

Total No. of Questions : 7]

SEAT No. :

**P5184**

**[5562]-1**

[Total No. of Pages : 2

**M.E.(Civil - Water Resources & Env. Engg.)**

**ENVIRONMENTAL HYDRAULICS & ENVIRONMENTAL  
STRUCTURES**

**(2013 Pattern) (Semester - II) (501086)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of electronic pocket calculator is allowed.*

**Q1) a)** A centrifugal pump is required to produce a flow of water at a rate of  $0.0160 \text{ m}^3/\text{s}$  against a total head of  $30.5\text{m}$ . The operating characteristics of pump at a speed of  $1430 \text{ rev./min.}$  & a rotor diameter of  $125\text{mm}$  is as follows **[6]**

Efficiency (%)	0	48	66	66	45
$Q_A (\text{m}^3/\text{s})$	0	0.0148	0.0295	0.0441	0.059
$H_A (\text{m})$	68.6	72	68.6	53.4	22.8

Determine the correct pump size & its speed to produce the required head & flow.

b) Explain the applications of various types of valves. **[4]**

**Q2)** A centrifugal pump has the following data : **[10]**

- Rotor inlet diameter  $D_1 = 40 \text{ mm}$   
Rotor outlet diameter  $D_2 = 100 \text{ mm}$   
Inlet vane height  $h_1 = 60 \text{ mm}$   
Outlet vane height  $h_2 = 20 \text{ mm}$   
Speed  $N = 1420 \text{ rev./min.}$   
Flow rate  $Q = 0.0022 \text{ m}^3/\text{s}$   
Blade thickness coefficient  $k = 0.95$

The flow enters radially without shock. The blades are swept forward at  $30^\circ$  at exit. The developed head is  $5\text{m}$  & the power input to the shaft is  $170 \text{ watts}$ .

Determine the following

- a) The inlet vane angle
- b) The diagram power
- c) The manometric head
- d) The manometric efficiency
- e) The overall efficiency

**P.T.O.**

- Q3)** a) Draw the symbols used in respective hydraulic & pneumatic circuits. (Atleast 4) [4]  
b) Differentiate LVDT & RVDT (Atleast 6 points) [6]
- Q4)** a) A heat exchanger transfers heat from hot CO<sub>2</sub> to superheated steam. The steam flows inside tubes & the gas flows over the outside in a parallel direction. The steam is at 200 bar pressure & is heated from 375 °C to 500 °C respectively. The CO<sub>2</sub> is cooled from 750 °C to 600 °C & flows at 0.35 kg/s. The tubes are thin walled & 40 mm diameter. The total length is 250m. Determine the following : [6]  
i) The flow rate of the steam  
ii) The logarithmic mean temperature  
iii) The effective heat transfer coefficient for the unit.  
b) Enlist various types of level measurements. [4]
- Q5)** a) Write a short note on forced vibrations on environmental structures. [4]  
b) Explain crystallization process. [6]
- Q6)** a) Write a short note on Gasketed joints in cylindrical vessels. [5]  
b) Classify pressure vessel as per IS 2825. [5]
- Q7)** a) Differentiate Thick & Thin cylinder. [4]  
b) Derive equation for pure bending of plate. [6]



Total No. of Questions :6]

SEAT No. :

**P5193**

**[5562]-10**

[Total No. of Pages :2

**M.E.(Computer Engineering)**  
**ADVANCED COMPUTER NETWORKS**  
**(2013 Course) (Semester - II) (510109)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

**Q1) a)** State the problem of reliable data delivery and explain key concepts involved in the design of reliable data delivery. **[9]**

OR

b) Enlist different network functions and explain the issue of “where to implement the capability” with suitable examples. **[9]**

**Q2) a)** In a clinic, the average rate of arrival of patients is 12 patients per hour . on an average, a doctor can serve patients at the rate of one patient every four, minutes. Assume, the arrival of patients follows a Poisson distribution and service to patients follows an exponential distribution. What is the average number of patients in the waiting line and in the clinic? Find the average waiting time in the waiting line or in the queue and also the average waiting time in the clinic. **[8]**

OR

b) What is memory less property of exponential distribution; explain with suitable example based on networks. **[8]**

**Q3) a)** Explain what is minimum spanning tree and CMST? Explain with suitable example its application in network. **[8]**

OR

b) What is centralized network design? Explain different issues associated with centralized network design. **[8]**

*P.T.O.*

**Q4) a)** Explain what is resource reservation with respect to quality of service in network design? [8]

OR

b) Enlist and explain different requirements of smart devices used for Ubiquitous computing. [8]

**Q5) a)** Explain fragmentation of IP packet. What if the size of IP datagram exceeds the MTU? What if the route contains networks with different MTU. [8]

OR

b) Compare IPv4 and IPV6, and explain how Ipv6 achieves more Efficient Routing and more Efficient Packet processing? [8]

**Q6) a)** Enlist and explain components of cyber physical system and various applications of cyber physical system. [9]

OR

b) What is content distribution network? Explain different issues to be considered while designing content distribution networks? [9]



Total No. of Questions : 6]

SEAT No. :

**P5194**

**[5562]-11**

[Total No. of Pages : 2

**M.E. (Computer Engineering)**

**ADVANCED STORAGE SYSTEMS AND INFRASTRUCTURE  
MANAGEMENT**

**(2013 Pattern) (Semester-III) (610101)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) Attempt any Five questions.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

**Q1) a)** Explain the factors contributing to the growth of data. What is the value of data to the business. **[5]**

b) Elaborately explain the components of storage system environment. **[5]**

**Q2) a)** What are the components of FC-SAN? Explain each in detail. **[5]**

b) What do you mean by Content-Addressed Storage? Explain key features of Content-Addressed Storage. (Explain at least 08 key features). **[5]**

**Q3) a)** What is the purpose of backup? With the help of neat diagram explain backup architecture. **[5]**

b) Explain (with diagrams) four backup topologies. **[5]**

**P.T.O.**

- Q4)** a) Explain evolution of systems from mainframes-to-midrange-to-PCS-to-Client server computing-to-New age systems. Elaborate how this evolution has affected their management. [5]
- b) What is system management? Explain at least four areas of business where system management has found its importance/value. [5]
- Q5)** a) Explain various benefits and risks of IT service management frameworks. (Expected: Benefits to customers, Benefits of IT organization, Potential problems/mistakes). [5]
- b) What is customer requirement? Explain the methods to determine customer requirements. [5]
- Q6)** a) What is Financial Management? Explain service valuation in the content of financial management using a neat block diagram. [5]
- b) With the help a neat diagram, explain capacity management process. [5]



Total No. of Questions : 8]

SEAT No. :

**P5195**

[Total No. of Pages : 2

**[5562]-12**

**M.E. (Computer Engineering)**

**ADVANCED UNIX PROGRAMMING**

**(2013 Pattern) (Credit) (Semester - III) (610102) (Elective - III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) Answer any five questions out of eight questions given.*
- 2) Draw neatly labeled diagram wherever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) Irrelevant answers will not attract any marks.*
- 5) Assume suitable data, if required.*

**Q1) a)** Compare and contrast IA-32 and IA-46 architecture. **[7]**

b) Write and explain, UNIX shell script to that will count the number of lines in the file, provided as argument. **[3]**

**Q2) a)** With the help of neatly drawn diagram, demonstrate role of a page table in effective addressing in UNIX. **[7]**

b) What problems one may encounter if he or she used wait ( ) instead of waitpid() in a program when one parent spawns multiple children, which may return at different times. **[3]**

**Q3) a)** With neatly labeled diagram explain how TLB support faster data access in UNIX. **[7]**

b) Buffer size limits on IP datagram put restrictions on data an application can transmit. Discuss. **[3]**

**Q4) a)** It possible to handle more than one input and output operations simultaneously in UNIX? Justify your answer in any case. **[7]**

b) What is record locking? State importance of the same with example. **[3]**

**P.T.O.**

- Q5)** a) What happens when two people access the same file simultaneously in UNIX? [7]  
b) State difference between FIFO and Named FIFO with example. [3]
- Q6)** a) Explain working of pre forking model. [7]  
b) Is it possible to use socket address, like IP, port with multiple client? Justify your answer in either case. [3]
- Q7)** a) Explain all the steps involved in implementation of concurrent server using VDP socket Give clear difference TCP and UDP socket communication. [7]  
b) Is it advisable to use socket based communication in case of communication between two processes of the same parents in same working memory. Justify your answer in any case. [3]
- Q8)** Write a short note on (Any two) : [5+5]
- a) Blocking I/O V/s Non blocking I/O.
  - b) IPV4 V/s IPV6 sockets.
  - c) Pre-threading V/s Pre-forking
  - d) State and explain difference between
    - i) Normal Process
    - ii) Daemon process
    - iii) Zombie process
    - iv) Orphan process





Total No. of Questions : 12]

SEAT No. :

