q10) a) Explain different clock sources used in AVR µC. **[9]**

b) Explain with suitable block diagram ADC pre-scaler of ATMega8535 AVR µC. **[9]**

✗   ✗   ✗

[4958]-1073

T.E.(Instrumentation & Control)
CONTROL SYSTEM COMPONENTS
(2012 Coures) (Semester-I) (306263)(End Semester)

Time :2½Hours] *[Max. Marks : 70*

Instructions to the candidates:
1) *Draw neat sketches wherever necessary.*
2) *Answer five questions.*
3) *Q1 or 2,Q3or 4, Q5 or 6 , Q 7 or 8, Q 9 or 10.*
4) *Assume suitable data.*

Q1) a) Draw and explain the working of a flow switch. **[6]**

b) Compare pneumatic and hydraulic system. **[4]**

OR

Q2) a) Draw and explain the application of an electromechanical relay. **[6]**

b) State the specifications and applications of a contactor. **[4]**

Q3) a) Draw the symbols for selector switch, Temperature switch, pressure switch level switch and flow switch. **[5]**

b) Draw and explain the working of time delay valve in pneumatics. **[5]**

OR

Q4) a) Explain with diagram the concept of inching of a motor. **[5]**

b) Compare an electromechanical relay and a solid state relay. **[5]**

Q5) a) Draw and explain the working of centrifuagal and vane pump in hydraulics. **[10]**

b) Draw & explain the working of a pressure reducing value in hydraulics.**[8]**

OR

Q6) a) Draw & explain the meter- in and meter out-circuit in hydraulics. **[10]**

P.T.O.

    b)   Draw & explain the hydraulic circuit for controlling a double acting cylinder. **[8]**

Q7) a)   Draw and explain the construction of shaker feeder. **[8]**

    b)   Draw & explain the use of low selector for motor speed manipulation.**[8]**

<div align="center">OR</div>

Q8) a)   Draw and explain the working of a circuit breaker in electrical system.**[8]**

    b)   Define fuse. Draw and explain construction and working of a HRC fuse. **[8]**

Q9) a)   State the advantages fo fluidics. Draw and explain the bistable amplifier. **[8]**

    b)   Draw and explain the explosion proof housing. Give its singificance in industrial systems. **[8]**

<div align="center">OR</div>

Q10) a)   Define hazardous area Give hazardous area classification in detail. **[8]**

    b)   State the types intrinsic safety barrier. Explain any one type. **[8]**

<div align="center">◀▶   ◀▶   ◀▶</div>

[4958] - 1074

T.E. (Instru.)

CONTROL SYSTEM DESIGN

(2012 Pattern)

Time : 2½ 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 indicate full marks.

    4)   Use of logarithmic tables, electronic pocket calculator and steam table is allowed.

    5)   Your answer will be valued as a whole.

    6)   Assume suitable data, if necessary.

Q1) a)   Discuss the selection of compensator as per required specification. **[4]**

    b)   Draw lead compensator and find it's transfer function. **[6]**

<div align="center">OR</div>

Q2) Design a lag compensator for the system whose open-loop transfer function is

$$G(s)H(s) = \frac{4}{s(2s+1)}$$

So that the phase margin will be 40° without sacrificing K_V. Also compute network component. **[10]**

Q3) a)   A process cycles at proportional gain of 20 with period of oscillation is 5sec in close loop. Determine tuning constants of PID controller. **[8]**

    b)   Write equations for PI controller. **[2]**

<div align="center">OR</div>

Q4) Design a PD controller such that dominant roots of characteristics equation is loacated at s = −1.2 + j102. The forward transfer function of unity gain feedback control system is given by **[10]**

$$G(s) = \frac{30}{s(s+1)(s+3)}.$$

Q5) a) Convert following state space model into controllable phase variable canonical form. **[8]**

$$\dot{x} = \begin{bmatrix} 1 & 2 & 0 \\ 1 & -1 & -3 \\ 0 & 2 & 0 \end{bmatrix} x + \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix} u$$

$$Y = [0\ 0\ 1]x$$

b) Convert the state model given below in to transfer function. **[8]**

$$\dot{x} = \begin{bmatrix} 1 & 1 & 0 \\ 1 & -1 & -3 \\ 1 & 2 & 0 \end{bmatrix} x + \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix} u$$

$$Y = [1\ 0\ 1]x + 5u$$

OR

Q6) The transfer function of system is given by

$$\frac{y(s)}{u(s)} = \frac{s+1}{s^2 + 9s + 20}$$

a) Convert transfer function into canonical state model. **[8]**

b) Convert transfer function into observable canonical state model. **[8]**

Q7) a) Determine whether following system is controllable and observable or not

$$\dot{x} = \begin{bmatrix} 1 & 2 & 0 \\ 1 & -1 & -3 \\ 0 & 2 & 0 \end{bmatrix} x + \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix} u$$ **[9]**

$$Y = [1\ 0\ 1]\ x$$

b) Convert following state space model in to canonical form using diagonalisation method **[9]**

$$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$Y = [1,\ 2,\ 2]\ x$$

OR

Q8) a) Obtain response if no input is applied [9]

$$\dot{x} = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix} x + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u$$

b) Give derivation to find solution of state space model. [9]

Q9) a) Consider a system having transfer function [8]

$$G(s) = \frac{1}{s^2 + 5s + 4}$$

b) Find the state space model of the given transfer function. Verify that the system is controllable, If so, Design a state feedback controller using Ackerman's method such that closed - loop poles are at s1 = –3, s2 = –6. [8]

OR

Q10) a) A consider a system having transfer function [8]

$$G(s) = \frac{3}{s^2 + 8s + 15}$$

b) Find the state space model of the given transfer function. Verify that the system is observable, If so, determine the observer gain matrix using Ackerman's method to place the observer poles at s1 = –5 and s2 = –7. [8]

🙟🙟🙟

[4958]-1075

T.E. (Instrumentation and Control Engineering)
INDUSTRIAL ORGANIZATION AND MANAGEMENT
(2012 Course) (End Semester) (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, Q.9 or Q.10.*
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:-

   a)   ISO 14000 EMS

   b)   Raw Material Handling and Storage   **[10]**

OR

Q2) a)   What are the different types of Business Organizations? Explain any two.   **[4]**

   b)   Explain Business process Re-engineering. Explain its importance to business.   **[6]**

Q3) a)   Explain briefly Porter's 5 forces of competition.   **[5]**

   b)   Define pollution. Give the factors causing pollution. Explain air pollution in brief.   **[5]**

OR

Q4) a)   With reference to general example, explain lshikawa diagram.   **[5]**

   b)   Derive the equation for economic ordering quantity.   **[5]**

Q5) a) Explain in relation with Manpower planning. **[12]**

      i)   Need

      ii)   Objectives

      iii) Requirements

      iv) Factors affecting

   b) Write a note on job description and its need. **[6]**

<div align="center">OR</div>

Q6) a) What is Leadership? What are the characteristics possessed by a leader?

     What are different leadership styles? **[12]**

   b) Define training. Explain briefly its methods with examples. **[6]**

Q7) a) What is capital budgeting? Explain briefly the different methods of capital budgeting. **[8]**

   b) What is the need and functions of money and capital market? **[8]**

<div align="center">OR</div>

Q8) a) Write a note on "Capital". **[8]**

   b) Explain concept of budget, its objectives and types. **[8]**

Q9) a) What is the need of business and professional ethics in today's competitive market? **[8]**

   b) What is ERP? What is the importance of ERP for industrial organizations? **[8]**

<div align="center">OR</div>

Q10) a) Explain the role of Information Technology in modern era of business. **[8]**

   b) Draw the block diagram of MIS and explain. **[8]**

<div align="center">✗ ✗ ✗</div>

[4958] - 1076

T.E. (Instrumentation & Control)
DIGITAL SIGNAL PROCESSING
(Semester - II) (2012 Course)

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 side indicate full marks.*

    4)   *Assume Suitable data if necessary.*

Q1) a)   Explain in detail classification of system.   **[4]**

     b)   If the impulse response of the system is   **[6]**

       $h(n)= [(0.5)^n + n (0.2)^n]\ u(n)$

       i)   Find the Transfer Function

       ii)   Obtain the differential equation of the system.

<p style="text-align:center">OR</p>

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]**

       $X(n)= 0.5$ $0 \le n \le 2$

           $= 0$ 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

Q4) a) Determine the Circular convolution of the given two sequence. **[6]**

$$X(n) = \{1, 2, 3, 2\} \quad h(n) = \{1, 2, 1, 2\}.$$

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 **[12]**

$$X(n) = \{1, 1, 2, 1\}.$$

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 **[12]**

$$X(n) = \{4, 3, 2, 1\}.$$

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]**

$$H_d(\omega) = e^{-j(N-1)\omega/2}, \qquad 0 < |\omega| < \pi/4$$
$$0 \quad , \qquad \pi/4 < |\omega| < \pi \qquad \text{for } N = 7$$

b) Differentiate between FIR & IIR filter. **[6]**

Q9) a) Find the order of analog low pass Butterworth filter for the given
specification **[6]**

$\alpha p = 1$ dB, $\alpha s = 30$ dB, $\Omega p = 200$ rad/sec, $\Omega s = 600$ rad/sec.

b) Design a Chebyshev filter with a max pass band attenuation of 2.5 dB at
$\Omega p = 20$ rad/sec & stop band attenuation of 30 dB at $\Omega s = 50$ rad/
sec. **[10]**

OR

Q10) a) Design a Butterworth filter using Impulse invariance method for following
specification. **[10]**

$$0.9 \leq |H(e^{j\omega})| \leq 1 \qquad 0 \leq \omega \leq \Pi/2$$
$$|H(e^{j\omega})| \leq 0.2 \qquad 3\Pi/4 \leq \omega \leq \Pi$$

b) Compare the features of digital Butterworth and Chebyshev type-1 filter
in terms of **[6]**

i) Filter order

ii) Transition width

ಇಲ್ಲಿಇಲ್ಲಿ

[4958]-1077

T.E. (Instrumentation and Control Engineering)
Instrument & System Design
(2012 Pattern) (Semester - II) (End - Semester)

Time : 2½ Hours.   *[Max. Marks :70]*

Instructions to candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q,6 Q7 or Q8, Q9 or Q10.*
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) Explain Ergonomics and Asthetics. **[3]**

   b) Draw the internal constructional diagram of IC XTR 110. Write its features and applications. **[7]**

<div align="center">OR</div>

Q2) a) What is noise? Classify it and explain thermal noise. **[5]**

   b) Explain the working of cold junction compensation circuit in IC AD 594. **[5]**

Q3) a) Write a note on prototyping and testing. **[5]**

   b) What is triboelectric effect? Explain ESD & its minimization mechanisms. **[5]**

<div align="center">OR</div>

Q4) a) Define IP standard. Explain IP 54 & 34 standards. **[5]**

   b) Draw the internal circuit of IC HCNR 201 and explain its operation for positive input positive output. **[5]**

Q5) a) Introduce and explain in detail the IC MM74C922. **[9]**

b) Describe the features of ICM 7217 and explain the functions of following pins. **[9]**

   i) Zero.

   ii) Count input.

   iii) Scan.

   iv) Up / Down

OR

Q6) a) Design frequency multiplier (fout = 10* fin) using suitable IC. Also draw the circuit diagram. **[9]**

b) A stepper motor is to be interfaced to micro controller. Suggest suitable IC. Draw interfacing diagram. Give its features, specifications and applications. **[9]**

Q7) a) What is soldering? Give its types. Explain wave soldering method. What are its advantages? **[8]**

b) Differentiate between single side board and double side board. **[8]**

OR

Q8) a) Explain different types of printed circuit boards. **[8]**

b) Give the design rules for analog circuit PCBs. **[8]**

Q9) a) Explain the terms maintainability and availability. **[4]**

b) Different between reliability and quality. **[6]**

c) Write a note on failure and failure modes. **[6]**

OR

Q10) a) Explain reliability, Exponential, Weibull and Gamma Distribution. **[8]**

b) Write short notes on- **[8]**

   i) Documentation.

   ii) Quality Assurance.