**P5196**

[Total No. of Pages : 2

**[5562]-13**

**M.E. (Computer Engineering) (Computer Networks)**

**ADVANCED NETWORK ALGORITHMS**

**(2013 Course) (Semester-I) (Credit Pattern) (510201)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, and Q9 or Q10, Q11 or Q12.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

**Q1)** a) Network bottleneck are fundamental reasons for network performance degradation Justify. **[4]**

b) Explain different end-node bottlenecks. **[4]**

OR

**Q2)** a) To understand network algorithmics, explain the example of “scouting an evil packet” for an intrusion detection system. **[4]**

b) Explain how endnode architecture affects network performance? Explain. **[4]**

**Q3)** a) Explain the scenario of buffer validation of Application Device Channels? **[6]**

b) Why one should use principles stated in algorithmics theory? Give reasons. **[3]**

OR

**Q4)** a) Explain the difference between Design and Implementation principles?[4]

b) Explain the problem of policing traffic patterns. **[5]**

**Q5)** a) Why do systems need timers? **4]**

b) Write a short note on “Obtaining fine granularity timers”. **[4]**

OR

*P.T.O.*

- Q6)** a) How timers are used by systems for failure recovery? Give examples. [4]  
b) Explain in details four component routines of a timer module. [4]

- Q7)** a) What is an exact match lookup? How it is implemented? [8]

OR

- Q8)** a) Write a short note on packet repeater. [4]  
b) Write a short note on filtering repeater. [4]

- Q9)** a) Summarize the principles used in the packet classification algorithms. [4]  
b) Explain with a neat diagram the problem of packet classification. [4]

OR

- Q10)** a) Explain how backtracking algorithm in packet classification reduces memory? [4]  
b) With respect to packet classification explain decision tree approach. [4]

- Q11)** a) The router is a distributed system: Justify. [5]  
b) Explain in brief the popular algorithmic approaches for traffic measurement. [4]

OR

- Q12)** a) Why network traffic measurement is difficult task? [5]  
b) Explain in brief, approaches to traffic matrices computation. [4]



Total No. of Questions : 8]

SEAT No. :

**P5197**

**[5562]-14**

[Total No. of Pages : 2

**M.E.(Computer) (Computer Networks)  
WIRELESS COMMUNICATION  
(2013 Course) (Semester - I) (510202)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

**Q1)** a) Explain Advanced Antenna Systems for Performance Enhancements in Wi-Max network. [6]

b) Explain OFDM systems Pros and Cons. [6]

OR

**Q2)** a) Differentiate between narrowband and broadband fading. [6]

b) What is Multipath Propagation? Explain Free Space path loss model and Two Ray path loss model. [6]

**Q3)** a) What are the different components of Mobile IP with Figure, Briefly Explain Triangular routing. [6]

b) Describe MPLS network and components with suitable diagram. [6]

OR

**Q4)** a) Explain Various steps involved in a typical PHS operation in Wi-MAX. [6]

b) Explain Closed-loop MIMO framework in IEEE 802.16e-2005 with figure. [6]

**Q5)** a) Explain QoS functional architecture as proposed by the Wi-MAX NWG. [7]

b) What are the important design principles that guided the development of the Wi-MAX network systems architecture. [6]

OR

*P.T.O.*

- Q6)** a) Explain Wi-MAX paging reference model. [7]  
b) Explain CSN-Anchored Mobility for IPv4. [6]

- Q7)** a) Describe the benefits of Multiple Antenna Techniques in Wi-Max? [6]  
b) Explain in detail Methodology for Link Level simulation. [7]

OR

- Q8)** Write short notes on (Any Two) [13]  
a) Convergent Devices  
b) Internetworking between WLANS and 3G  
c) AWGN Channel Performances of Wi-MAX.



Total No. of Questions : 8]

SEAT No. :

**P5198**

**[5562]-15**

[Total No. of Pages : 2

**M.E. (Computer Network)**

**ADVANCED DATABASES**

**(2013 Pattern) (Semester-I) (510203)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*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 indicate full marks.*

**Q1)** a) What do you mean by performance benchmark. What are different TCP benchmark standards. [6]

b) Explain in brief about distributed transaction management. [6]

OR

**Q2)** a) Discuss the need of Indexing and explain how to select it. [6]

b) Define Optimization and explain optimization of access queries: [6]

- i) A framework for query optimization
- ii) JOIN Queries
- iii) General Queries

**Q3)** a) Explain with neat diagram, the following TP monitors, architectures. [6]

- i) Process - per client model
- ii) Single - process model
- iii) Many - server, single - router model
- iv) Many - server, many router model

b) What is semi-structured data and discuss the defacto standard i.e. XML for semi structured data. [6]

OR

*P.T.O.*

- Q4) a)** What are transactional workflows. Give it examples and explain the Loan processing workflow. [6]
- b) Discuss the following (Any two): [6]
- i) SOAP
  - ii) Xpointer
  - iii) WSDL

- Q5) a)** Discuss Multimedia Databases. Why multimedia is a problem for database. [7]
- b) Why mobile databases are required. Explain the client server model of mobile database with neat diagram. [6]

OR

- Q6) a)** What is Spatial Database. Discuss the types of data stored in Spatial Database. [7]
- b) Explain the real-time databases. [6]

- Q7) a)** Discuss on what concept the Hadoop framework works in managing Large Scale data. [7]
- b) Discuss the following: [6]
- i) E-commerce.
  - ii) Legacy system

OR

- Q8) a)** Explain the Distributed computing with MAPREDWCE and PIG. [7]
- b) What is the difference between Hadoop and traditional RDBMS. [6]



Total No. of Questions : 6]

SEAT No. :

**P5199**

[Total No. of Pages : 2

**[5562]-16**

**M.E. (Computer Engineering) (Computer Networks)**

**RESEARCH METHODOLOGY (Paper-I)**

**(Semester-I) (510204) (2013 Pattern)**

*Time : 3Hour]*

*[Max. Marks : 50*

*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, slide rule, charts, electronic pocket, calculator and steam table is allowed.*
- 5) *Assume suitable data if necessary*

**Q1) a)** Describe the different steps involved in research process. **[9]**

OR

b) Distinguish between Research methods and Research methodology. **[9]**

**Q2) a)** What is research problem? Define the main issues which should receive the attention of the researcher in formulating the research problem. Give suitable examples to elucidate your points. **[8]**

OR

b) Explain Different types of research hypothesis with Suitable example. **[8]**

**Q3) a)** Describe some of the important research designs used in experimental hypothesis-testing research study. **[8]**

OR

b) How would you differentiate between simple random sampling and complex random sampling designs? **[8]**

*P.T.O.*

- Q4) a)** Calculate coefficient of correlation, coefficient of determination, and portable error from the following data. [8]

X	43	44	46	40	44	42	45	42	38	40	42	57
Y	29	31	19	18	19	27	27	29	41	30	26	10

OR

- b) Enumerate the different methods of collecting data. Which one is the most suitable for conducting enquiry regarding family welfare programme in India? Explain its merits and demerits. [8]

- Q5) a)** What is a measure of central tendency indicate? Describe the important measures of central tendency pointing out the situation when one measure is considered relatively appropriate in comparison to other measures. [8]

OR

- b) describe some of the important applications and uses of computers in present times. [8]

- Q6) a)** Write a short note on 'Documentation' in the context of a research report. [9]

OR

- b) Mention the different types of report, particularly pointing out the difference between a technical report and a popular report. [9]





Total No. of Questions : 8]

SEAT No. :

**P5200**

**[5562]-17**

[Total No. of Pages : 2

**M.E.(Computer Networks)**

**NETWORK DESIGN, MODELING AND ANALYSIS  
(2013 Pattern) (Semester - II) (510207)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any FIVE questions.*
- 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 Continuous random variable, discrete random variable and expectations of random variable. [5]
- b) What is probability mass function for a random variable? What is its significance in the network designs? [5]
- Q2)** a) Explain with modelling a Little's Theorem. What is a probabilistic form of little's theorem? [5]
- b) Explain Mathematical Model of Cumulative distribution function? [5]
- Q3)** a) Write a short note on: [5]
- i) M/G/1 queue with vacation.
  - ii) Modelling Network as a Graph.
- b) What are Greedy algorithms and Exchange algorithms? Explain. [5]
- Q4)** a) Explain Esau-Williams Algorithm with suitable example? [4]
- b) Explain Multiplexing of traffic in communication networks? [3]
- c) Explain M/M/m Queue model with State Transition Diagram? [3]
- Q5)** a) Explain network design principles? [4]
- b) Explain MENTOR algorithm for router design? [3]
- c) Explain Performance metrics for network design? [3]

- Q6)** a) Explain one speed one design in details? [5]  
b) What are the reliability constraints of network design? Explain. [5]
- Q7)** a) What is access network design? Discuss issues in simple access network design? [4]  
b) What are reliability constraints of network design? Explain. [3]  
c) Explain COM algorithm of concentrator location? [3]
- Q8)** Write a short note on following( Any Three) [10]  
a) Role and responsibilities of Network Administrator  
b) Packet Delay and data networks  
c) Reliability Constraints  
d) Exponential distribution and its properties.  
e) Router Architecture.