[4958]-1078

T.E.(Instrumentation & Control)
UNIT OPERATIONS & POWER PLANT INSTRUMENTATION
(2012 Pattern)(Semester-II)

Time :2½Hours]   *[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) Enlist any five Unit operations used in Chemical Industry? Explain the principle & purpose of same. **[10]**

OR

Q2) Draw the neat sketch of Distillation column & explain its working in brief.**[10]**

Q3) a) Explain the Evaporation Principle & types of evaporation. **[6]**

     b) Explain Nucleation and Crystal Growth in relation with crystallisation.**[4]**

OR

Q4) a) Explain Block diagram of PV system. **[5]**

     b) Explain Renewable and non- renewable energy generation resources in brief. **[5]**

Q5) a) Explain with block diagram working of thermal power plant. **[8]**

     b) Explain air to fuel ratio control in boilers. **[8]**

OR

Q6) a) Explain different boiler interlocks in detail. **[8]**

     b) Explain principle & working of chemical dosing systems in thermal power plant. **[8]**

Q7) a) Explain excess air- combustion chemistry in detail. **[9]**

     b) Write note on turbine instrumentation. **[9]**

OR

Q8) a) Explain condition monitoring & power distribution instrumentation concept in brief. **[9]**

b) Explain staem temperature control system in Power plant. **[9]**

Q9) a) Explain effluent management and handling system in power plant. **[8]**

b) Explain any one type of the reactor used in Nuclear Power Plant with neat sketch. **[8]**

OR

*Q10)*a) Compare & contrast hydroelectric & wind power plant. **[8]**

b) Explain construction and working of electrostatic precipitator. **[8]**

◄► ◄► ◄►

[4958] - 1079

T.E. (Instrumentation & Control)
BIOMEDICAL INSTRUMENTATION
(2012 Pattern) (Semester - II)

Time : 2½ Hours]   *[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 the Electrode offset potential, Action potential, Evoked potential.
         [6]

    b) Define bio electrode. Polarizable electrode, Non-polarizable electrode. **[4]**

OR

Q2) a) Why silver - silver chloride electrode is suitable in biomedical applications. **[6]**

    b) Define Tachy cardia and Bradycardia state of Heart rhythm. **[4]**

Q3) a) Discuss the Invasive and non-invasive methods of Blood pressure measurement with respect to their advantages and disadvantages. **[6]**

    b) What is Phono-cardiogram? List out the various heart sound frequencies in Phonocardiograph. **[4]**

OR

Q4) a) Draw and explain the principle of Photo plethesmograpghy. **[5]**

    b) Explain the principle of Electromagnetic Blood flowmeter. **[5]**

Q5) a) Draw and explain the various cerebral lobes. What do you mean by efferent and afferent nerves. **[10]**

b) Explain the functions of the followings. **[8]**

Cerebellum, Thalamus and Hypothalamus, Medulla oblongata , Pons

OR

Q6) a) What is an EEG? Explain the EEG Montage system. **[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) What is audiometer? Briefly explain the basic types of Audiometers. **[10]**

b) What are Rods and Cones in the Human vision system? Explain the function performed by each of them. **[6]**

Q9) a) Explain the breathing physiology with active and passive respiration. **[8]**

b) Define the followings terms with respect to respiratory system. **[8]**
i) Internal Respiration
ii) Tidal Volume
iii) Total Lung Capacity
iv) Expiratory reserve volume

OR

Q10) a) Draw & explain Inverted bell Spiro meter for respiratory measurement. **[8]**

b) Draw and explain Oxygen gas analyzer. **[8]**

❖ ❖ ❖ ❖

Total No. of Questions : 10]

P3922

SEAT No. :

[Total No. of Pages : 3

[4958]-1080

T.E.(Instrumentation)

PROCESS LOOP COMPONENTS

(2012 Pattern)(Semester-II)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Attmept 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 calculator is allowed.*
5) *Assume suitable data if necessary.*

Q1) a) Draw Level control loop using standard symbols and explain its components in brief. **[8]**

   b) State the features of conventional transmitter. **[2]**

<div align="center">OR</div>

Q2) a) Draw P & ID symbols for the following components & also explain the use of each components **[6]**

   i) Air to Close Control valve,

   ii) High Alarm signal

   iii) Pressure Indicator and Controller

   iv) Temperature Transmitter

   v) Pnenmatic signal line

   vi) Hydraulic Signal line

   b) Compare transmitters and convertor.(Min 3 comparison points). Give one example for each. **[4]**

Q3) a) Explain the following terms related to controller **[8]**

   i) Offset

   ii) Dead Zone,

   iii) Rate Action,

   iv) Proportional Band

   b) Give the limitations of Integral Controller. **[2]**

<div align="center">OR</div>

Q4) a) Draw and explain the response of Proportional, Integral and Derivative controller for step change in error. **[8]**

b) Explain tuning of controller? **[2]**

Q5) a) Explain with following w.r.t. PLC **[10]**

     i) Ladder diagram,

     ii) timer,

     iii) Scan time,

     iv) Rung

     v) Watch dog timer

b) Develop physical ladder diagram for a motor with following: **[8]**

NO start P.B., NC stop PB., thermal over load limit switch opens on high temperature, green light when running and red light for thermal overload. Assume suitable data if required.

OR

Q6) a) Explain block diagram of PLC. Give one example of Aanlog Input and Digital Output (min 2 each). **[10]**

b) Compare Relay logic and PLC logic(min 6 comparison points). **[8]**

Q7) a) List various types of control valve. Draw and explain any one type in detail. **[8]**

b) Explain w.r.t control valve **[8]**

     i) Yoke

     ii) Rangeability

     iii) Plug

     iv) Travel indicator

OR

Q8) a) Draw and explain fail safe action in level control application-{Air to Open(ATO) and Air to closed(ATC) valve applications}. **[8]**

b) What do you mean by "Installed characteristics of control valve"? Why they are different than inherent characteristics. **[8]**

Q9) a) Find (a) the valve coefficient (Cv) for a control valve that must allow 150gal. of ethyl alcohol per minute with a specific gravity of 0.8 at maximum pressure of 50 psi and (b) the required valve size in inches. **[8]**

Use following data.

Cv	0.3	3	14	35	55	108	174	400	725
Valve size in inches	0.25	0.5	1	1.5	2	3	4	6	8

b) Explain high temperature service valves and needle valve. **[8]**

OR

Q10) a) Draw and explain Cavitation and Flashing. Draw pressure profile diagram.Also list techniques to reduce it. **[10]**

b) Explain use of Positioner in control valve and list different selection criteria for control valve. **[6]**

◆▶ ◆▶ ◆▶

[4958]-1081

T.E. (Computer Engg.)
DATABASE MANAGEMENT SYSTEMS APPLICATIONS
(2012 Course) (Semester - I)

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)   Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. **[5]**

    b)   Consider relational schema **[5]**

       Customer (cname, ccity, phone)

       Loan (lno, branch_name, amount)

       Borrower(cname, lno)

       Depositor(cname,accno)

       Branch(bname, bcity)

       Account(bname, accno, bal)

       Write SQL queries for following requirements: (Any two)

       i)   Find the names of customers whose city name includes 'bad'.

       ii)   Find all customers who have an account but no loan in the bank.

       iii) Find out average account balance at each branch.

<p align="center">OR</p>

Q2) a) Explain document based data model of NOSQL database. **[5]**

b) Define Database normalization. Explain any two normal forms with suitable example. **[5]**

Q3) a) Consider following structure for MongoDB collection and write a query for following requirements in MongoDB (any 2) **[5]**

Teachers(Tname, dno, experience, salary, date_of_joining)

Department(Dno, Dname)

Students(Sname, roll_no, class)

i) Write a query to create above collection & for insertion of some sample documents.

ii) Find the information about all teachers of dno = 2 and having salary greater than or equal to 10,000/-

iii) Find the student information having roll_no=2 or Sname = xyz .

b) What is serializable schedule? Explain conflict & view serializable schedule. **[5]**

OR

Q4) a) Explain BASE Properties of NOSQL database with suitable example. **[5]**

b) Explain in brief two phase locking protocol. **[5]**

Q5) a) Explain parallel database architectures. Explain Speed up and scale up factors in parallel database. **[8]**

b) Explain 3-tier web architecture with diagram for on line shopping database system. **[8]**

OR

Q6) a) Explain distributed database architecture. Also explain homogeneous and heterogeneous distributed databases. **[8]**

b) Explain cassandra database system. **[8]**

Q7) a) <! DOCTYPE db [**[7]**

<! ELEMENT emp (ename, children*, skills*)>

<!ELEMENT children (name, birthday)>

<!ELEMENT birthday (day,month, year)>

<!ELEMENT skills (type, exams+)>

<!ELEMENT exams (year, city)>

<!ELEMENT ename (# PCDATA)>

<!ELEMENT name (# PCDATA)>

<!ELEMENT day (# PCDATA)>

<!ELEMENT month (# PCDATA)>

<!ELEMENT year (# PCDATA)>

<!ELEMENT type (# PCDATA)>

<!ELEMENT city (# PCDATA)>

] >

Write the following queries in XQuery, assuming the DTD given above (any 2)

i) Find the names of all employees who have a child who has a birthday in March.

ii) Find those employees who took an examination for the skill type "typing" in the city "Pune".

iii) List all skill types in Emp.

b) Write short note on   **[10]**

   i)   JSON

   ii) Hive

OR

Q8) a) Explain different components of HADOOP in detail.   **[7]**

   b) Explain Xpath & Xquery with suitable example.   **[5]**

   c) Write short note on R programming.   **[5]**

Q9) a) Compare operational systems and data warehouse.   **[5]**

   b) Write short note on Data-mining clustering.   **[5]**

   c) Explain supervised & unsupervised machine learning algorithms.   **[7]**

OR

Q10) a) Explain Extract - Transform - Load (ETL) process in data warehouse. **[5]**

   b) Explain in brief different BIS components.   **[5]**

   c) Write short note on Data-mining classification.   **[7]**

✦ ✦ ✦

[4958]-1082

T.E.(Computer Engineering)

DATA COMMUNICATION AND WIRELESS SENSOR NETWORKS

(2012 Course) (Semester-I) (310243)

Time :2 .5Hours]   *[Max. Marks : 70*

Instructions to the candidates:

   1)   *Question 1,2,3,4 (10 marks each). Solve either Question 1 or Question 2 and Question 3 or Question 4.*

   2)   *Question 7 and 8(18 marks) Solve any one.*

   3)   *Question 5,6,9,10(16 marks each). Solve either Question 5 or Question 6 and Question 9 or Question 10.*

   4)   *Neat diagrams must be drawn wherever necessary.*

   5)   *Assume suitable data if necessary.*

   6)   *Figures to the right indicate full marks.*

Q1) a)   Differentiate between Infrastructure based and Infrastructure less wireless topologies.   **[5]**

   b)   Encode the following binary data stream into Bipolar, Manchester: 1100 1010111000111100001.   **[5]**

Q2) a)   What is RFID? Explain RFID based data communication?   **[6]**

   b)   Explain significance of bluetooth and zigbee IEEE standard.   **[4]**

Q3) a)   Explain in detail Data link layer design issues from perspective of error and flow control.   **[6]**

   b)   Write in detail working of CSMA/CD   **[4]**

Q4) a)   With neat diagram explain architecture of Sensor node   **[6]**

   b)   Explain in detail how Virtual Private Network works and its applications?
                                                                                            [4]

Q5) a)   Differentiate with detail example Contention- based protocols, Schedule-based protocols.   **[10]**

b) State True or false with justification "SPIN uses attribute value pairs for data and queries" **[6]**

Q6) a) Explain in detail why classical IP based protocols cannot be applied for wireless sensor Networks. **[8]**

b) State True or false with justification "LEACH uses single hop routing within cluster which is not applicable to network in large region". **[8]**

Q7) a) Differentiate between proactive and reactive routing techniques with example. **[8]**

b) What is localization in Wireless Sensor Network? Explain different methods of localization? **[8]**

c) Explain PICONET in Wireless Sensor Network. **[2]**

Q8) a) Write in detail application of Wireless body Sensor network in health care domain. **[10]**

b) Justify the statement "data generated by an individual sensor may not appear to be significant, but the overall data generated across dense Wireless Sensor Network can produce a significant portion of the big data". **[8]**

Q9) a) Explain in detail Operating System design issues in Wireless Sensor Network with reference to Architecture, Function etc. **[8]**

b) Write in detail application of Wireless Sensor Network in military domain. **[8]**

Q10) a) Write in detail role of Wireless Sensor Network in "Internet of Things(IoT)". **[8]**

b) Explain the impact of anchor placement in Wireless Sensor Network. **[8]**

◆▶ ◆▶ ◆▶

[4958]-1083

T.E.(Computer Engineering)
COMPUTER FORENSIC & CYBER APPLICATIONS
(2012 Course) (Semester-I) (End-sem)

Time :2½Hours]   *[Max. Marks : 70*
Instructions to candidates:
   1) Solve Q1 or 2,Q3or 4, Q5 or 6 , Q 7 or 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 circuit switching, packet switching and message switching. **[8]**

    b) Explain in brief Indian IT Act. **[6]**

    c) Describe in brief how computer intruders operate **[6]**

<div align="center">OR</div>

Q2) a) Describe the layers of OSI model with suitable diagram. **[8]**

    b) Describe testimony of digital investigator in courtroom. **[6]**

    c) Explain how location can be instrumental in investigating an alibi with example. **[6]**

Q3) a) Explain Private key and public key encryption. **[8]**

    b) Write a short note on Email Encryption. **[8]**

<div align="center">OR</div>

Q4) a) Write a short note on cyber stalking and cyber stalkers. **[8]**

    b) Write short note on class & indivisual characteristics of digital evidence. **[8]**

Q5) a) Explain patents, copyrights& trademarks in detail. **[8]**

    b) Describe FAT file system. **[8]**

<div align="center">OR</div>

Q6) a) Explain data recovery process in unix file system. **[8]**

b) Explain fundamentals of mobile device technology. **[8]**

Q7) a) Write short note on: Ethernet &ATM network. **[9]**

b) Explain role of sniffer in evidence collection at physical layer. **[9]**

<div align="center">OR</div>

Q8) a) Explain E-mail forgery & Tracking in detail. **[9]**

b) Explain different internet services and justify internet as an investigation tool. **[9]**

<div align="center">◀▶ ◀▶ ◀▶</div>

P2891

SEAT No. :

[4958] - 1084

T. E. (Computer Engineering)
OPERATING SYSTEMS DESIGN
310242:(Semester - I) (2012 Course)(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 Q9 OR10.*
2) *Neat diagrms must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*

Q1) a)   Explain following algorithms of Buffer cache   **[6]**

     i)   getblk

     ii)   brelease

     b)   Explain Unix file system structure.   **[4]**

OR

Q2) a)   Is operating system itself a process? Justify your answer.   **[5]**

     b)   Explain in details six steps of Android boot process.   **[5]**

Q3) a)   Explain with example data structures used for demand paging.   **[5]**

     b)   Explain with neat diagram address translation in paging.   **[5]**

OR

Q4) a)   Explain with neat diagram Linux memory management.   **[4]**

     b)   Write in short - allocating and freeing swap space.   **[6]**

Q5) a) Explain shared memory with its system calls. **[8]**

b) What is Inter - process communication? Why it is important in operating system? **[8]**

OR

Q6) a) What do you mean by pipe? Explain anonymous and named / FIFO pipe. **[8]**

b) What is semaphore? Provide solution to producer - consumer problem using semaphore. **[8]**

Q7) a) What is make utility? Explain it with example. Consider your own makefile. **[8]**

b) Compare grep and awk utilities. State one example of each. **[8]**

OR

Q8) a) What are the EFI and UEFI? Explain with an application. **[8]**

b) Write AWK script to generate a report on student database. **[8]**

Q9) a) What is multiprocessor system? List the types of multiprocessor system. **[6]**

b) What is UNIX Free - BSD scheduler? List different priority levels of the same. **[6]**

c) Explain different types of approaches for real time scheduling. **[6]**

OR

*Q10)*a) Enlist different characteristics of real time system and explain it. **[9]**

b) Write short notes on **[9]**

i) Palm OS

ii) Master / Slave Architecture

iii) Frame of Reference

ಛಿಖಿಂಛಿಖಿಂ

[4958]-1085

T.E. (Computer)
THEORY OF COMPUTATION
(2012 Course) (Semester - I) (310241)

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)   Assume suitable data if necessary.

Q1) a)   Determine a Regular Expression over the alphabets $\{x, y\}$ for the following

      i)   All strings containing exactly two x's

      ii)   All strings that do not end with xy

      iii) All strings starting with yy   **[6]**

   b)   Define Pumping Lemma and apply it to prove the following

      $L = \{0^m 1^n 0^{m+n} \mid m >= 1 \text{ and } n >= 1\}$ is not regular   **[6]**

   c)   Give the Right & Left linear grammar for the following DFA shown in Fig1   **[8]**
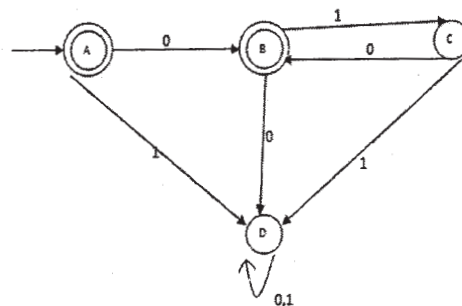

Fig 1

OR

P.T.O.

Q2) a) State Principle of Mathematical Induction and apply it to show that $n^4 - 4n^2$ is divisible by 3 for all n>0. **[6]**

b) Make use of Arden's theorem to determine the regular expression for the finite automata shown in fig 2. **[6]**
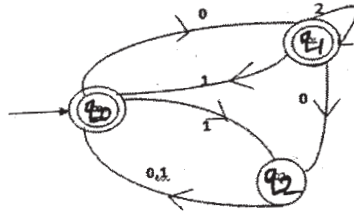

Fig 2

c) Construct a DFA for the following left linear grammar **[8]**

$S \to B1|A0|C0, \quad B \to B1|1, \quad A \to A1|B1|C0|0, \quad C \to A0$

Q3) a) What is a Turing Machine? Give the formal definition of TM. Design a TM that replaces every occurrence of abb by baa. **[9]**

b) Write short note on: **[9]**

i) Universal Turing Machine (UTM)

ii) Recursively Enumerable Languages.

iii) Halting Problem of Turing Machine.

OR

Q4) a) What is a post machine? Give formal definition of Post Machine. Construct a Post Machine for Accepting strings with equal number of $a^{'s}$ & $b^{'s}$. **[9]**

b) What are the different ways for extension of TM? Explain. Construct a two tape TM to convert an input W into WW^R. **[9]**

Q5) a) Construct a PDA that accept $L = \{a^n b^n \mid n \geq 1\}$ through Empty stack. **[7]**

b) Obtain CFG for the PDA given below: **[9]**

$$\delta(q_0, 1, z_0,) = \{q_0, xz_0,\} \qquad \delta(q_0, 1, x) = \{q_0, xx\}$$
$$\delta(q_0, 0, x) = \{q_1, x\} \qquad \delta(q_0, \varepsilon, z_0,) = \{q_0, \varepsilon\}$$
$$\delta(q_1, 1, x) = \{q_1, \varepsilon\} \qquad \delta(q_0, 1, z_0,) = \{q_0, z_0\}$$

OR

Q6) a) What is PDA? What are the different types of PDA? Give its applications. **[6]**

b) What is NPDA? Construct a NPDA for The set of all strings over {a,b} with even length palindrome. **[10]**

Q7) a) What do you mean by Polynomial Time Reduction? Explain with suitable example. **[8]**

b) What is Clique Problem? Show that it is a NP-Complete problem. **[8]**

OR

Q8) a) What do you mean by NP-Problems? Justify why the Travelling Salesman problem is a NP-Problem. **[8]**

b) What is Kruskal's Algorithm? How can we solve this problem using Turing Machine? **[8]**

$$\times \quad \times \quad \times$$

[4958]-1086

T.E. (Computer Engg.)
PRINCIPLES OF CONCURRENT & DISTRIBUTED PROGRAMMING
(2012 Course) (Semester - II) (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) *Assume suitable data, if necessary.*

Q1) a) Define computation model. Explain specialized computation model in detail. **[5]**

   b) Explain the different types of dependency relationships with suitable example. **[5]**

OR

Q2) a) Explain the open CL development framework and architecture with suitable diagram. **[5]**

   b) Explain the various parallel programming models. **[5]**

Q3) a) Explain the use of concurrent java for multithreading with suitable example. **[5]**

   b) Explain Flynn's architectural classification scheme with diagrams. **[5]**

OR

Q4) Write short note on (any two): **[10]**

   a) MPI Java.

   b) Shared memory.

   c) CUDA hardware overview

P.T.O.

Q5) a) Why are distributed operating systems more difficult to design than operating systems for centralized time sharing system? **[5]**

b) Explain the different aspects of transparency supported by the distributed operating system. **[5]**

c) Why are distributed computing systems gaining popularity? Which DCS model is popularly used nowadays? Justify your answer. **[7]**

OR

Q6) a) Enlist the relative advantages and disadvantages of minicomputer and workstation models. **[5]**

b) Explain processor -Pool model with diagram. Enlist the advantages and disadvantages of it. **[5]**

c) In what respect are distributed computing systems better than parallel processing system. Explain suitable example of application for which distributed computing systems will be more suitable than parallel processing systems. **[7]**

Q7) a) Explain Domain 0 and communication with xen with suitable diagram.**[5]**

b) Explain the various approaches for paravirtualization with suitable diagram. **[5]**

c) Draw a diagram showing the X86 virtualization architecture & explain the various components of it. **[6]**

OR

Q8) a) List and explain the advantages of virtualization. **[5]**

b) Write a short note on hardware support for virtualization. **[5]**

c) Draw a diagram showing the basic organization of a virtual machine monitor and explain the virtualization basics. **[6]**

Q9) a) Write a program in CUDA for matrix multiplication. **[5]**

b) Explain block scheduling with respect to CUDA. **[5]**

c) Explain the cloud and mobile computing principles. **[7]**

OR

*Q10)*a) Explain the structure of CUDA Block, Threads with suitable example.**[5]**

b) Explain the concept of multi-CPU and multi -GPU with suitable example. **[5]**

c) Explain memory handling in CUDA with respect to the following: **[7]**

i) Shared memory

ii) Constant memory

iii) Global memory

EEE

[4958]-1087

T.E.(Computer Engineering)
COMPUTER NETOWRKS
(2012 Course) (Semester-II) (End Semester)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:
1)   Figures to the right indicate full marks.
2)   Draw neat diagrams wherever necessary.
3)   Assume suitable data if necessary.

Q1) a)   What is FTP? What are the three FTP transmission modes?   **[4]**

   b)   Explain UDP Header? The following is a dump of a UDP header in hexadecimal format.   06 32 00 0D 00 1C E2 17   **[8]**

      i)   What is source port number?

      ii)   What is destination port number?

      iii)   What is the total length of the user datagram?

      iv)   What is the length of the data?

      v)   Is the packet directed from a client to a server or vice versa?

      vi)   What is the client process?

   c)   What is fragmentation in IPv4, Explain with example? An IPv4 datagram arrives with fragmentation offset of 0 and an Mbit(More fragment bit) of 0, Is this a first fragment, middle fragment or last fragment?   **[4]**

   d)   What is the difference between open-loop congestion control and closed-loop conjestion control? Name the policies that can prevent congestion?   **[4]**

OR

Q2) a)   Suppose a router has built up the routing table shown below. The router can deliver packets directly over interfaces 0 and 1, or it can forward packets to routers R2, R3 or R4. Describe what the router does with a packet addressed to each of the following destinations.   **[8]**

      i)   128.96.39.10

      ii)   128.96.40.12

      iii)   128.96.40.151

      iv)   192.4.153.17

      v)   192.4.153.90

SubnetNumber	SubnetMask	NextHop
128.96.39.0	255.255.255.128	Interface 0
128.96.39.128	255.255.255.128	Interface 1
128.96.40.0	255.255.255.128	R2
192.4.153.0	255.255.255.192	R3
(Default)		R4

Routing table

b) What are four general techniques to improve quality of service? Explain any one in detail? **[6]**

c) Describe following commands with syntax: **[6]**

   i) Ping

   ii) Traceroute

   iii) Telnet

Q3) a) Explain 802.11 Wireless frame format in detail? **[6]**

b) Write short note on wireless Application Protocols. **[6]**

c) What is the purpose of NAV? Explain **[4]**

<div align="center">OR</div>

Q4) a) Explain in detail MAC Sublayer DCF(Distributed Coordination Function) used in wireless LAN. **[6]**

b) Explain WLAN architecture **[6]**

c) Explain bluetooth frame format. **[4]**

Q5) a) What is VoIP? Explain SIP(Session Initiation protocol) in detail **[8]**

b) Explain VANET architecture? What are the challenges in Vehicular Network? **[8]**

<div align="center">OR</div>

Q6) a) What is DTN? Explain different layers of DTN? **[8]**

b) Explain H.323 protocol used in VoIP? **[6]**

c) What are applications of VoIP? **[2]**

Q7) a) What is virtualization? Explain. **[6]**

b) Explain ATM architecture? **[6]**

c) Write short note on GMPLS. **[6]**

OR

Q8) a) Explain ATM Header? Explain Application Adaption Layer in detail.**[8]**

b) What are components of Optical Network. **[6]**

c) Explain SONET frame structure? **[4]**

◀▶   ◀▶   ◀▶

[4958]-1088

T.E. (Computer Engineering)
EMBEDDED OPERATING SYSTEMS
(2012 Course) (Semester -II) (310250)

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) How user space application communicates with the hardware? **[4]**

    b) Write an ARM assembly program to find value of expression $5X + 4Y + 3Z$, where $X = 4$, $Y = 5$, $Z = 3$. **[6]**

OR

Q2) 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]**

Q3) a) Explain the steps involved in initialization flow of control on embedded Linux. **[6]**

    b) Why 'BusyBox' is used in embedded systems? Explain. **[4]**

OR

Q4) a) What are the steps involved in 'subsystem initialization'? **[4]**

    b) Write short note on(any two): **[6]**

        i) LSB

        ii) OSDL

        iii) Init thread

Q5) a) Explain the role of boot loader in embedded systems. **[4]**

b) Explain Linux device driver architecture using minimal device driver. **[8]**

c) What module utilities are used to add, delete & to get information about the modules? **[5]**

OR

Q6) a) How MTD services are enabled in embedded system? **[6]**

b) Explain about U-boot configurable commands. **[5]**

c) Give the general steps involved in PCI discovery process and probe function. **[6]**

Q7) a) Explain the use of GDB in debugging a core dump. **[7]**

b) With a neat diagram explain the graphics display of data in embedded systems. **[10]**

OR

Q8) a) How to debug the kernel using 'printk'? **[5]**

b) Write short note on (any two): **[6]**

i) DDD

ii) EGL

iii) OpenGL

c) Explain the tracing and profiling tools used in Embedded Application development. **[6]**

Q9) a) Explain in detail, development process of Android applications. **[8]**

b) Explain four preemption modes of Linux kernel. **[8]**

OR

*Q10)*a) Write short notes on (any two): **[8]**

i) Dalvik VM

ii) Zygote

iii) Activity Manager

b) What policies are used by Linux to schedule a real time process? **[8]**

ℰ ℰ ℰ

[4958]-1089

T.E. (Computer Engineering)
DIGITAL SIGNAL PROCESSING APPLICATIONS
(2012 Pattern) (Semester - II) (310253)

Time : 2½ 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 diagrams 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 -

$$y(n) = x(n) - x(n-1) + 3y(n-1) - 2y(n-2)$$ **[5]**

b) Draw the basic butterfly structures for DIT and DIF FFT algorithms and hence obtain the computational complexity of FFT algorithm. **[5]**

OR

P.T.O.