Total No. of Questions : 8]

SEAT No. :

**P5201**

**[5562]-18**

[Total No. of Pages : 2

**M.E. (Computer Networks)**

**DISTRIBUTED SYSTEMS**

**(2013 Pattern) (Semester-II) (510208) (Credit)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

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

**Q1) a)** Explain in detail challenges encountered during the design of distributed systems. **[4]**

b) List out various communication features in handling remote objects. **[5]**

**Q2) a)** Explain Global States cuts with example. **[4]**

b) Explain Lamport's concepts of logical clocks. **[4]**

**Q3) a)** Explain Quorum based mutual exclusion algorithm. **[4]**

b) Explain the concurrency control in distributed transactions. **[4]**

**Q4) a)** What is deadlock? What are different issues? Discuss any one distributed deadlock detection algorithm. **[4]**

b) What are the agreement problems? Explain Agreement Protocols. **[4]**

**P.T.O.**

- Q5)** a) Explain Resource sharing and web caching. [4]  
b) Discuss design issues of distributed file systems. [4]
- Q6)** a) Differentiate between backward and forward error recovery in distributed system. [4]  
b) Write short note on distributed multimedia systems. [4]
- Q7)** a) Explain Distributed file system requirement in details. [4]  
b) Explain Vote reassignment Protocol. [4]
- Q8)** a) What is the use of middleware in distributed system? Explain. [4]  
b) Explain Java messaging Service from JEE architecture. [5]



Total No. of Questions :10]

SEAT No. :

**P5202**

**[5562]-19**

[Total No. of Pages :2

**M.E. (Computer Networks )  
HIGH PERFORMANCE NETWORK  
(2013 Pattern) (510209) (Semester-II)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) Answer Q.1 or Q2, Q.3 or Q4, Q.5 or Q 6, Q.7 or Q8, Q.9 or Q.10.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

**Q1)** Attempt following:

- a) Enlist physical parameter fiber distributed data interface and explain (FDDI) in detail. [5]
- b) What is frame relay and x.25? [5]

OR

**Q2)** Attempt following:

- a) Explain token bus and token ring topology [5]
- b) Write short note on 802.11 [5]

**Q3)** Attempt following:

- a) Describe full duplex Ethernet in detail. [5]
- b) Explain the DIX Ethernet Frame Format. [5]

OR

**Q4)** Attempt following:

- a) With the help of diagram Explain the architecture of gigabit ethernet. [5]
- b) Explain evaluation of Ethernet, fast Ethernet, and Gigabit Ethernet [5]

**Q5)** Attempt following:

- a) Explain ATM PHYSICAL Layer Functions. [5]
- b) What are AAL ATM service MODEL. [5]

OR

*P.T.O.*

**Q6)** Attempt following:

- a) Explain the mechanism ATM traffic management. [5]
- b) Working IP Over MPLS? [5]

**Q7)** Attempt following:

- a) Explain MPLS in detail and Label operations. [5]
- b) Describe MPLS architecture AND LDP PROTOCOL. [5]

OR

**Q8)** Attempt following:

- a) Describe with the help of diagram architecture GPRS. [5]
- b) Explain the GSM architecture. [5]

**Q9)** Attempt following:

- a) What are the MOBILE WIMAX. [5]
- b) Explain 1G to 5G in details. [5]

OR

**Q10)** Attempt following:

- a) How HSUPA achieve performance explain different approach. [5]
- b) Write short note IP OVER MPLS. [5]



Total No. of Questions : 8]

SEAT No. :

**P5185**

[Total No. of Pages : 2

**[5562]-2**

**M.E. (CIVIL W.R.E.E.)**

**DAM ENGINEERING**

**(2013 Course) (Semester - III) (601093)**

*Time :3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) Answer any five questions.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right side indicate full marks.*
- 4) Use of Calculator is allowed.*
- 5) Assume suitable data, if necessary.*

**Q1) a)** Explain seismic prediction and reliability also explain modified Mercalli intensity scale. **[6]**

b) Explain rising tube grouting method with sketch. **[4]**

**Q2) a)** What are basic principles of dam design? State and explain causes of failure of earthen dams. **[7]**

b) Discuss remedies to avoid seepage in earthen dam. **[3]**

**Q3) a)** Explain elastic theory for design of arch dam. **[7]**

b) State various forces acting on arch dam with neat sketch. **[3]**

**Q4) a)** Explain various types of rock fill dams and draw the sketch of one of them. **[6]**

b) What is buttress dam? Explain the classification of buttress dam. **[4]**

**P.T.O.**

- Q5)** a) Explain straight drop spillway and ogee spillway. [6]  
b) Calculate the discharge over an ogee shaped weir whose coefficient of discharge is equal to 2.5 at a head of 4m. The length of the spillway is 40m. The weir crest is 6m above the bottom of the approach channel which has the same width as that of spillway. [4]
- Q6)** a) Explain determination of settlement of earth dam embankments. [6]  
b) Explain determination of settlement and lateral movements in dam [4]
- Q7)** a) State common objectives of ICID and ICOLD. [4]  
b) Explain functioning of global water partnership (GWP). [6]
- Q8)** a) How does global warming increased by large dams? [6]  
b) What is the impact due to construction of dam on displacement and rehabilitation? [4]





Total No. of Questions : 8]

SEAT No. :

**P5203**

**[5562]-20**

[Total No. of Pages : 1

**M.E. (Computer Networks)**

**ADVANCED TCP/IP**

**(2013 Pattern) (Semester-III) (610201) (Credit)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) Attempt any Seven question.*
- 2) Figures to the right indicate full marks.*
- 3) Neat diagram must be drawn whenever necessary.*
- 4) Assume suitable data, if necessary.*

**Q1)** Draw and explain client server model? **[8]**

**Q2)** Explain need of NVT character set in telnet? **[7]**

OR

**Q3)** Draw and write explanation of TCP stack format? **[7]**

**Q4)** How would you accommodate abbreviations in a domain naming scheme?  
Show with one example? **[7]**

**Q5)** Write difference between TCP Tahoe and TCP Reno? **[7]**

**Q6)** Explain types of firewall with configuration? **[7]**

**Q7)** Write difference between UDP and TCP protocol? **[7]**

**Q8)** Explain ADOV Protocol? **[7]**



Total No. of Questions :12]

SEAT No. :

**P5204**

**[5562]-21**

[Total No. of Pages : 2

**M. E. Computer (Networking)**  
**SYSTEM OPERATIONS AND MAINTENANCE**  
**(2013 Course) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

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

**Q1)** What are the requirements of Carrier-Grade NOS. **[9]**

OR

**Q2)** Draw and explain IOS XR Layered High Availability Architecture. **[9]**

**Q3)** Explain Control plane and data plane configuration management. List the functionalities of Cisco IOS XR Configuration Manager. **[8]**

OR

**Q4)** Discuss the unique features of IOS XR configurations. **[8]**

**Q5)** What is Embedded Event Manager? Discuss EEM policies that can be implemented on router to help better fault management and event notification. **[8]**

OR

**Q6)** Compare Admin plane and Secure domain router (SDR) plane used in Cisco IOS XR operating software. **[8]**

**Q7)** What are the types of Interior routing protocol? Explain the different roles of OSPF routers. **[8]**

OR

**P.T.O.**

**Q8)** Explain in details Enhanced Interior Gateway Routing Protocol. [8]

**Q9)** Explain in detail IOS XR MPLS Architecture. [8]

OR

**Q10)** What is Multicast Routing? Explain with the diagram various building blocks involved in the implementation of multicast routing. [8]

**Q11)** Discuss Owner and Non-owner SRD and role of SRD Privileges. [9]

OR

**Q12)** Write a note on. [9]

- a) Line Card Chassis
- b) Fabric Card Chassis
- c) Switch fabric Cards.