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]**

Q5) a) Obtain and realize Direct Form –I and Direct Form –II IIR filter structure for a system described as –

$$y(n) = y(n-1) - \tfrac{1}{2}y(n-1) + x(n) - x(n-1) + x(n-2)$$ **[9]**

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 Compounding? How important this process is in audio processing? Explain the Compounding 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]**

✗ ✗ ✗

[4958]-1090

T.E.(Computer Engineering)
SOFTWARE ENGINEERING
(2012 Pattern) (Semester-II) (End sem) (310252)

Time :2½Hours]   *[Max.Marks : 70*

Instructions to the candidates:
1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 orQ 8, Q 9 or Q10 ,Q 11 or Q 12.*
2) *Figures to the right side indicate full marks.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Assume suitable data if necessary.*

Q1) What are the various umbrella activities applied throughout a software project? **[7]**

OR

Q2) Explain the concept of Software Evolution. Explain the merits and demerits of Agile process model. **[7]**

Q3) Explain class Based modeling with suitable example. **[7]**

OR

Q4) What are functional and non functional requirements of software. **[7]**

Q5) Explain in detail the need of SAAM (Software Architecture Analysis Method) and its steps. **[6]**

OR

Q6) Justify "The analysis and design process for user interfaces is iterative". **[6]**

Q7) a) What are the main objective of software Testing and what are the principles of software testing? **[9]**

    b) Differntiate between:- **[8]**

       i) Condition and loop Testing

       ii) Verification and Validation

OR

Q8) a) What do you understand by Integration testing? Explain objectives of integration testing. **[9]**

b) What is the difference between verification and validation? Explain with suitable example. **[8]**

Q9) a) Explain the earned value analysis in project scheduling. **[8]**

b) What are the different categoris of Risk. Explain Risk management process in detail. **[9]**

OR

Q10) a) What is software configuration management(SCM)? Explain the change control mechanism in SCM. **[8]**

b) Explain COCOMO model for project cost estimation. **[9]**

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 Reliability? What are the factors affecting Software Reliability? **[8]**

◀▶ ◀▶ ◀▶

[4958] - 1091

T.E. (Chemical)

CHEMICAL ENGINEERING MATHEMATICS

(2012 Course) (End Semester) (Semester - I) (309341)

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) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
4) *Assume suitable data, if necessary.*

Q1) a)   The bacteria concentration (C) in a reservoir varies as $C = 4e^{-2t} + e^{-0.1t}$. Calculate the time required for bacteria concentration to be 0.5 accurate upto 4 decimal places, use Newton Raphson method.   **[5]**

   b)   Explain convergence and divergence in case of Newton - Raphson method using graphical representation.   **[5]**

                                         OR

Q2) a)   Solve the following system of equations using relaxation method. Perform 3 iterations.

   $10x_1 + x_2 + x_3 = 12$

   $2x_1 + 10x_2 + x_3 = 13$

   $2x_1 + 2x_2 + 10x_3 = 14$ **[5]**

   b)   What are the drawbacks of elimination method.   **[5]**

Q3) a) Use least square regression to fit a straight line to the data given below

x	1	2	3	4	5	6	7
y	0.5	2.5	2.0	4.0	3.5	6.0	5.5

[5]

b) The value of Nusselt number (Nu) and Reynold number (Re) found experimently are given below. If the relation between Nu and Re is of type Nu = a. Re^b, find the values of *a* and *b* for the given values of Nu and Re **[5]**

Re	3000	4000	5000	6000	7000
Nu	14.3575	16.6517	16.7353	17.6762	18.5128

OR

Q4) a) What is linear extrapolation and polynomial extrapolation. **[5]**

b) A function $f(x)$ is described by following data

x	1	1.1	1.2	1.4	1.6	1.9	2.2
f(x)	3.123	4.247	5.635	9.299	14.303	24.759	39.319

Find the numerical integration of function in limit from 1 to 2.2 using Trapezoidal rule. **[5]**

Q5) a) Solve the following equation.

$$2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 9y = 9 \text{ with } y(0) = 1, \ y'(0) = -2. \text{ Estimate } y \text{ at } x = 0.1$$

using Taylor series method. Take step size = 0.1. **[8]**

b) Explain error induced by Eulers method. **[8]**

OR

Q6) a) Using Runge - Kutta 2nd order method solve the following differential

equation $\dfrac{dy}{dx} = x + y$, $y(0) = 1$, $h = 0.1$, find y(0.2). **[8]**

b) Explain graphical interpretation of modified eulers method. **[8]**

Q7) Solve $\dfrac{d^2 y}{dx^2} + y = 0$ with boundry conditions

$y = 0$ when $x = 0$

$y = 0$ when $x = 1$

Find y at $x = 0.5$ **[16]**

OR

Q8) Solve $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$ for the following conditions using Crank - Nicolson method.

At $x = 0$ and $x = 3$, $u = 0$ for all values of t

At $t = 0$, $u = x^2$ for $0 < x < 3$

Take increment in x as 1 and increment in t as 0.1. Find all values of u for $t = 0$ to $t = 0.3$ **[16]**

Q9) a) Explain salient features of Golden search method. **[9]**

b) Explain numerical methods for optimizing a function of one variable. **[9]**

OR

[4958] - 1091 3

Q10) A confectioner manufactures two types of biscuits A and B. A sells at profit of Rs. 40 per box, where B brings a profit of Rs. 50 per box. The biscuits are processed in three main operations blending, cooking and packaging. The average time taken in minutes for each box, for each of the processing operations is tabulated. The blending equipment is available for a maximum 12 machine hrs, cooking facilities for almost 30 hrs, and packing equipment for more than 15 hrs. Determine how many boxes of each type of confectioner should manufacture in order to maximize profit. How much is this profit. **[18]**

	Blending	Cooking	Packaging
A	1 (min)	5	3
B	2 (min)	4	1

෧෫෧෫

[4958] - 1092

T.E. (Chemical Engineering)

CHEMICAL ENGINEERING THERMODYNAMICS - II

(2012 Course) (Semester - I) (309345)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidate:

  1)   ***Answer five questions.***

  2)   ***Neat diagrams must be drawn wherever 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) a)   Explain the property changes of mixing for various thermodynamic properties.   **[6]**

      b)   Explain and derive Chemical Potential as a criterion for phase equilibrium.   **[4]**

OR

Q2) a)   Derive the equation for Lawis/Randall Rule.   **[6]**

      b)   Estimate a value for the fugacity of 1Butene vapor at 200°C and 70 bar. Where, $T_r = 1.13$, $P_r = 7.74$, $\omega = 0.187$, $\varphi^\circ = 0.620$ and $\varphi^1 = 1.095$.   **[4]**

P.T.O.

Q3) A Vapor-liquid equilibrium data for Chloroform **[10]**

a) and 1-4 Dioxane

b) at 50°C is given below

P (kN/m²)	15.79	17.51	18.50	19.30	19.89	21.37	24.95	29.82	34.80	42.10	60.38	65.39	69.36
X_1	0	0.093	0.125	0.176	0.200	0.263	0.361	0.475	0.555	0.672	0.878	0.940	1.00
Y_1	0	0.179	0.238	0.330	0.369	0.463	0.418	0.755	0.838	0.914	0.986	0.994	1.00

Calculate γ_1, γ_2, G^E/RT, G^E/RTx_1x_2 and plot $\ln\gamma_1$, $\ln\gamma_2$, GE/RT, G^E/RTx_1x_2 vs x_1. Find the values of $\ln\gamma_1^{\infty}$, $\ln\gamma_2^{\infty}$.

OR

Q4) a) Explain the procedure for bubble temperature calculations. **[5]**

b) For the binary system we have Wilsons constants A_{12}" $=0.1258$ & A_{21}" $=0.7292$

The Antonie equation is

$\ln P_1^{sat} = 16.68-(3640.2/(T - 53.54))$

$\ln P_2^{sat} = 16.29 - (3816.44/(T -46.13))$

Where T is in K and P is in kN/m²

Assuming validity of modified Raoults Law, Calculate pressure and vapor phase composition at T = 353 K and $x_1 = 0.25$. **[5]**

Q5) a) Explain the criteria of stability. **[8]**

b) Derive Clausius Clapeyron equation. **[8]**

OR

Q6) a) Explain Osmotic pressure and derive the equation for osmotic pressure.**[8]**

b) Explain criteria of phase equilibrium at constant parameters. **[8]**

Q7) a) For the following reactions obtain the relation between mole fraction & reaction coordinate.

$$CH_4 + H_2O = CO + 3H_2$$

$$CH_4 + 2H_2O = CO_2 + 4H_2$$
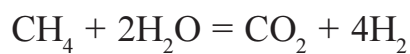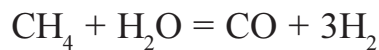
Assume 2 moles of CH_4, 2 moles of H_2O and 3 moles of H_2 initially present. **[6]**

b) Derive the equation for equilibrium constant and effect of temperature on it. **[10]**

OR

Q8) a) n-Butane is isomerised to i-Butane by the action of catalyst at moderate temperature, it is found that the equilibrium is attend at the following compositions. **[8]**

| Temp (k)	mole % of n-Butane
317	31.00
319	43.00

Assuming that, activities are equal to the mole function. Calculate the standard free energy of the reaction at 317 k and 319 K and average value of heat reaction over this temperature range.

b) Derive the equation for relation between composition and reaction coordinate for multireaction system. **[8]**

Q9) a) Explain and derive the relation between equilibrium constant and composition in case of gas phase reactions. **[6]**

b) Explain the Duhem's Theorem for reacting systems. **[6]**

c) Explain in detail fuel cell with its types. **[6]**

OR

Q10) a) Explain and derive the relation between equilibrium constant and composition in case of liquid 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]**

$$CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$$
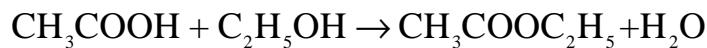
If initially there is 1 mole of each acetic acid and ethanol. Estimate the mole fraction of ethyl acetate in the reacting mixture at equilibrium with the help of following data

Component	$\Delta H°f_{298}$ (j/mol)	$\Delta G°_{298}$ (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]**

ೞಲಐೞಲಐ

[4958]-1093

T.E. (Chemical)
CHEMICAL PROCESS TECHNOLOGY (309344)
(2012 Course) (Semester - I) (End Semester)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions:
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.*

Q1) a) Discuss various forms of Flow diagrams used in Process Industry. **[5]**

     b) What do you mean by PFD and Major Engineering problems.   **[5]**

OR

Q2) Describe electrolytic process for production of Aluminum.   **[10]**

Q3) Describe production of Single Super phosphate.   **[10]**

OR

Q4) Explain contact process for manufacturing of Sulfuric acid in detail.   **[10]**

Q5) Explain Starch and give contact its manufacturing process from maize. **[10]**

OR

Q6) Explain manufacturing of Penicillin with its major Engineering problems. **[10]**

Q7) a) Explain manufacturing destructive distillation of coal and carbonization processes. **[20]**

b) Explain Production of Water gas and Producer gas.

OR

Q8) a) Explain Production of Portland cement in details. **[20]**

b) Discuss the basic chemistry and cleaning action of soap explain the Production process of soap.

Q9) a) Explain Production of phenol by cumene process. **[20]**

b) Explain manufacturing of Acetone.

OR

Q10) a) Explain manufacturing of Formaldehyde. **[20]**

b) Explain Production of Vinyl Chloride.

✘   ✘   ✘

T.E.(Chemical)

INDUSTRIAL ORGANISATION AND MANAGEMENT

(2012 Pattern) (Semester-I)(End Semester)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:

    1)   Attempt Q1 or 2,Q3or 4, Q5 or 6 , Q 7 or 8, Q 9 or 10.

    2)   Neat diagrams must be drawn wherever necessary.

    3)   Black figures to the right indicate full marks.

    4)   Assume suitable data if necessary.

Q1) a)   Explain Line organization with advantages and disadvantages.   **[6]**

    b)   Wirte a note on Management by Objectives.   **[4]**

OR

Q2) Enlist the sources of recruitment. Explain in detail the selection process. **[10]**

Q3) a)   Explain different types of tenders.   **[6]**

    b)   Define Job and Job specifications.   **[4]**

OR

Q4) Explain various functions of Storekeeper.   **[10]**

Q5) a)   What is sales forecasting? Explain the two types of sales forecasting indetail.   **[8]**

    b)   Explain in detail Marketing Mix.   **[8]**

OR

Q6) a) Write an explanatory note channel of distribution. **[8]**

b) Explain any two Pricing strategies in deatil **[8]**

Q7) a) Write Notes on **[8]**

i) Antidumping Duty

ii) Custom and excise duty

iii) Additional custom duty

iv) Duty on bounty fed articles

b) Explain in detail Total Quality Management of a process industry. **[8]**

OR

Q8) a) Explain Quality Circle. **[8]**

b) Explain in detail International trade with its importance for a developing country. **[8]**

Q9) Write short notes on. **[18]**

i) MRTP

ii) Monopolies Restrictive Trade Practices(MRTP)

iii) Patent and Patent Rights

OR

Q10) 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 Flow Chart and Flow Diagram. **[6]**

◆▶ ◆▶ ◆▶

[4958]-1095

T.E. (Chemical Engg.)

MASS TRANSFER - I

(2012 Course) (Semester - I)

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)　Use of logarithmic tables slide rule, Mollier charts, electronic pocket Calculator and steam tables is allowed.

　　4)　Assume suitable data, if necessary.

Q1) a)　A gas mixture containing one fifth hydrogen and four fifth methane by volume is prepared, through which oxygen is allowed to diffuse. The total pressure is 1×10^5 N/m^2 and temperature is 2°C. Estimate the rate of diffusion of oxygen through a film of gas mixture, 3 mm thick when the concentration change across the film is 12 to 7% by volume. The diffusivity are, $D_{O2\text{-}H2} = 7.1 \times 10^{-5}$ m^2/sec. $D_{O2\text{-}CH2} = 1.88 \times 10^{-5}$ m^2/sec. **[5]**

　　b)　State Fick's First law of diffusion. Derive an expression for steady state equimolar counter current Diffusion. **[5]**

OR

Q2) a)　Ammonia gas is diffusing through a layer of stagnant air, 2.5mm thick at constant rate. Conditions are fixed so that gas contains 50% ammonia by volume a one boundary of stagnant layer. Ammonia is quickly absorbed on other side and its concentration is negligible at that plane. The temperature is 20°C and pressure is atmospheric. The diffusivity for ammonia-air system is 0.18 cm^2/sec. Calculate the rate of diffusion of ammonia through air in gm. mole/hr.cm^2 **[5]**

　　b)　Write short note on Chilton-Colburn Analogy and Reynolds Analogy. **[5]**

Q3) a) Define absorption factor and stripping factor. **[2]**

b) Ammonia is absorbed by water in wetted wall column using operating temperature of 20°C and 1 atm pressure. The overall coefficient is $2.72×10^{-4}$ kmol/m² atm. At one point in the column the gas contained 10mol% ammonia and the liquid phase concentration was $6.42×10^{-2}$ kmol ammonia per m³ of solution. Temperature is 20°C and 1 atm pressure. 85% of the resistance to mass transfer lies in a gas phase. If Henry's law constant is $9.35×10^{-3}$ atm m³/kmol, calculate the individual film coefficient and the interfacial composition. **[8]**

OR

Q4) A mixture of Acetone vapor and air contain 5% by volume of acetone is to be freed from acetone content by scrubbing it with water in a absorption column. The flow rate of gas mixture is 700 m³/hr of acetone free air measured at NTP and that of water is 1500 kg/ hr. the absorber operates at an average temperature of 20°C and a pressure of 101 KPa. The scrubber absorbs 98% acetone. The equilibrium relation for the acetone-water system is $Y* = 1.68 X$, where Y = Kmol of acetone/kmol of dry air, X=Kmol of acetone/kmol of water, calculate

a) mean driving force for absorption,

b) mass transfer area if overall mass transfer coefficient is $K_G = 0.4$ kmol of acetone/m². hr **[10]**

Q5) a) 30000 m³ of gas at 298°K and 101.3 kN/m² saturated with water vapor is compressed to 340 kN/m², cooled to 289°K and condensed water is drained off. Subsequently the pressure is reduced to 170 kN/m² and the gas is distributed at this pressure and temp. What is % humidity. The vapor pressure of water at 289°K is 1.8 kN/m². **[8]**

b) Define:

i) adiabatic saturation temperature,

ii) enthalpy,

iii) humid heat,

iv) humid volume. **[4]**

c) What are different types of cooling tower? Discuss spray chamber in brief. **[4]**

OR

Q6) a)   Acetone is evaporated in to a steam of nitrogen gas and this mixture of acetone vapor and nitrogen flows through a duct of cross section $0.08m^2$. The pressure and dry bulb temperature at one point in the duct are 800mms. Hg and 45°C. At this point the average velocity is 4 m/s, the wet bulb temperature is 28°C. Calculate the mass flow rate of acetone vapor carried by duct. The data given: latent heat of vaporization for acetone = 403000 J/kg, h_G/K_y = 1700 J/kg°K, vapor pressure of acetone = 50mms. Hg. **[8]**

b)   Define wet bulb temperature and psychometric ratio. Derive an expression relating wet bulb temp with absolute humidity and psychometric ratio.**[8]**

Q7) a)   Define

   i)   Murphree tray efficiency,

   ii)   Overall tray efficiency,

   iii)   Coning,

   iv)   Weeping.   **[8]**

b)   What are different types of trays used in column? Explain working of any one.   **[4]**

c)   Explain the end effects of axial mixing.   **[4]**

OR

Q8) a)   With neat sketch explain

   i)   Wetted Wall Column,

   ii)   Mechanically Agitated Vessels   **[8]**

b)   Compare packed and plate columns.   **[6]**

c)   What is pressure drop in column? Brief about positive and negative effects of pressure drop.   **[2]**

Q9) a) Under constant drying conditions, a wet solid is dried from 30% to 4%. The time taken is 4 hours. All are on dry basis. The equilibrium moisture content is 2%. Critical moisture content is 10%. How long it takes to dry to 7%? Assume falling rate period is linear. **[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) Data on drying rate curve of a particular solid is given below. The weight of the dry material in the solid is 48 kg/m². Calculate the time required to dry the material from 25% to 8% moisture (dry basis) **[10]**

kg/kg dry solid (X)	0.30	0.20	0.18	0.15	0.14	0.11	0.07	0.05
kg/hr.m² (N)		1.22	1.22	1.14	0.90	0.80	0.56	0.22	0.05

b) Explain rate of drying curve with neat sketch. **[6]**

c) What are the uses of drying operation? **[2]**

✗ ✗ ✗

[4958] - 1096

T. E. (Chemical)

TRANSPORT PHENOMENA

(2012 Course) (End - Sem) (Semester - II)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 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) Derive the expression of velocity and average velocity for flow of falling film with variable viscosity, $\mu = \mu_0 e^{-ax/\delta}$.   **[10]**

OR

Q2) Liquefied gases are sometimes stored in well insulated spherical containers vented to the atmosphere. Develop an expression for steady state heat transfer rate through the walls of such container with inner and outer radius as r_0 and r_1 and temperatures are T_0 and T_1 respectively. Assume that thermal conductivity of insulation varies linearly with temperature from k_0 at T_0 to k_1 at T_1.   **[10]**

Q3) The solute HCl is diffusing through a thin film of water 2 mm. Concentration of HCl at point 1 is 12 wt% (density = 1061 kg/m^3) and at point 2 is 6 wt% (density = 1030 kg/m^3). Diffusivity of HCl in water is 2.5×10^{-9} m^2/s. Calculate flux of HCl in kmol/m^{2}s.   **[10]**

OR

Q4) a)   Explain Bingham model of non-Newtonian fluid.   **[4]**

   b)   Explain procedure to solve heat transfer problems.   **[3]**

   c)   Explain mass balance equation.   **[3]**

Q5) a) Use Navier- Stokes equation of motion to determine velocity distribution for laminar flow of Newtonian fluid through vertical pipe. **[12]**

b) Explain dimensional form of equation of change and dynamic similarity.**[6]**

OR

Q6) a) Derive Newton's second law of motion. **[12]**

b) What do you mean by partial time, total time and substantial time derivative? **[6]**

Q7) a) What pressure gradient is required to cause N, N-diethylaniline to flow in a horizontalsmooth tube of inside diameter 3 cm at a rate of 1.1 lit/s at 20°C. Density of diethylaniline is 935 kg/m^3 and viscosity is 1.95 cp. Assume friction factor f = 0.0063. **[8]**

b) Derive Blake Kozeny and Burke Plummer equation for flow of fluid in a packed column. **[8]**

OR

Q8) a) Explain friction loss in pipe fittings due to sudden expansion and contraction. **[8]**

b) Explain macroscopic momentum balance equation. **[8]**

Q9) a) Explain Chilton-Colburn analogy. **[8]**

b) Explain Martinnelli's analogy. **[8]**

OR

*Q10)*a) Explain transfer coefficients at high transfer rates by film theory. **[8]**

b) A spherical water droplet, 0.05 cm in diameter is falling at velocity of 215 cm/sec through dry, still air at 1 atm pressure. Estimate the instantaneous rate of evaporation from the drop if the drop surface is at 21°C and air at 60°C. The vapor pressure of water at 21°C is 0.0247atm. Assume Pseudo steady state condition and $k_{xm} = 1.35 \times 10^{-3}$ mol s^{-1} cm^{-2}. **[8]**

છ૪૪છ૪૪છ

[4958]-1097

T.E. (Chemical)
CHEMICAL REACTION ENGINEERING -I
(2012 Pattern)
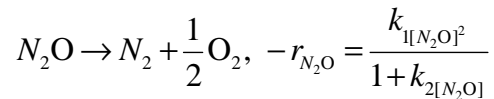
Time : 2½ Hours]　　　　　　　　　　　　　　　　　　*[Max. Marks :70*

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) Figures to the right indicate full marks.

    4) Assume suitable data, if necessary.

Q1) a)　The decomposition of nitrous oxide is found to proceed as follows:**[6]**

$$N_2O \rightarrow N_2 + \frac{1}{2}O_2, \quad -r_{N_2O} = \frac{k_{1[N_2O]^2}}{1+k_{2[N_2O]}}$$

    What is the order of this reaction with respect to N_2O, and overall?

   b)　Differential between single and multiple reactions with suitable example.**[4]**

<div align="center">OR</div>

Q2) a)　At certain temperature, the half-life period and initial concentration for a reaction are,　　　　　　　　　　　　　　　**[6]**

$$t\frac{1}{2} = 420\,\text{sec}, C_{A0} = 0.405\,\text{mol/lit}$$

$$t\frac{1}{2} = 275\,\text{sec}, C_{A0} = 0.64\,\text{mol/lit}$$

    Find the rate constant of reaction.

   b)　Derive and explain pseudo first-order reaction.　　　　　　**[4]**

Q3) a) Deduce the performance equation for recycle reactor. **[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]**
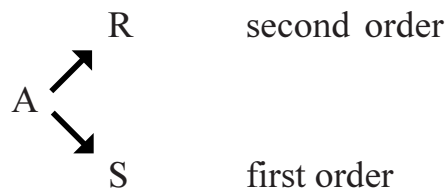
OR

Q4) A homogeneous gas reaction A →3R has reported rate at 215°C **[10]**

$-r_A = 10^{-2} C_A^{1/2}$ [mol/lit. sec].

Find the space time needed for 80% conversion of 50% A and 50% inert feed to a Plug flow reactor operating at 215°C and 5 atm ($C_{A0} = 0.0625$ mol/lit)

Q5) a) Substance A in a liquid reacts to product R and S as follows: **[8]**

R   second order

A

S   first order

A feed ($C_{A0} = 1$, $C_{R0} = 0$, $C_{S0} = 0.3$) enters two mixed flow reactors in series, ($\tau_1 = 2.5$ min, $\tau_2 = 10$ min). Knowing the composition in the first reactor ($C_{A1} = 0.4$, $C_{R1} = 0.2$, $C_{S1} = 0.7$), find the composition leaving the second reactor.
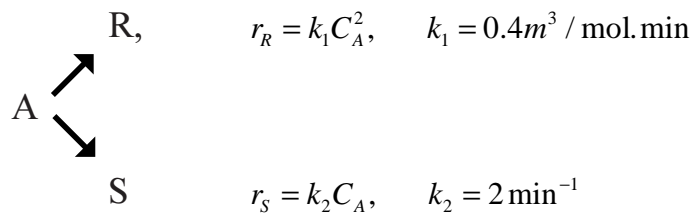
b) Explain in detail **[8]**

   i) Instantaneous yield (ψ)

   ii) Overall yield (φ)

OR

Q6) a) Liquid reactant A decomposes as follows: **[12]**

$$R, \qquad r_R = k_1 C_A^2, \qquad k_1 = 0.4\, m^3 / mol.\,min$$
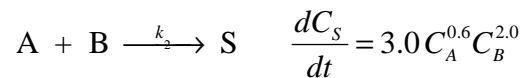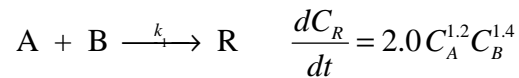
$$A$$

$$S \qquad r_S = k_2 C_A, \qquad k_2 = 2\, min^{-1}$$

A feed of aqueous A (C_{A0} = 40 mol / m³) 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)   Explain qualitative discussion about product distribution. **[4]**

Q7) a) Find out instantaneous fractional yield of reaction (ψ) **[4]**

$$A + B \xrightarrow{k_1} R \qquad \frac{dC_R}{dt} = 2.0\, C_A^{1.2} C_B^{1.4}$$

$$A + B \xrightarrow{k_2} S \qquad \frac{dC_S}{dt} = 3.0\, C_A^{0.6} C_B^{2.0}$$

   b)   Under the ultraviolet radiation, reactant of A of C_{AO} = 10 kmol/m³ in a process stream (v = 1 m³/min) decomposes as follows. **[12]**

$$R \qquad r_R = 16\, C_A^{0.5}\ kmol / m^3\ .min$$

$$A \rightarrow S \qquad r_S = 12\, C_A\ kmol / m^3\ .min$$

$$T \qquad r_T = C_A^2\ kmol / m^3\ .min$$
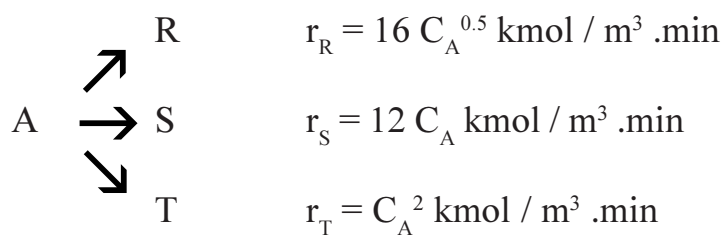
We wish to setup a reactor for a specific duty. Sketch the scheme selected, and calculate the fraction of feed transformed into desired product as well as the volume of reactor needed when product R is the desired material.