Total No. of Questions : 6]

SEAT No. :

**P5205**

**[5562]-22**

[Total No. of Pages : 1

**M.E.(Electrical - Control System)  
PROCESS CONTROL MANAGEMENT  
(2013 Course) (Semester - I) (503102)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

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

- Q1)** a) Explain process reaction curve with proper diagram. [6]  
b) Draw & explain block diagram of process control system. [6]  
c) With suitable example, explain that conflict management is necessary for organizational activity. [6]

OR

- Q2)** a) Write short note on Motivation and Leadership in process control management. [6]  
b) Explain PID Controller and its tuning for Dynamic Performance. [6]  
c) Explain Ziegler-Nichols closed loop method for tuning in detail. [6]

- Q3)** a) Develop a feed forward control system for Heat exchanger. [8]  
b) Explain generalized block diagram for feed forward-feedback control system. [8]

OR

- Q4)** a) Explain cascade control of Heat exchanger process with proper diagram. [8]  
b) Explain The Discrete PID Control Algorithm. [8]

- Q5)** a) Explain the Relative Gain Array for a process with two inputs and two out puts. [8]  
b) What is one-way decoupling of two control loops? Why it could be acceptable? [8]

OR

- Q6)** a) Explain the effect of interaction on the stability of multi loop control systems. [8]  
b) Describe interaction of control loops in a stirred tank heater for liquid level and temperature control with suitable diagram. [8]



Total No. of Questions : 6]

SEAT No. :

**P5206**

**[5562]-23**

[Total No. of Pages : 2

**M. E. (Electrical Control Systems)**  
**COMPUTER AIDED CONTROL SYSTEM DESIGN**  
**(2013 Course) (Semester - III) (603102)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, and Q5 or Q6.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicates full marks.*
- 4) *Assume suitable data, if necessary.*

- Q1)** a) Explain the importance of computer as an aid in the analysis and design of control system. [6]
- b) Derive the transfer function of the following compensator networks and draw the corresponding Bode diagrams. [6]
- i) Phase - lead network
- c) Explain the computer method for determining the controllability and observability of control system. Draw the flow chart and give its algorithm. [6]

OR

- Q2)** a) Explain the computer method for obtaining the solution of state and output equations of a closed - loop control system represented by. [8]
- $$\dot{x}(t) = Ax(t) + Bu(t)$$
- $$y(t) = Cx(t)$$
- With usual notation. Give its algorithm.
- b) Draw the block diagram of observer system and explain with the designing steps of full order observe. [4]
- c) Explain clearly terms 'Absolute stability' and 'Relative stability'. Explain the measures of relative stability using polar plot and bode diagrams. [6]
- Q3)** a) Explain with algorithm the computer method of design of PID controller using Ziegler-Nichols method. State the limitations of this method. [8]

**P.T.O.**

- b) Consider a process control system with plant transfer function. [8]

$$Gp(s) = \frac{30}{s^3 + 11s^2 + 36s + 36}$$

Design a PID controller for this system using Ziegler-Nichols method.

OR

- Q4)** a) Explain with diagram the working of P, PI and PID controller. [8]  
 b) Explain step by step the design procedure of tunable PID controller using Ziegler-Nicol's method. Give its algorithm. [8]

- Q5)** a) Discuss the advantages of digital controller over continuous time controller; also explain the problems in implementing digital control system. [8]

- b) A discrete time control system is represented by the differential equation  $x(k+1) = Fx(k) + Gu(k)$ . Where k is the sampling instant, x(k) is n x 1 state vector, u(k) is m x 1 control vector. F and G are constant matrices of compatible dimensions. Explain the computer method for obtaining closed loop system response. Draw flow chart and give its algorithm. [8]

OR

- Q6)** a) Draw the block diagram of a typical digital control system and explain clearly the working of each block. What is the effect of sampling period 'T' on the stability of the system? [8]

- b) Consider the system [8]

$$x(k+1) = Gx(k) + Hx(k)$$

$$y(k) = Cx(k)$$

$$u(k) = K_0 r(k) - Kx(k),$$

$$\text{Where } G = \begin{bmatrix} 0 & 1 \\ -0.16 & -1 \end{bmatrix}, H = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C = [1 \ 0]$$

Determine a suitable state feedback gain matrix K such that the system will have the closed loop poles at  $z = 0.5 + j0.5$ ,  $z = 0.5 - j0.5$



Total No. of Questions : 6]

SEAT No. :

**P5207**

[Total No. of Pages : 2

**[5562]-24**

**M.E. Electrical (Power Electronics & Drives)**

**POWER CONVERTERS**

**(503303) (2013 Course) (Semester-I)**

*Time : 3Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of electronic calculator is allowed.*
- 4) *Assume suitable data, if necessary.*

- Q1) a)** A single phase half controlled converter is used to supply the field winding of a separately excited dc machine. With the rated armature voltage the motor operates at the rated no load speed for a firing angle  $\alpha=0^\circ$ . Find the value of  $\alpha$  which will increase the motor no load speed by 30%. Neglect losses and saturation. Assume continuous conduction. **[10]**
- b) Explain with a neat diagram the operation of Buck converter with necessary waveforms. **[8]**

OR

- Q2) a)** Explain three phase Voltage Source Inverter ( $180^\circ$  conduction mode) with necessary waveforms and derive the line-line output voltage equation using Fourier Series. **[10]**
- b) Explain with necessary diagrams and waveforms the operation of a single phase full controlled converter supplying RL load **[8]**
- Q3) a)** With a neat diagram explain zero voltage switching (ZVS) resonant switch converter. **[8]**
- b) With a neat diagram explain the working of series loaded resonant half bridge dc-dc converter. **[8]**

OR

*P.T.O.*

**Q4) a)** With a neat diagram explain the working of Parallel loaded resonant half bridge dc-dc converter. [8]

b) Compare ZCS and ZVS topologies. [8]

**Q5) a)** What is the difference between an ac voltage controller and a cycloconverter? With a neat diagram and waveforms explain the working of a single phase/ single phase cycloconverter. [8]

b) Explain three phase AC voltage controller with necessary circuit diagram and waveforms. [8]

OR

**Q6) a)** Draw a neat diagram explain the working of single phase full wave AC voltage controller with R load. [8]

b) A single phase voltage controller is employed for controlling the power flow from 230V 50Hz into a load circuit containing  $R=4\ \Omega$  and  $\omega L=3\Omega$ . Calculate

The control range of firing angle 2) maximum value of RMS load current maximum power and power factor. [8]





Total No. of Questions : 8]

SEAT No. :

**P5208**

**[5562]-25**

[Total No. of Pages : 2

**M.E. (Electrical) (Power Electronics and Drives)  
DESIGN OF POWER ELECTRONIC SYSTEMS  
(2013 Pattern) (Semester-II) (503308)**

*Time : 2½ Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any one from 1&2, 3&4, 5&6, 7&8.*
- 2) *Neat diagrams to the right indicate full marks.*
- 3) *Use of calculator is allowed.*
- 4) *Assume suitable data if necessary.*

**Q1)** Derive mathematical model of IGBT. **[9]**

OR

**Q2)** Explain necessity of heat sink in Power Electronic circuitary. Explain steps for designing heat sink with parameters taken into account. **[9]**

**Q3)** a) Design a heat sink for a dc-dc Boost system. **[6]**

- b) For the Buck converter, find the peak device current, the peak dissipation and the case to ambient thermal resistance. Use maximum junction temperature of 150°C and the ambient temperature to be at 40°C and the case temperature should not exceed 60°C. Duty ratio is 40%. The thermal impedance at 400mS is  $Z = 0.4^{\circ}\text{C}/\text{W}$ . **[3]**

OR

**Q4)** An inductor is to be designed to meet the following specifications.  $L = 5$  millihenries;  $I_{\text{rms}} = 3$  A sinewave;  $f = 100$  kHz;  $T_s = 90$  C and  $T_a = 30$  C. The inductor is to be fabricated on a double-E core made from 3F3 ferrite. The windings are to be made with foil conductors which have  $k_{cu} = 0.6$ . A core size of  $a = 2$  cm is chosen for the design. The emissivity  $E$  of the surface of the completed inductor equals 0.9 and that the vertical height is  $3a$ . **[9]**

- a) Determine the conductor cross-sectional area,  $A_{cu}$ , and number of turns  $N$ . Ignore eddy currents and the proximity effect.
- b) Specify the length of the airgaps in the core. Assume four distributed airgaps.