OR

Q8) a) Compare and explain Arrhenius and transition-state theories. **[4]**

b) A first order liquid phase reaction is carried out in mixed flow reactor. The concentration of reactant in feed is 3 kmol/m³ and volumetric flow rate is 60×10^{-6} m³/s. The density and specific heat of reaction mixture are constant at 103 kg/m³ and 4.19×10^3 J/(kg.K). The volume of the reactor is 18×10^{-3} m³. 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 $= 4.48 \times 10^6$ exp(-62800/RT) C, kmol/(m³/s) **[12]**

Q9) Write short notes: **[18]**

a) Dispersion model

b) E,F curves

c) Seggregation model

d) Micro and macro mixing of fluids

e) Early and late mixing

f) Examples of non-ideality in reactors

OR

Q10) a) Derive and discuss tank in series model. **[8]**

b) A sample of the tracer hytane at 320 K was injected as a pulse to a reactor and the effluent concentration measured as a function of time resulting in the following data: **[10]**

t (min)	0	1	2	3	4	5	6	7	8	9	10	12	14
C (g/m³)	0	1.5	5.5	8.6	10	8.6	6	4.5	3.5	2.2	1.5	0.6	0

i) Construct figures showing C(t) and E(t) as function of time.

ii) Determine fraction of material leaving the reactor that has spent between 4 and 9 min in the reactor.

iii) Determine fraction of material that has spent 2 min or less in the reactor.

$\mathcal{EEE}$

[4958]-1098

T.E. (Chemical)
CHEMICAL ENGINEERING DESIGN - I
(2012 Course) (End - Semester) (309350) (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.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right side indicate full marks.*

    4)   *Assume suitable data, if necessary.*

Q1) Design the skirt support for a cylindrical vertical vessel with the help of following data: **[10]**

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 N/mm^2

Permissible stress of concrete = 35 N/mm^2.

OR

Q2) A storage vessel is to be covered by using a conical roof. Check the suitability of 10mm thick plates for the construction of conical roof with permissible slope of 1 in 5. Superimposed load = 1250 N/m^2, density of steel = 7700 kg/m^3. Diameter of vessel is 10m. If the plates are not suitable, suggest the required thickness for roof plates. **[10]**

P.T.O.

Q3) 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]**

OR

Q4) a) Give the step by step method for designing of rectangular tanks as per IS:804? **[5]**

b) Discuss in detail classification of vessel supports? **[5]**

Q5) 15,000 kg/hr of liquid with 10% solids available at 21°C is to be concentrated to 50% solids. The vacuum can be used at 13.3 kN/m². BPR of the solution can be neglected. Design the evaporator as triple effect with backward feed arrangement. Heat capacity of solution = 4180 K/kg K, Temperature of steam at 205 kN/m² = 121°C, Temperature of steam at 13.3 kN/m² = 52°C, Latent heat of steam at 121°C = 2200 kJ/kg, Latent heat of steam at 52°C = 2377 kJ/kg OD of the tube = 75 mm, Length of the tube = 2.0m Overall heat transfer coefficient are U_1 = 2500 W/m² K, U_2 = 2000 W/m² K, U_3 =1600 W/m² K. Arrangement of the tubes is square pitch with centre to centre distance equal to 1.25 times the OD of the tube. **[18]**

OR

Q6) a) Write a short note on: **[8]**

   i) Condensation inside and outside vertical tubes.

   ii) Condensation of mixtures.

b) Make a preliminary design for a vertical thermosyphon for a column distilling crude aniline. The column will operate at atmospheric pressure and a vaporisation rate of 6000 kg/h is required. Steam is available at 22 bar (300 psig). Take the column bottom pressure as 1.2 bar.

Physical properties, taken as those of aniline: Boiling point at 1.2 bar 190°C. Molecular weight 93.13, Tc = 699 K, Latent heat 42,000 kJ/kmol, Steam saturation temperature 217°C. Design heat flux = 25,000 W/m², shell diametrical clearance = 14 mm. **[10]**

Q7) a) Explain in detail various types of agitators and their selection criteria.**[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/cm² respectively. **[8]**

OR

Q8) a) Calculate the diameter of the shaft used in agitation system. Torque acting over the shaft is 1,15,000 kg.cm while bending moment acting over the shaft is 34,600 kg.cm. Factor of safety = 6. Ultimate tensile strength of materials of shaft = 6,900 kg/cm². Ultimate shear stress is 75% of UTS.**[8]**

b) Explain different types of jacket with neat sketches and design of plain jacket. **[8]**

Q9) Write short notes on: **[16]**

a) Knock-out drum

b) Decanter

c) Gravity separator

d) Liquid-liquid separators

OR

*Q10)*a) Make a preliminary design for a separator to separate a mixture of steam and water. Steam flow rate is 2500 kg/h and water flow is 1250 kg/h. Operating pressure is 4.2 bar. Liquid density = 950 kg/m³, Vapour density = 2.5 kg/m³. Design the separator with demister pad. **[10]**

b) Explain the importance of column auxiliaries. **[6]**

ℰ ℰ ℰ

[4958]-1099

T.E. (Chemical)
PROCESS INSTRUMENTATION AND CONTROL
(2012 Pattern) (Semester - II) (309352)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6, Q. No. 7 or 8, Q. No. 9 or 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) Explain functional elements of instruments in detail. **[5]**

    b) Explain need and scope of process instrumentation. **[5]**

<div align="center">OR</div>

Q2) a) Give the classification of instruments. **[5]**

    b) Explain the difference between accuracy and precision in an instrument.**[5]**

Q3) a) Give classification of pressure measuring instruments. **[5]**

    b) Explain with diagram, construction and working diaphragms. **[5]**

<div align="center">OR</div>

Q4) a) Define temperature and give classification of temperature measuring instruments. **[5]**

    b) Explain with diagram, construction and working filled - system thermometers. **[5]**

Q5) a) Explain classification of flow measuring instruments. **[8]**

b) Explain with diagram, construction and flow equation orifice meter plate.
[8]

OR

Q6) a) Explain classification of level measuring instruments. **[8]**

b) Explain with diagram, construction and working sight or gauge glass method. **[8]**

Q7) Describe with diagram the following techniques of composition analysis**[16]**

a) IR absorption spectroscopy

b) Ultraviolet absorption spectroscopy

OR

Q8) Write note on **[16]**

a) HPLC

b) liquid chromatography

c) refractometry

d) Ph meter

Q9) a) Describe the heat exchanger automatic control system with block diagram.
[9]

b) Derive the dynamic response equation of first order system for step changes. **[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%.   **[9]**

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)   50%

ii)   25%

b)   Explain with equation, different control actions.   **[9]**

✗   ✗   ✗

[4958]-1100

T.E. Chemical

MASS TRANSFER - II

(2012 Course) (End Semester) (Semester - II)

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 side indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a)   Define all types of tray efficiencies?   **[4]**

b)   Define relative volatility and give significance.   **[4]**

c)   Define molecular Distillation?   **[2]**

OR

Q2) a)   A liquid mixture is subjected to differential distillation containing 50 mole % n-heptane and 50 mole % n-octanes at atmospheric pressure until the residual liquid contains 35 mole % n-heptane. Find out the % of feed left over as residue   **[6]**

X	0.5	0.46	0.42	0.38	0.34	0.32
Y	0.689	0.648	0.608	0.567	0.523	0.49

b)   Write short note on Azeotropic distillation and extractive distillation. **[4]**

P.T.O.

Q3) a) A continuous fractionating column is to design to separate 350 gm-mole per minute of binary mixture containing 40 weight % of benzene and 60 weight% of toluene. The top product contains 97 weight % of benzene and bottom product contains 98 weight % toluene. A reflux ratio of 3.5 moles to 1 mole of product is to be used. The feed is liquid at its boiling point. **[6]**

      i)   Determine the number of ideal plates

      ii)   Calculate the moles of overhead and bottom product.

Equilibrium data:

X	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Y	0.185	0.36	0.50	0.61	0.70	0.78	0.84	0.90	0.95	1.0

   b) Explain the selection criteria for solvent for liquid - liquid extraction. **[4]**

<div align="center">OR</div>

Q4) A 2500 Kg batch of pyridine - water solution, 50% pyridine is to be extracted with chlorobenzene three times and each time 2200 Kg of solvent is used. Determine the concentration of pyridine in the final raffinate. Equilibrium tie-line data for the system water - chlorobenzene - pyridine at 25°C are given below: **[10]**

Pyridine	Chlorobenzene	Water	Pyridine	Chlorobenzene	Water
0	99.95	0.05	0	0.08	99.92
11.05	88.28	0.67	5.02	0.16	94.82
18.95	79.90	1.15	11.05	0.24	88.71
24.10	74.28	1.62	18.90	0.38	80.72
28.60	69.15	2.25	25.50	0.58	73.92
31.55	65.58	2.87	36.10	1.85	62.02
35.05	61.00	3.95	44.95	4.18	50.87
40.60	53.00	6.40	53.20	8.90	37.90
49.00	37.8	13.2	49.00	37.80	13.20

Q5) a) Give detail procedure for finding the number of stages in multistage countercurrent leaching. **[10]**

b) What are the uses of leaching? Give factors affecting the rate of leaching? **[6]**

OR

Q6) a) Roasted copper ore containing copper as $CuSO_4$, is to be extracted in a counter current extractor. The feed charge to be treated per hour comprises of 10 tones of gangue, 1.2 tones of copper sulphate and 0.5 tone of water. The strong solution produced is to consist of 90% H_2O and 10% $CuSO_4$ is to be 98% of that of ore. Pure water is to be used as the fresh solvent. After each stage one tone of water plus copper sulphate dissolved in that water. Equilibrium is attained in each stage. How many stages are required? **[10]**

b) Write material balance for single stage leaching. **[6]**

Q7) a) Explain in brief: **[5]**

i) Break through curve

ii) Adsorption isotherm

b) Explain industrial adsorbents. **[4]**

c) 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 2000 kg solution for a single stage process. The data for an equilibrium isotherm is as follows: **[7]**

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

OR

Q8) a) Give detail material balance and its application to Freundlich adsorption isotherm for multistage crosscurrent adsorption. **[8]**

b) Explain Adsorption hysteresis. **[4]**

c) Explain Langmuir Isotherm. **[4]**

Q9) a) Explain ion exchange process? **[8]**

b) Explain reverse osmosis for water purification? **[6]**

c) Explain the principal of Nanofiltration. **[4]**

OR

Q10) a) Give classification of crystallization equipments. Explain construction and working of Swenson-Walker Crystallizer. **[8]**

b) A Solution contains 500 kg Na_2CO_3 and water has a concentration of 25% by wt. of salt. It is cooled from 335 K to 285 K in an agitated mild steel vessel. Wt. of the vessel is 750 kg. 2.0% water is lost by evaporation crystals of $Na_2CO_3.10 H_2O$ are formed. Calculate the yield of crystals and the heat to be removed? **[10]**

Data: Solubility At 285K : 8.9 kg/100 kg water.

Heat capacity of solution : 3.6 kJ/kg K.

Heat Capacity of M.S : 0.5 kJ/kg K.

Heat of Solution : 78.5 MJ/Kmol.

Latent heat of Vaporization : 2395 kJ/kg.