**P.T.O.**

**Q5)** Derive mathematical model of single phase inverter with circuit averaging method. [16]

OR

**Q6)** Design a 2.5V, 1 A Buck converter from a 12V dc source. The output voltage ripple should be less than 1% of the dc output voltage magnitude. The switching frequency is required to be 50 KHz. Consider the minimum load current to be 10% of load to maintain Continuous conduction mode. [16]

**Q7) a)** Explain need of firing circuits for thyristors. Explain any one circuit in detail with their limitations. [7]

b) For step down converter circuit, the dc input voltage  $V_d = 500V$ , the load current  $I_o = 500A$ , and the switching frequency is 1kHz. The free wheeling diode has a reverse recovery time  $t_{rr} = 10\mu s$ . The GTO has a current fall time  $t_{fi} = 1\mu s$ , a maximum applied voltage rate  $dv/dt = 50V/\mu s$ , and a maximum controllable anode current  $I_{AM} = 1000A$ . [9]

i) Find the appropriate values for resistance  $R_s$  and capacitance  $C_s$  for the turn-off snubber circuit.

ii) Estimate the power dissipated in the snubber resistance

OR

**Q8) a)** Explain how gate drive of IGBT is provided with isolation using optical isolator. [8]

b) Explain how snubbers are used for protection of power devices. Explain turn on snubber in detail. [8]



Total No. of Questions : 4]

SEAT No. :

**P5209**

[Total No. of Pages : 2

[5562] - 26

**M.E. (Electrical) (Power Electronics and Drives)**

**ADVANCED CONTROL SYSTEMS**

**(2013 Course) (Semester - II) (503309)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

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

**Q1) a)** Define and explain state observer. **[4]**

b) Derive the expression for Matrix-Riccati equation. **[5]**

**Q2) a)** Explain types of uncertainties with block diagram. **[5]**

b) Define equilibrium point. Also find all equilibrium points for each of the following system. **[4]**

i)  $\dot{x}_1 = -0.1x_1 + x_2$        $\dot{x}_2 = 0.5x_1 - 4x_2 - x_1^2 - 0.2x_1^3$

ii)  $\dot{x}_1 = -0.4x_1 + x_2(5 + x_1)$        $\dot{x}_2 = -x_1(3 + x_1)$

**Q3) a)** Explain what you understand by sliding mode control. **[8]**

b) 
$$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -2 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u + \begin{bmatrix} 0 \\ 0 \\ 0.3\sin(t) \end{bmatrix}$$

Design a sliding surface for the system to get  $\xi=0.8$  and  $\omega_n=5$ . **[8]**

**P.T.O.**

**Q4)** Write short note on the following (Attempt any two) :

**[16]**

- a) Buck Boost converter
- b) Control of solar system
- c) Distribution generation
- d) Power quality devices



Total No. of Questions : 6]

SEAT No. :

**P5210**

**[5562]-27**

[Total No. of Pages : 2

**M.E. (Electrical) (Power Electronics & Drives)**

**POWER ELECTRONICS APPLICATIONS**

**(2013 Pattern) (Semester-III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6.*
- 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 the different power system components? Explain each of them with their characteristics. [6]
- b) Discuss criteria of design of ac filters. Also mention various types of ac filters with their circuit configurations. [6]
- c) Draw the block diagram and explain in brief the operation of wind energy system. [6]

OR

- Q2)** a) Explain TSC by covering the following points: [6]
- |               |                          |
|---------------|--------------------------|
| i) Diagram    | ii) Operation            |
| iii) V-I Char | iv) Loss characteristics |
- b) List the issues to be addressed while integrating solar PV system with the grid. [6]
- c) Draw the six pulse Graetz circuit and analyze the circuit without overlap. [6]

*P.T.O.*

**Q3)** Explain STATCOM by covering following points: **[16]**

- a) Neat diagram and working of six pulse and 12 pulse STATCOM.
- b) VI characteristics.
- c) List any 2 power system parameters that can be improved by STATCOM.
- d) Advantages.

OR

**Q4)** Explain UPFC by covering following points: **[16]**

- a) Basic schematic diagram and working.
- b) Singnificance of DC link.
- c) Principle of controls in UPFC.
- d) Advantages over STATCOM.

**Q5) a)** Draw the schematic diagram of switched mode power supply. Explain the working of each block. **[8]**

- b) Identify the various voltage disturbances likely to occur in power system operation. How can it be control using uninterruptured power supplies? Explain its working with the help of block diagram. **[8]**

OR

**Q6)** Explain the use of power electronic techniques in Hybrid vehicle system, illumination application and fluorescent lighting. **[16]**



Total No. of Questions : 6]

SEAT No. :

**P5211**

[Total No. of Pages : 2

**[5562]-28**

**M. E. (Electrical) (Power Electronic & Drives)**

**POWER ELECTRONICS IN SMART GRID**

**(2013 Course) (Semester - III) (603302)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) Figures to the right indicate full marks.*
- 3) You are advised to attempt not more than three questions.*

**Q1)** Write short note on any three.

**[18]**

- a) Local area networks.
- b) Power quality issues.
- c) High frequency applications in space applications.
- d) Interconnected grid system and relative problems.

OR

**Q2)** Write short note on any three

**[18]**

- a) Attributes of the smart grid.
- b) Legal and organizational regulations of power quality issues.
- c) Micro-grid and its role in smart grid system.
- d) Integration and interconnection challenges of distributed energy resources.

**Q3)** a) Compare between HAN and WAN communication infrastructures. **[8]**

b) Describe advanced metering infrastructure (AMI) used in smart grid. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain the concept of cyber security and its need in smart grid system. [8]  
b) Describe bluetooth technology with its importance. [8]

- Q5)** a) Explain use of AC/AC voltage regulator for compensation of voltage sag and swell. [8]  
b) Explain operation of D-STATCOM along with decoupled current control method. [8]

OR

- Q6)** a) Explain with a neat diagram operation and use of dynamic static synchronous controller. [8]  
b) Describe with a neat sketch any one type of dynamic voltage restorer. [8]





Total No. of Questions : 8]

SEAT No. :

**P5212**

**[5562]-29**

[Total No. of Pages : 3

**M.E. (Electronics) (Digital Systems)**  
**MICROELECTRONICS**  
**(2013 Pattern) (Semester - I) (504101)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data if necessary.*
- 5) *Figures to the right indicate full marks.*
- 6) *Use of calculator is allowed.*

**Q1) a)** Explain MOS Gate Capacitance and Diffusion Capacitance model in detail. **[5]**

b) Draw and explain the CMOS inverter voltage transfer characteristic. What is effect of  $\frac{\beta_n}{\beta_p}$  ratio on VTC? **[5]**

**Q2) a)** What is lithography? List various lithography techniques used in fabrication process. Explain Photolithography process. **[4]**

b) What is pass transistor logic? Give an expression for the output voltage for the pass transistor networks shown in Figure 1. Neglect the body effect. **[4]**

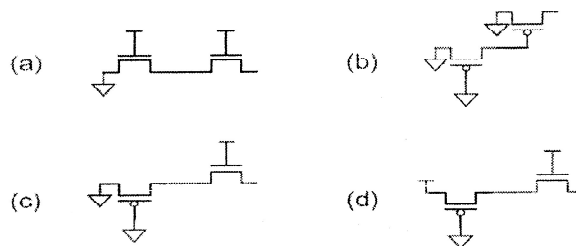


Figure 1

c) What is transmission gate? How it works? **[2]**

*P.T.O.*

- Q3)** a) Compare n-well, p-well and twin tub process. Draw and explain fabrication steps of CMOS inverter using twin tub process. [5]
- b) Draw the CMOS circuit, stick diagram and layout for [5]
- i) NOR gate.
- ii) AND gate.
- Q4)** a) List non ideal I-V effects in MOS device and explain velocity saturation and mobility degradation. [4]
- b) What are the different power dissipations in CMOS circuits? Explain in detail. [4]
- c) What is Lambda based Layout design Rule? [2]
- Q5)** a) Draw Stick Diagram and Layout for following functions. [4]
- i) Two Input OR gate.
- ii) Two Input NOR gate.
- b) Draw and explain fabrication steps for following processes. [4]
- i) n-well process.
- ii) p-well process.
- c) Explain why PMOS devices are used as PUN and NMOS devices are used as PDN. [2]
- Q6)** a) What is the effect of CMOS sizing on propagation delay,  $C_{gs}$ ,  $R_{DS(ON)}$  and current sink / source capabilities. [4]
- b) Design a Full adder using [4]
- i) Static CMOS logic.
- ii) Pass transistor logic.
- c) Calculate the approximate power dissipation in a chip operating with  $V_{dd} = 1.2V$  at 180MHz with an internal switched capacitance of 150 pF. [2]

- Q7)** a) What is current mirror circuit? Draw the basic current mirror circuit and explain the working. [4]
- b) Compare CMOS and Bi-CMOS technologies with respect to speed, noise margin, power dissipation and input impedance. [4]
- c) Explain how CMOS inverter can be used as an amplifier. [2]
- Q8)** a) Implement the following circuits using transmission gate. [4]
- i) 2 : 1 Multiplexer.
- ii) 4 : 1 Multiplexer.
- b) Write short notes (any two) : [4]
- i) Low Power Design Techniques.
- ii) Scaling in CMOS VLSI circuits.
- iii) CMOS RF circuits.
- c) Explain how to fabricate resistor and capacitor on CMOS IC. [2]



Total No. of Questions : 8]

SEAT No. :

**P5186**

**[5562]-3**

[Total No. of Pages : 2

**M.E.(Chemical Engineering)**

**PROCESS OPTIMIZATION**

**(2013 Course) (Semester - I) (509102) (Theory)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer total 5 questions from following.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**Q1) a)** Find whether the following function is strictly convex / strictly concave [5]

$$f(x) = 8x_1^2 + 15x_1x_2 - 20x_1 + 13x_2 - 6x_2^2 + 15$$

b) Explain Concavity Vs Convexity of a function. [5]

**Q2) a)** Write a note on - Continuity of a function. [5]

b) Explain global Vs local optima. [5]