✦ ✦ ✦

[4958] - 1101

T.E. (IT)

DATABASE MANAGEMENT SYSTEMS

(Semester - I) (2012 Course) (314443)

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 side indicate full marks.*

4)   *Assume Suitable data if necessary.*

Q1) a)   Compare DBMS and file processing system with following points   **[3]**

    i)   Redundancy

    ii)   Access Control

    iii)   Data Integrity

b)   Consider the following relations: **[3]**

BRANCH(bno, street, area, city, pcode, telno)

STAFF(Sno, Fname, Lname, address, position, salary, bno)

Express the following queries in SQL:

    i)   List the staff who work in the branch at 'Main Street'

    ii)   Find staff whose salary is larger than the salary of every member of staff at branch 'S1'.

c)   For a given functional dependencies F, find primary key?   **[4]**

$A \rightarrow BCD, AE \rightarrow F, E \rightarrow G, D \rightarrow H, FE \rightarrow I$

OR

Q2) a) Following information is maintained for online bookstore. **[6]**

    i) books (<u>ISBN</u>, title, price, year)

    ii) author (<u>name, address</u>, URL)

    iii) publisher (<u>name</u>, address, phone, URL)

    iv) customer (<u>name</u>, address, email, phone) (name is discriminating attribute)

    v) Shoppingbasket (<u>basketID</u>)

    Construct an ER diagram with following constraint

    Each book should have a author and a publisher. Book may have more than one author. Each Customer have a dedicated shopping basket. Books can further be categorized as books, music cassette, or compact disks.

  b) Write an algorithm to find cycle in a precedence graph. **[4]**

Q3) a) List down all the possible crash recovery methods? Explain any one with proper example? **[5]**

  b) Consider the following relations **[5]**

    PLAYER (PID#, Name)

    MATCH (MID#, PID#, Match_date, opponent)

    i) Write a simple inner join query using SQL to display information about the player and match played by the player.

    ii) Show intermediate steps of inner join with proper example (assume suitable data).

<p style="text-align:center">OR</p>

Q4) a) Discuss the MongoDB aggregation framework with suitable example? **[6]**

b) What do you mean by cascadeless schedule? Explain with suitable example. **[4]**

Q5) a) For each of the three partitioning techniques, namely round robin, hash, range partitioning, give an example of a query for which that partitioning would provide the faster response. **[6]**

b) Compare **[6]**

i) Speedup and scaleup

ii) Horizontal and Vertical Fragmentation.

c) Why it is necessary to have a client server architecture for database management system. **[6]**

OR

Q6) a) Write short note on (any two) **[12]**

i) Transaction Server Process Structure.

ii) Data fragmentation in distributed databases.

iii) Interoperation parallelism.

b) Discuss the relative advantages of centralized and distributed databases.**[6]**

Q7) a) Give the DTD for an XML representation of the following nested relational schema **[7]**

Emp = (ename, ChildrenSet Setof(Children), SkillsSet Setof(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 XQuries format

Find the names of all employees who have a child who has a birthday in March.

b) Discuss with examples JSON data types. **[4]**

c) What is HDFS? Explain in detail. **[5]**

OR

Q8) a) What is XML Schema? Advantages of XML Schema over DTD? Give simple example of XML Schema? **[7]**

b) Discuss Hbase Data Model. **[5]**

c) Compare JSON and XML with example. **[4]**

Q9) a) Draw and explain various components of data warehouse and its Characteristics. **[8]**

b) Explain Knowledge discovery process in detail. **[8]**

OR

Q10) a) Write short note on **[8]**

Hadoop MadReduce.

Data warehouse Schemas

b) Why there is need for Mobile database? Draw and explain the architecture of mobile database. **[8]**

ເຊຂຍເຊຂຍ

[4958]-1102

T.E. (Information Technology)
SOFTWARE ENGINEERING
(2012 Course) (Semester - I)

Time : 2½ Hours]   *[Max. Marks : 70*
Instructions:
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) *Draw neat diagrams whenever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume suitable data if necessary.*

Q1) a) Explain software Engineering process framework activities. **[5]**

    b) What is Agile manifesto? Explain difference between traditional software development and agile development. **[5]**

<div align="center">OR</div>

Q2) a) Explain spiral Model. Give an example of application using spiral model. **[5]**

    b) Write short note on test driven development. **[5]**

Q3) a) Differentiate between exploratory testing and scripted testing. **[5]**

    b) Explain tasks included in Requirement Engineering action. **[5]**

<div align="center">OR</div>

Q4) a) What is generic process model? Explain its activities. **[5]**

    b) For "Banking system", make your assumption about the scope of the system, identify use case and depict them in diagram. **[5]**

Q5) a) Define software design and give quality guidelines and quality attributes.**[8]**

b) What are elements of Design model? What are the elements of architectural design? Explain in short design principles. **[8]**

OR

Q6) a) What is software architecture? Explain any 2 architectural styles of the system. **[8]**

b) Write short note on Architecture Patterns. **[8]**

Q7) a) Explain Seeheim model of human-computer dialog management. **[8]**

b) What are the steps for interface design? Explain with example of online student Registration. **[8]**

OR

Q8) a) Write short note on Shneiderman's 8 golden rules. **[8]**

b) What are the methods of collecting user requirements in user-centered design? **[8]**

Q9) a) What is software SCM repository? Explain the features of tool set supporting SCM repository. **[8]**

b) What is cleanroom software development? Explain cleanroom process model in detail. **[10]**

OR

*Q10)*a) Write short note on **[8]**

i) Technology evolution.

ii) Collaborative development.

b) Explain SCM process in detail. **[10]**

✗ ✗ ✗

[4958]-1103

T.E. (Information Technology)
COMPUTER NETWORK TECHNOLOGY
(2012 Pattern) (Semester - I) (End Sem) (314441)

Time : 2½ Hours]   *[Max. Marks : 70*
Instructions:
   1) Neat diagram must be drawn whenever necessary.
   2) Figures to the right side indicate full marks.
   3) Assume suitable data if necessary.

Q1) a)   State reasons for having layered architecture and its disadvantages. **[6]**

     b)   Compare connection oriented and connection less services.   **[4]**

<div align="center">OR</div>

Q2) a)   Explain choke packets and hop by hop choke packets.   **[6]**

     b)   Compare link state routing and distance vector routing.   **[4]**

Q3) a)   Draw and explain IPV4 leader format.   **[6]**

     b)   State classes in IP addressing with range of addresses and no of devices that can be connected.   **[4]**

<div align="center">OR</div>

Q4) a)   State and explain. Name Address resolution techniques in DNS.   **[6]**

     b)   Explain persistent and non persistent HTTP.   **[4]**

Q5) a)   Explain Bluetooth architecture.   **[8]**

     b)   Explain Frame format of IEEE 802.16   **[8]**

<div align="center">OR</div>

Q6) a) Explain MAC layer mechanism of IEEE 802.11. **[8]**

b) Describe with neat diagram WLAN architecture. **[8]**

Q7) a) Explain difference between pure and slotted ALOHA. **[8]**

b) Discuss naming and addressing in wireless sensor network. **[8]**

OR

Q8) a) What are various design issues and challenges of WSN. **[8]**

b) Explain following terms

i) Data aggregation

ii) Data diffusion

iii) Data dissemination **[8]**

Q9) a) Explain content based and geographic routing. **[10]**

b) Explain STEM for energy conservation in MAC layer. **[8]**

OR

*Q10)*a) Write short note on (any two) **[10]**

i) LEACH

ii) LOT

iii) DSR

b) Explain SPIN routing protocol in WSN. **[8]**

✗   ✗   ✗

[4958]-1104

T.E.(IT)

WEB ENGINEERING AND TECHNOLOGY

(2012 Course)(Semester-I) (314445)

Time :2½Hours]   *[Max. Marks : 70*

Instructions to the candidates:
1) *Answer Q1 or Q2,Q3or Q4, Q5 or Q6 , Q 7 or Q8, Q 9 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) What is DNS? Explain with suitable diagram. **[4]**

     b) Explain with suitable diagram the categories of web application **[6]**

OR

Q2) a) Explain the working of search engines. **[5]**

     b) Describe the phases of website development in brief. **[5]**

Q3) a) Define navigation systems. Explain different types of navigation systems. **[5]**

     b) State the characteristics of good websites. **[5]**

OR

Q4) a) Write HTML tag for hyper link, character formatting and ordered list**[6]**

     b) Differentiate between HTML and DHTML. **[4]**

Q5) a) Explain session management technique in PHP. **[8]**

     b) Explain control and looping statement in PHP. **[8]**

OR

P.T.O.

Q6) a) Explain how object is created and modified in java script. **[8]**

b) Describe following functions of PHP **[8]**

   i)   Chr( )

   ii) Strlen ( )

   iii) Strpos ( )

   iv) Strcmp ( )

Q7) a) What is the difference between doget( ) and dopost ( ) in servelet? **[8]**

b) Explain the life-cycle methods of java servelet. With suitable diagram **[8]**

OR

Q8) a) Differentiate between HTML and XML. **[8]**

b) Write a short note on web personalization and Ontology. **[8]**

Q9) a) What are the different steps for web-site deployment. **[9]**

b) Compare and constrast CMS development tools Drupal and Joomla. **[9]**

OR

Q10) a) What is Loop in wordpress and how it works? **[9]**

b) Write a short note on AJAX with example. **[9]**

◆▶ ◆▶ ◆▶

[4958]-1105

T.E. (I T)
THEORY OF COMPUTATION
(2012 Pattern) (End Semester) (Semester - I)

Time : 2½ Hours]   *[Max. Marks : 70*
Instructions:
1) *Neat diagrams must be drawn wherever necessary.*
2) *Figures to the right indicate full marks.*
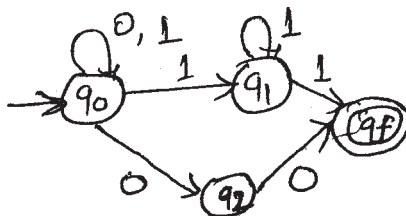3) *Assume suitable data, if necessary.*

Q1) a)   Define the following terms   **[4]**

   i)   Strings

   ii)   Language

   iii)   Alphabets

   iv)   Kleen closure

b)   Obtain a DFA equivalent to the NFA.   **[6]**

OR

Q2) a)   Explain the Basic Finite Automata? What are the various application & limitation of it?   **[4]**

b)   Describe in the simple english the language defined by the following RE

   i) $(a+b)^* a (a+b)^*$

   ii) $(01^*0)^* 1$

   iii) $a(a+b)^* bb$ **[6]**

Q3) a) Obtain regular expression to the following regular grammar **[4]**

$S \rightarrow aA/bB$

$A \rightarrow bA/a$

$B \rightarrow aB/b$

b) Simplify given grammar **[6]**

$S \rightarrow AaA$

$A \rightarrow Sb/bcc/ \in$

$C \rightarrow cc/abb$

OR

Q4) a) Define ambiguous Grammar. Show given Grammar is ambiguous or not.
$S \rightarrow aSbS/bSaS/ \in$ **[4]**

b) Construct a FA for given regular expression $(10)^* 101(01)^*$ **[4]**

c) Define derivation tree with suitable example. **[2]**

Q5) a) Give formal Definition of Push Down automata & applications of PDA.**[4]**

b) Construct a PDA accepting $L = \left\{ w \subset w^R \mid w \text{ is in } (a/b)^* \text{ and } w^R \text{ is reverse of } w \right\}$

[8]

c) Prove that the Language $L = \left\{ ww \mid w \text{ is in } (0+1)^* \right\}$ is not a CFL. **[6]**

OR

Q6) a) Give the CFG generating the Language accepted by the following PDA.**[8]**

M = ($\{q_0,q_1\}$, $\{0,1\}$, $\{z_0,x\}$, δ, q_0,z_0,ϕ) where δ is given below

$\delta (q_0,1,z_0) = \{(q_0,xz_0)\}$

$\delta (q_0,1,x) = \{(q_0, xx)\}$

$\delta (q_0,0,x) = \{(q_1, x)\}$

$\delta (q_0,\in ,z_0) = \{(q_0, \in)\}$

$\delta (q_1,1,x) = \{(q_1, \in)\}$

$\delta (q_1,0,z_0) = \{(q_0, z_0)\}$

b) Write short note on post machine with example. **[6]**

c) Construct a PDA equivalent to following grammar **[4]**

$S \rightarrow aAA$

$A \rightarrow aS / bS / a$

Q7) a) Construct a Turing machine to perform mod2 operation on given binary number retain original number as well as store result after number separated by blank. **[8]**

b) Differentiate between FA, PDA, and TM. **[4]**

c) Write short note on multitape turing machine. **[4]**

OR

Q8) a) Construct a Turing machine to perform the two's complement of given binary number. **[8]**

b) Write short note on universal Turing machine. **[8]**

Q9) a) Write short note on post correspondence problem (PCP). **[4]**

b) Explain with example decidable & non decidable language. **[6]**

c) Explain with example Turing Reduceability. **[6]**

OR

*Q10)*a) Show that following decision problems are recursive. **[10]**

i) NFA accepts a word or not

ii) CEG G generates the string w or not.

b) Write short note on recursive language & recursively enumerable language with suitable example. **[6]**

✗ ✗ ✗

[4958]-1106
T.E. (IT)
SYSTEMS PROGRAMMING
(2012 Course) (Semester - II) (314450)

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)   For the following piece of assembly language code, show the contents of symbol table, literal table and pool table. Assume machines opcodes and size of instruction equal to one.   **[6]**