**Q3) a)** Explain the Simplex Search Method and demonstrate for minimization of  $f(x) = 2x_1^2 + 5x_2^2 - 9$  starting at  $(x^0)^T = [4 \ 3]$  in the direction  $s^0 = [-1 \ -3]^T$ . Perform 2 iterations. [5]

b) Find whether the given direction  $s$  at the point  $x$  is descent for the function [5]

$$f(x_1, x_2) = 2x_1^2 + x_2^2 - 2x_1x_2 + 4 \quad s = (1, 1)^T, \quad x = (2, 3)^T$$

**Q4) a)** Maximize  $f = x_1 - 3x_2 + 3x_3$  [5]  
subject to

$$3x_1 - x_2 + 2x_3 \leq 7,$$

$$2x_1 + 4x_2 \geq -12,$$

$$-4x_1 + 3x_2 + 8x_3 \leq 10,$$

$$x_i \geq 0,$$

$i = 1, 2, 3$ . Use simplex method.

b) Write a note on - Box's Evolutionary Optimization method. [5]

**P.T.O.**

- Q5)** a) Explain and write the algorithm for variable elimination method. [5]  
b) Write a short note on - Kuhn Tucker conditions. [5]
- Q6)** a) What are the differences between Genetic Algorithm and traditional methods? [5]  
b) Explain 'crossover' operator in Genetic Algorithm. [5]
- Q7)** a) Minimize  $f(x) = x^4 + 2x^3 + (9/(1 + x^2)) - (1/(1 + x))$ . Use Internal Halving Method. Write complete algorithm for this method and demonstrate at least 3 steps towards finding optimized solution for the above function. [5]  
b) Minimize  $f(x) = x^2 + (3/(1 + x))$ . Use Newton Raphson Method. Write complete algorithm for this method and demonstrate at least 3 steps towards finding optimized solution for the above function. [5]
- Q8)** a) Minimize  $f(x) = x^2 + (2/x) + (1/x^3)$ . Use (a) Fibonacci Search Method. Perform 2 iterations. [5]  
b) Secant Method. Write complete algorithm for these methods and demonstrate at least 3 steps towards finding optimized solution for the above function. [5]



Total No. of Questions : 8]

SEAT No. :

**P5213**

**[5562]-30**

[Total No. of Pages : 2

**M.E.(Electronics - Digital Systems)**  
**DIGITAL SIGNAL PROCESSING ARCHITECTURES**  
**(2013 Pattern) (Semester - I) (504102)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions out of eight questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *Use of scientific calculator is allowed.*

- Q1)** a) Compute 4 point DFT of the following sequence:  $x[n] = \{6, 2, 7, 9\}$ . [3]  
b) Explain along with example overlap-add method for filtering long length sequence. [3]  
c) Explain the DTMF signal receiver using Goertzel algorithm. [4]
- Q2)** a) Compute 8 point DIF FFT of the following sequence :  $x[n] = \{8, 9, 4, 7, 2, 3, 5, 8\}$ . [6]  
b) Explain the Chirp Z- Transform algorithm. [4]
- Q3)** a) Explain IIR filter design using bilinear transformation method. [3]  
b) Explain the Butterworth filter design using impulse invariant method. [4]  
c) Explain different properties of STFT. [3]
- Q4)** a) Explain with a block schematic a sampling rate converter with a factor of I/D. [Interpolator/Decimator] [5]  
b) Design a suitable two stage interpolator for following systems: Baseband 0-20 kHz, Input sampling Frequency: 44.1kHz; Output sampling Frequency 176.4 kHz ; Stop band attenuation: 50 dB ; pass band ripple: 0.5 dB transition width: 2 kHz; stop band edge frequency: 22.0 kHz.[5]

*P.T.O.*

- Q5)** a) Calculate the wavelet decomposition for the impulse response  $h(n) = \{1,2,4,7\}$ . [4]  
 b) What is multi resolution analysis? How wavelets are useful in it? [4]  
 c) Draw and explain Radix-2 DIT FFT butterfly structure. [2]
- Q6)** a) Draw and explain the architecture of Texas TMS320C6713 floating point DSP processor. [5]  
 b) What is Code Composer Studio? Explain the use of CCS in developing signal processing application. [5]
- Q7)** a) Draw & explain the architecture of 'SHARC' digital signal processor. [5]  
 b) Explain on chip peripherals of TMS320C54XX. [5]
- Q8)** a) Design an ideal low pass FIR filter with a frequency response [5]  
 $H_d(e^{jw}) = 1$  for  $-\Pi/2 \leq w \leq \Pi/2$   
 $= 0$  for  $-\Pi/2 \leq w \leq \Pi/2$   
 Find the values of  $h(n)$  for  $N = 11$ . Plot the magnitude Response.  
 b) Explain Circular buffering, MAC and barrel shifter. [5]



Total No. of Questions : 8]

SEAT No. :

**P5214**

[Total No. of Pages : 2

**[5562] - 32**

**M.E. (Electronics - Digital Systems)**  
**RANDOM SIGNALS AND PROCESSES**  
**(2013 Pattern) (Semester - II) (504109)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Solve any 5 questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**Q1)** a) In a digital communication channel, the probability of sending 0 or 1 is 0.5. If the probability of error due to noise in channel is 0.05, find the probability of sending 0 when received bit is 1. **[4]**

b) Explain Properties of probability binomial and poisons distribution. **[6]**

**Q2)** a) What is hypothesis testing? Explain KS Test and the types of error involved in it. **[4]**

b) A device has a sensor connected to an alarming system. The sensor triggers with probability 0.96 if dangerous conditions exist in a given day and with probability 0.004 if conditions are normal during the day. Days with dangerous conditions occur with probability 0.004. Given the above: **[6]**

i) What is the probability of false alarm, i.e. the probability that conditions are normal when the alarm system triggers?

ii) What is the probability of unidentified critical condition, i.e. the probability that conditions are dangerous when the system does not trigger?

iii) How many false alarms and how many unidentified critical conditions should be expected to occur during a 8-year period? Comment on the effectiveness of the alarming system.

**P.T.O.**



- Q3)** a) Explain the central limit theorem. [4]  
 b) Consider a continuous random variable with the density function. [6]

$$f(x) = \begin{cases} 0 & -\infty < x < -\frac{1}{2} \\ 3\left(\frac{1}{2} + x\right)\left(\frac{1}{2} - x\right) & -\frac{1}{2} < x < \frac{1}{2} \\ 0 & \frac{1}{2} < x < \infty \end{cases}$$

Find expected value of X and the variance of X.

- Q4)** a) Suppose the moment generating function for the random variable X is  $m_x(t) = 1/(a-t^2)$ . Find [4]  
 i)  $E(X)$   
 ii)  $E(X^2)$   
 iii) The moment generating function for  $U=X/\sqrt{2}$ .  
 b) Explain the properties of joint distribution function and joint density function. [6]
- Q5)** a) Explain the random process w.r.t. [6]  
 i) Stationarity  
 ii) Averages  
 iii) Correlation  
 b) Describe the power spectrum of discrete time processes. [4]
- Q6)** a) Define Power Spectral Density. Explain its any two properties. [5]  
 b) Describe the spectral characteristics of random processes. [5]
- Q7)** a) Explain the Neyman-Pearson test for binary hypothesis testing. [5]  
 b) Explain the Cramer- Rao Inequality. [5]
- Q8)** a) What is Maximum likelihood estimation? State its properties. [5]  
 b) Explain the Bays Criteria for Simple binary hypothesis test. [5]



Total No. of Questions : 8]

SEAT No. :

**P5215**

**[5562]-33**

[Total No. of Pages : 2

**M.E. (E & TC) (Communication Network)**

**MOBILE COMPUTING**

**(2013 Course) (Semester-III) (604501)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answers any Five Questions out of Q.1 to 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) What are the different tiers in three tier architecture? Describe the functions of these tiers. [5]

b) What is handoff mechanism? Explain the concept of soft handoff and hard handoff. [5]

**Q2)** a) Explain the significance of Co-channel interference reduction factor and frequency reuse scheme with respect to mobile technologies. [5]

b) Describe what is multiple access? Describe FDMA, TDMA, CDMA with the application areas and examples? [5]

**Q3)** a) Explain in detail the concept of WLL. [4]

b) Explain the GPRS architecture in detail. [4]

c) What is Wi-Max. How it is different from Wi-Fi. [2]

**Q4)** a) Describe the GSM architecture. Describe different elements in this architecture. [4]

b) Describe various handoff technologies used in mobile networks. [4]

c) Give any two securities and privacy needs of wireless systems. [2]

**P.T.O.**

- Q5)** a) Describe the IS-95 architecture. Compare this architecture with the GSM architecture. [4]
- b) Write a short note on VOIP architecture. [4]
- c) Compare in brief Wi-Fi and 3G technology. [2]
- Q6)** a) Differentiate 1G and 2G mobile technology. [4]
- b) Explain IP multimedia system architecture. [4]
- c) Draw 4G LTE network architecture? [2]
- Q7)** a) What are the methods of providing privacy and security in wireless system? [4]
- b) Explain dynamic channel allocation. [4]
- c) What is mobile ad hoc network. [2]
- Q8)** a) Explain the authentication and security related issues in GSM? [4]
- b) Explain Bluetooth architecture. [4]
- c) Compare OFDM and CDMA techniques. [2]



Total No. of Questions : 8]

SEAT No. :

**P5216**

**[5562]-34**

[Total No. of Pages : 2

**M. E. (E & TC) (Communication Network)**

**DIGITAL COMMUNICATION RECEIVERS**

**(2013 Pattern) (Semester - III) (604502) (Credit)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions out of eight.*
- 2) *Neat diagrams and waveforms must be drawn whenever 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 Pulse Modulation techniques? Explain in detail M-ary Pulse Modulation in detail. What is the advantage of multilevel signaling? [5]

b) Explain the various PCM waveforms for the binary data 10110001. [5]

**Q2)** a) Explain the following with reference to the digital modulation. [5]

i) BPSK                      ii) MSK                      iii) QPSK

b) Draw the vectorial representation for values of  $M = 2, 4, 8$  and  $16$  for MPSK signal. [5]

**Q3)** a) Describe Correlation Receiver & Match Filter Receiver used for Implementing the Optical receiver for AWGN channel with respect to MAP receiver. [5]

b) Derive the probability of error of M-ary Orthogonal signals. [5]

**Q4)** a) Explain detection of signals with memory using max likelihood sequence detection algorithm. [4]

b) Explain how the Probability of Error is reduced by using Envelope detection for Correlated binary signal. [4]

c) Describe in brief the Optimal demodulation & detection for PCM signals. [2]

**P.T.O.**

- Q5)** a) With the help of a model, explain diversity for Binary signals. [4]  
b) Explain in detail, what are the statistical models for Multipath fading channels? [4]  
c) What is Doppler shift? [2]
- Q6)** a) Describe different types of symbol synchronization techniques. [4]  
b) What is Frequency selective fading channel? Explain modeling of same. [4]  
c) Define the following : [2]  
i) Coherence Time  
ii) Scatter function of the channel.
- Q7)** a) Describe adaptive decision feedback equalizer. [5]  
b) Explain the need for carrier synchronization. Enlist the techniques for the same. [3]  
c) Draw the Adaptive Zero Forcing Equalizer. [2]
- Q8)** a) Explain Early-Late Gate synchronizer. [4]  
b) What are decision directed loops for carrier phase estimation? [4]  
c) Write a short note on Stochastic Gradient Algorithm for Blind Equalization. [2]



Total No. of Questions : 8]

SEAT No. :

**P5217**

[Total No. of Pages : 2

**[5562]-35**

**M.E. (E & TC) (Signal Processing)**  
**IMAGE PROCESSING & ANALYSIS**  
**(Semester I) (2013 Course)**

*Time : 3Hour]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any 5 questions.*
- 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 the elements of human visual perception and explain how the image is formed in human eye. **[6]**

b) Give the formula for 2-D DCT and explain its properties. **[4]**

**Q2) a)** Why median filter is better for salt and pepper noise removal than averaging filter. For the given Pseudo image apply the median and averaging filter and show the output. **[6]**

$$\begin{bmatrix} 24 & 22 & 33 & 25 & 22 & 24 \\ 34 & 255 & 24 & 26 & 0 & 23 \\ 23 & 21 & 32 & 31 & 28 & 26 \end{bmatrix}$$

b) Explain the concept of frequency domain filtering with the help of block diagram. **[4]**

**Q3) a)** How the image enhancement is different than image restoration. Hence explain the Wiener filter for image restoration **[6]**

*P.T.O.*

- b) Draw and explain the transformation that will highlight range of intensity values between A&B and will preserve all other levels. [4]
- Q4)** a) In many image processing, applications, why image segmentation is necessary? Hence explain image segmentation technique using Region growing & Region splitting and merging. [6]
- b) What is global thresholding? How the drawback of global thresholding is overcome in adaptive thresholding. [4]
- Q5)** a) What is hough transform, explain in detail. How the hough transform is useful for edge linking. [6]
- b) How the boundary is represented with the help of chain code? Taking 8-directional chain code draw the shape represented by following chain codes. [4]
- i) 46600124642
- ii) 46600242
- Q6)** a) What is morphology with respect to image processing? What is structuring element? Hence explain Erosion, Dilation, Opening and closing operations in detail. [6]
- b) How to find out skeleton of an object? Explain the algorithm to find out skeleton of an image/object. [4]
- Q7)** a) With respect to image compression, what is redundancy, name the three redundancies & explain them. What is fidelity and explain the fidelity criteria used in image compression. [6]
- b) Explain the concept of baseline JPEG encoder with block diagram [4]
- Q8)** a) What is the need of color model? Explain in detail RGB, CMY, YIQ and HIS color model in detail with its typical application. [6]
- b) What is the difference between Pseudo coloring and False coloring. Explain the pseudo coloring concept in detail. [4]



Total No. of Questions : 8]

SEAT No. :

**P5218**

**[5562]-36**

[Total No. of Pages : 2

**M.E.(E&TC) (Signal Processing)**  
**SIGNAL PROCESSING TECHNIQUES**  
**(2013 Pattern) (Semester - I) (504402)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of non-programmable, scientific calculator is allowed.*
- 5) *Assume suitable data, if required.*

**Q1) a)** Design a digital Butterworth filter that satisfies the following constraints using Bilinear transformation. Assume  $T = 1$  s. **[5]**

$$0.9 \leq |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq \frac{\pi}{2}$$

$$|H(e^{j\omega})| \leq 0.2 \quad \frac{3\pi}{4} \leq \omega \leq \pi$$

b) Derive the equation of impulse response of ideal FIR bandpass filter using Frequency sampling method. **[5]**

**Q2) a)** Design a FIR digital filter to approximate an ideal LPF with passband gain of unity, Cutoff Frequency of 850 Hz and working at sampling frequency of 5000 Hz. The length of impulse response should be 5. Use rectangular and hamming window method. **[5]**

b) Design a suitable interpolator for the following system. **[5]**  
Baseband 0- 20 KHz, I/P sampling frequency 44.1 KHz,  
O/P sampling frequency 176.4 KHz, Stop band attenuation 50 dB,  
Pass band ripple 0.5 dB, Transition width 2 KHz,  
Stop band edge frequency 22.05 KHz.

**Q3) a)** Explain with suitable diagrams, the polyphase implementation of interpolators. **[4]**

b) Explain warping effect in case of bilinear transformation and describe pre-warping Procedure. **[4]**

c) What is the need of anti-imaging filter in interpolator? Explain with neat diagram. **[2]**

**P.T.O.**



- Q4) a)** Design a two stage decimator that downsamples an audio signal by a factor of 100 & satisfies the following specifications. [4]  
 Input sampling frequency = 20000 Hz  
 Passband = 0 to 40 Hz  
 Transition band = 40 to 50 Hz  
 Passband ripple = 0.02  
 Stopband ripple = 0.002
- b) Explain different addressing modes of digital signal processor. [4]
- c) Consider ARMA process generated by difference equation [2]  
 $x(n) = 1.6x(n-1) - 0.63x(n-2) + w(n) + 0.9w(n-1)$
- i) Determine system function of whitening filter & its poles & zeros.  
 ii) Determine power density spectrum of  $\{x(n)\}$ .
- Q5) a)** Explain the properties of retiming with example. [4]
- b) Obtain the polyphase decomposition of IIR system with transfer function  
 $H(z) = \frac{1-2z^{-1}}{1+3z^{-1}}$  for two sections. Also draw the polyphase structure. [4]
- c) What are the advantages of Kaiser Window over other window functions. [2]
- Q6) a)** Explain algorithm for unfolding, using example. [4]
- b) What are the uses of retiming. Explain any one with the aid of example. [4]
- c) Derive the expression for output spectrum of sampling rate conversion by a rational I/D factor in terms of input spectrum. [2]
- Q7) a)** Explain parallel and pipelining process in digital signal processor. [4]
- b) Discuss the adaptive telephone echo cancellation with suitable diagram. [4]
- c) Explain VLIW architecture for DSP processors. [2]
- Q8) a)** Explain circular buffering in detail. [4]
- b) Explain register minimization technique of folding using lifetime analysis. [4]
- c) If a sum of 256 products is to be computed using a pipelined MAC unit, if the MAC unit execution time of the unit is 100 nsec, what will be the total time required to complete the operation? [2]



Total No. of Questions : 8]

SEAT No. :

**P5219**

[Total No. of Pages : 2

[5562] - 37

**M.E. (E&TC) (VLSI & Embedded Systems)**

**EMBEDDED SIGNAL PROCESSORS**

**(2013 Pattern) (Semester - II) (504209)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *All questions carry equal marks.*
- 4) *Assume suitable data wherever required.*
- 5) *Figures to the right side indicates full marks.*