>   START 100
>   A   DC 10
>   MOVER AREG, B
>   MOVEM BREG, = '1'
>   ADD AREG, = '2'
>   SUB BREG, = '1'
>   B   LTORG
>   PRINT C
>   MOVER CREG, LOOP
>   C   EQU B+10
>   ORIGIN 10
>   MOVEM AREG, = '1'
>   END.

b)   Explain absolute loader scheme. What are the advantages and disadvantages of this scheme?   **[4]**

<div align="center">OR</div>

Q2) a) For the following assembly language program show MNT, MDT, ALA and the expanded assembly language program. **[8]**

    MACRO

    XYZ &A

    ST 1, &A

    MEND

    MACRO

    MIT &Z

    MACRO

    &Z &W

    AR 4, &W

    XYZ ALL

    MEND

    ST &Z, ALL

    MEND

   PROG START

    USING *, 15

    MIT HELLO

    ST 2,3

    HELLO YALE

    YALE EQU 5

   ALL DC F '3'

    END.

 b) List down the phases of a compiler. **[2]**

Q3) a) Give ESD, TXT and RLD cards for both PG1 and PG2 for the following assembly language program. **[6]**

Rel. Addr.		Source program
0	PG1	START
		ENTRY PG1ENT1, PG1ENT2
		EXTRN PG2ENT1, PG2
20	ENT1	------
30	PG1ENT2	------
40		DC A(PG1ENT2)
44		DC A(PG1ENT1 +15)
48		DC A(PG1ENT2 - PG1ENT1 –3)
52		DC A(PG2)
56		DC A(PG2ENT1 + PG2 - PG1ENT1 +4)
		END
0	PG2	START
		ENTRY PG2ENT1
		EXTRN PG1ENT1, PG1ENT2
16	PG2ENT1	------

24		DC A(PG1ENT2)
28		DC A(PG1ENT1)
32		DC A(PG1ENT2 – PG1ENT1 –3)
		END

b) Explain different parameter passing methods used in macroprocessors. **[4]**

<center>OR</center>

Q4) a) Convert the given Regular expression to its equivalent DFA. **[6]**

(a.b)* + (a+c)*

b) Give the various data structures used in the lexical analysis phase of compilers. **[4]**

Q5) a) With a neat diagram explain the classification of parsers. **[6]**

b) Define table -driven predictive parser. For the following grammar **[8]**

S → aSbs / bSaS / ε

Construct table-driven predictive parser and parse the string "ab".

c) Compare bottom up and top down parser. **[4]**

OR

Q6) a) Consider the following grammar **[10]**

S → CC

C → cC / d

Construct LALR parser and parse for the string "ccd".

b) Explain YACC file structure. **[4]**

c) Compare LALR and CLR parsers. **[4]**

Q7) a) Construct parse tree, syntax tree and annotated parse tree for 3*5+4. **[6]**

b) Explain type checking and its types. **[6]**

c) Generate three address code for **[4]**

while (a<b) do

{

x=y+z;

}

OR

Q8) a) For the following statement, Generate intermediate code in the format:**[8]**

   i) Postfix notation

   ii) Quadruple

   iii) Parse tree

   iv) Triple

   Temp = limit*(max-min)+3*limit*(max+min).

 b) Translate the following C fragment into the three address code   **[8]**

   begin

     int add,i,j;

     int a[10][10],b[10][10];

     add=0;

     i=1;

     j=1;

     do

      begin

        add=add+a[i,j]*b[i,j];

         i++;

         j++;

       end;

      while(i<=20 && j<=20);

   end;

Q9) 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]**

OR

*Q10)*a) Explain following machine independent optimization techniques: **[8]**

  i) Loop invariation.

  ii) Common sub-expression elimination.

  iii) Dead code elimination.

  iv) Strength reduction.

b) Compare machine dependent and independent optimization. **[4]**

c) Explain different storage allocation strategies. **[4]**

ℰ ℰ ℰ

T.E.(Information Technology)
OPERATING SYSTEMS
(2012 Course) (Semester-II) (314451)(End - Sem)

Time :2½Hours] *[Max. Marks : 70*
Instructions to the candidates:
  1) *Attempt Q1 or Q2, Q3or Q4, Q5 or Q6, Q 7 or Q8, Q 9 or Q10.*
  2) *Figures to the right hand indicates full marks.*
  3) *Neat diagrams must be drawn wherever necessary.*
  4) *Assume suitable data if necessary.*

Q1) a) Explain the difference between a monolithic kernel and a microkernel with advantages & disadvantages. **[5]**

b) Describe in detail the functions of OS as a resource manager. **[5]**

OR

Q2) a) Explain deadlock prevention techniques with example. **[5]**

b) What is Operating system? Explain any two types of OS in detail. **[5]**

Q3) a) Explain thread life cycle **[5]**

b) Explain FCFS scheduling with example **[5]**

OR

Q4) a) Draw and explain process state transition diagram. **[5]**

b) What are the requirements for mutual exclusion? **[5]**

Q5) a) What are requirements for memory management? **[8]**

b) Consider the following page reference string:

1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6 **[8]**

Calculate the no. of page faults for following page replacement algo.

i) FIFO ii) Optimal

iii) LRU

OR

P.T.O.

Q6) a) Explain buddy system with example. **[8]**

b) Consider the following segment table: **[8]**

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses?

i) 0,430 ii) 1,10 iii) 2,80 iv) 3,400 v) 4,90

Q7) a) List and briefly explain three techniques for performing I/O. **[8]**

b) List and briefly define file organizatio techniques. **[8]**

OR

Q8) a) List and briefly define three blocking methods. **[8]**

b) Assume a disk with 200 tracks and the disk request queue has random requests in it as follows: 55, 58, 39, 18, 90, 160, 150, 38, 184.

Find the no. of tracks traversed and average seek length if

i) SSTF ii) SCAN

iii) C-SCAN

algorithms are used and initially head is at track no 100. **[8]**

Q9) a) What is kernel module? Explain the process for inserting a module in the kernel. **[8]**

b) With neatly labeled diagram explain embedded linux system architecture **[10]**

OR

Q10) Write a short note on any three **[18]**

a) NACH OS.

b) SOOS

c) Ubuntu EDGE

d) Embedded OS

◀▶   ◀▶   ◀▶

[4958]-1108

T.E. (Information Technology)
MULTIMEDIA TECHNOLOGIES
(2012 Course) (Semester -II) (End-Semester) (314452)

Time : 2½ 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 Distributed Multimedia System explain with suitable example.**[5]**

     b) What is Authoring Tools. Explain the Authoring tools used in a Education field. **[5]**

OR

Q2) a) What is a need of image enhancement? Explain any one image enhancement technique. **[5]**

     b) What are different Image File Format explain each. **[5]**

Q3) a) What are various audio compression techniques? Explain any one in brief. **[5]**

     b) Write a short note on characteristic of sound wave Amplitute, frequency, Waveform, Speed. **[5]**

OR

Q4) a) What are the Multimedia Supported audio formats in Android. **[5]**

     b) Explain text compression technique Huffman Encoding with suitable example. **[5]**

P.T.O.

Q5) a) What is component, composite and S-video signal formats with there application. **[8]**

b) Explain each video transmission standard briefly. **[8]**

OR

Q6) a) What is a need of video file formats? Explain AVI and H.261 briefly.**[8]**

b) What is digitization of video? Explain process of digitization of video.**[8]**

Q7) a) What is OpenGL? Explain OpenGL shadowing and rendering technique. **[8]**

b) What is Animation? Explain different technique used to create Animation. **[8]**

OR

Q8) a) Enlist the 12 principles of Animation. Explain any three in detail. **[8]**

b) What is Steaming Technology? Explain RTSP and RTP Protocols used for streaming. **[8]**

Q9) a) What is Virtual Reality? Describe the devices used in Virtual Reality. **[6]**

b) Explain GStreamer based Multimedia Framework. **[6]**

c) Explain CCD and its use in the multimedia application. **[6]**

OR

*Q10)*a) Explain the need for synchronization in multimedia applications. State and explain types of synchronizations. **[6]**

b) Explain the terms Multimedia over IP and Media on demand briefly. **[6]**

c) Describe Android Multimedia Framework Architecture. **[6]**

ℰ ℰ ℰ

T.E. (Information Technology)
INFORMATION TECHNOLOGY PROJECT MANAGEMENT
(2012 Pattern) (Semester - II) (314453)

Time : 2½ Hours]   *[Max. Marks : 70*
Instructions to the candiates:
    1)   *Answers Question 1 or 2, 3 or 4, 5 or 6, 7 or 8 and 9 or 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)   Explain Macgregor's theory of X and Y for motivation.   **[4]**

      b)   What are various career fields possible for Engineering graduates?   **[6]**

<div align="center">OR</div>

Q2) a)   Explain scientific management.   **[4]**

      b)   Explain Maslow's need hierarchy theory of motivation.   **[6]**

Q3) a)   Explain any 4 dimensions of leading Technical professionals.   **[4]**

      b)   List any six contents of project proposal.   **[6]**

<div align="center">OR</div>

Q4) a)   What is the difference between programmed and non programmed decision?   **[4]**

      b)   Write short note on: **[6]**

         i)   ISO 9000

         ii)   Six sigma

Q5) a) Explain four major sections of project management plan. **[8]**

b) What are a Project Audit, & Why Is It Done? **[8]**

OR

Q6) a) Explain configuration management process in detail. **[8]**

b) What is role of Manager in Project metrics? **[8]**

Q7) a) State and explain success and failure factors of ERP implementation.**[8]**

b) Explain any two implementation strategies for ERP in an organisation.**[8]**

OR

Q8) a) Explain ERP implementation Life Cycle. **[8]**

b) Explain risks in ERP. **[8]**

Q9) a) Write short note on: **[10]**

i) Trends in SCM

ii) Reverse engineering

b) Explain professional Responsibility of Project Manager. **[8]**

OR

*Q10)*a) Write short note on: **[10]**

i) Reengineering

ii) Project management tools

b) Explain Software Configuration Management as a process. **[8]**

✗ ✗ ✗

[4958]-1110

T.E. (Information technoloy)
DESIGN AND ANALYSIS OF ALGORITHMS
(2012 Course) (314449) (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, 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)   Prove by mathematical induction that "sum of the cubes of first n positive integers is equal to the square of sum of these integers".   **[5]**

    b)   Explain the potential method of amortized analysis with example.   **[5]**

OR

Q2) a)   Solve the following recurrence relation using substitution method.   **[5]**

$$T(n) = 2T\left(\sqrt{n}\right) + C \quad, \quad n > 2$$
$$\quad\quad = 1 \quad\quad\quad\quad, \quad n <= 2$$

    b)   Consider following letters with their probability

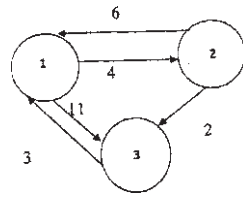| Character	a	b	c	d	e
Probability	1/2	1/4	1/8	1/16	1/32

    Find out the Huffman coding for a, b, c, d, e.   **[5]**

Q3) a)   Perform multiplication of given large integers 957 × 9873 in time less than $O(n^2)$.   **[8]**

    Analyze the time complexity of this multiplication.

    b)   State "Principle of Optimality".   **[2]**
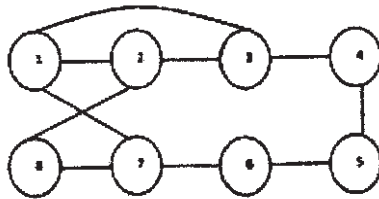
OR

Q4) a) Solve the all pairs shortest path problem for the given graph. **[6]**

b) Write down recurrence relation for merge sort and find out its time complexity by substitution method. **[4]**
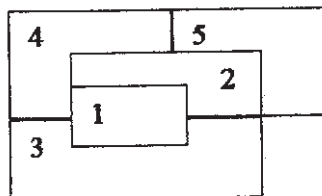
Q5) a) Write a recursive algorithm which shows a recursive formulation of the backtracking technique and explain it. **[8]**

b) Find out Hamiltonian cycle for following graph **[8]**

OR

Q6) a) Construct planar graph for following map. Explain how to find m-colorings of this planer graph by using m-colorings backtracking algorithm. **[8]**

b) Write a recursive backtracking algorithm for sum of subset problem.**[8]**

Q7) a) What is LC Search? Explain in detail Control abstraction for LC Search.**[8]**

b) Solve the following instance of 0/1 knapsack problem by FIFO branch and bound approach : n = 4; M = 15 and (p1, p2 , p3, p4) = (10, 10, 12, 18); (w1, w2, w3, w4) = (2, 4, 6, 9). **[10]**

OR

Q8) Write short note on **[18]**

a) Various searching techniques in branch and bound.

b) Bounding function in branch and bound.

c) Backtracking Vs branch and bound.

Q9) a) Specify one example of NP-complete problem. Also justify that why it is NP-complete. **[8]**

b) Explain the need and significance of parallel algorithms. Define the speedup of parallel algorithm. **[8]**

OR

*Q10)*a) Write and explain non-deterministic algorithm for searching an item in an array. What is its complexity? **[8]**

b) Differentiate between different models of parallel computations. **[8]**

✦ ✦ ✦