- Q1)** a) Explain in brief real time embedded signal processing. [4]  
b) Discuss Linear Convolution with suitable example. [3]  
c) Explain the terms convolution, correlation & covariance. [3]
- Q2)** a) Compare FIR & IIR filters. Which types of filters are used more in practice? Why? [4]  
b) What is zero-padding? Explain its significance. [3]  
c) Write a short note Digital Filters. [3]
- Q3)** a) Explain Linear & Non-Linear filters with suitable examples. [4]  
b) Explain use of Adaptive Filters for noise cancellation & system identification. [3]  
c) Describe Sampling & Quantization. [3]
- Q4)** a) Discuss design steps of IIR filters using Bilinear Transformation method. [4]  
b) Write a short note on DFT. [3]  
c) Explain FFT [3]

***P.T.O.***

- Q5)** a) What are structures? Explain its types. [4]  
b) Explain the characteristics of Window Function. [3]  
c) Write short note on Gibb's phenomenon. [3]
- Q6)** a) Describe MAC and Barrel shifter in DSP processors. [4]  
b) Explain application of DSP in image processing. [3]  
c) Draw and Explain architecture overview of Black fin processor. [3]
- Q7)** a) Explain the architecture of DSP processor with neat diagram. [4]  
b) Give different addressing formats of DSP processors. [3]  
c) With neat block diagram explain the software development tools used for designing DSP system. [3]
- Q8)** a) Explain Wavelet algorithm in brief. [4]  
b) Discuss the DSP application in image enhancement. [3]  
c) Explain any one adaptive filtering algorithm. [3]



Total No. of Questions : 8]

SEAT No. :

**P5220**

**[5562]-38**

[Total No. of Pages : 2

**M.E. (E & TC) (VLSI & Embedded Systems)  
FAULT TOLERANT SYSTEMS  
(2013 Pattern) (Semester-III) (Credit System)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Neat diagrams must be drawn whenever necessary.*
- 2) *Assume suitable data, if necessary.*
- 3) *Solve any five questions.*

**Q1) a)** Write a short note on: External & internal models. **[4]**

b) What is statistical fault analysis? **[6]**

**Q2) a)** Describe the various trade-offs which need to be considered for DFT. **[6]**

b) Discuss the concept of hardcore. **[4]**

**Q3) a)** Explain the significance of an intersection operator with its table. **[5]**

b) Construct a binary decision diagram for  $f = \bar{a}bc + a\bar{b}c + abc$  considering "a" as root node. **[5]**

**Q4) a)** Explain the following concepts with respect to the design for testability (DFT) technique. **[6]**

i) Monostable multivibrators

ii) Oscillators & clocks.

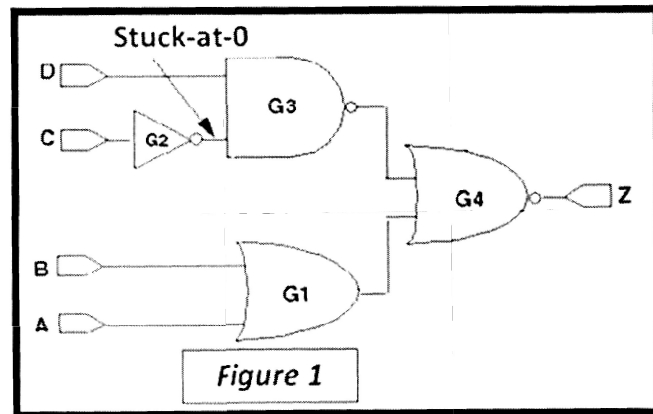
b) Write a short note on fault sampling. **[4]**

**Q5) a)** List & explain various levels of modeling. **[3]**

b) Draw & explain state diagram of TAP controller. **[7]**

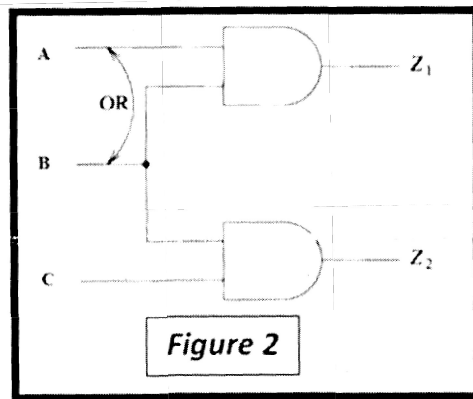
**P.T.O.**

- Q6)** a) With the help of suitable schematic explain the simulation process. [5]  
 b) Find the test vector to detect stuck-at-0 fault at the output of G2 gate in circuit shown in Figure 1. [5]



- Q7)** a) Define the following terms: [4]  
 i) Explicit fault model  
 ii) Implicit fault model  
 b) With the help of neat diagram explain the working of IEEE 1149.1 test bus circuitry. [6]

- Q8)** a) Define bridging fault. Find test vector that determine the OR bridging fault between input A & B in circuit shown in Figure 2. [5]



- b) With the help of suitable diagram explain the triple modular redundancy (TMR) technique used in fault tolerant design. [5]



Total No. of Questions : 8]

SEAT No. :

**P5221**

[Total No. of Pages : 2

**[5562] - 39**

**M.E. (Information Technology)**  
**ADVANCE COMPUTER ARCHITECTURE**  
**(2013 Course) (Semester - II) (514409)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

- Q1)** a) Describe Flynn's classification for different types of computer systems. Discuss MIMD & SIMD in detail. [4]  
b) Explain various types and levels of parallelism with neat diagram. [4]  
c) Discuss the limitations of Instruction Level parallelism. [2]
- Q2)** a) Explain the overcoming of the data hazards with dynamic scheduling. [4]  
b) What makes pipelining hard to implement? [4]  
c) Differentiate between data dependence and control dependence with example. [2]
- Q3)** a) Define Thread-Level Parallelism. How multithreading uses Thread-Level parallelism? [4]  
b) Discuss the limitations on ILP for Realizable Processors. [4]  
c) Explain Hardware based speculation. [2]
- Q4)** a) What is an Interconnection Network? Explain Buses and crossbar switches for Interconnection Networks. [4]  
b) Discuss the various cache coherency issues. [3]  
c) Write a note on snooping protocol. [3]

**P.T.O.**

- Q5)** a) Explain the Software and hardware multithreading in details. [4]  
b) Write a note on SUN CMP architecture. [3]  
c) Explain design issues in multi-core architecture. [3]
- Q6)** a) Explain the Memory Optimizations in the context of protection. [4]  
b) Discuss about the advanced optimizations of cache performance. [4]  
c) Explain memory hierarchy design. [2]
- Q7)** a) Discuss the Recent Architectural trends in Computer architecture. [5]  
b) Write notes on : [5]  
i) Computational models  
ii) Sequential Control Flow
- Q8)** a) Explain various Multicore Memory Issues. [5]  
b) Explain Intel Core DUO architecture with neat block diagram. Address the different multi-core issues in this architecture. [5]



**M.E. (Computer Engineering)**  
**APPLIED ALGORITHMS**  
**(2013 Pattern) (Semester - I) (510101)**

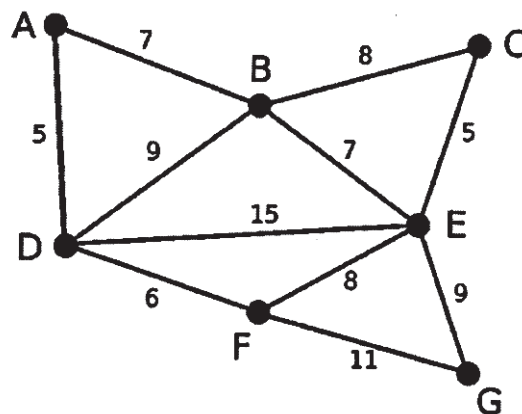
Time : 3 Hours]

[Max. Marks : 50

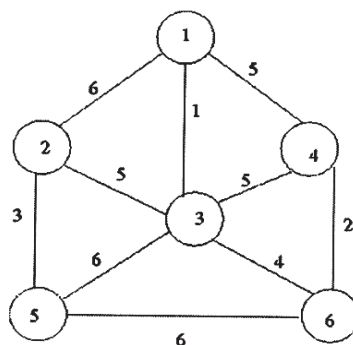
Instructions to the candidates:

- 1) Q.No.1 is compulsory. Solve any five questions from Q.No.2 to Q.No. 8.
- 2) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right side indicate full marks.
- 3) Assume suitable data if necessary.

- Q1) a)** Explain asymptotic notations: Big O, Omega, and Theta notations with suitable example. State standard complexity classes. [5]
- b) Write KRUSKAL's algorithm of minimum spanning tree using Greedy approach and find out the minimum spanning tree using KRUSKAL's algorithm. [5]



- Q2) a)** Write an algorithm for Quick sort and discuss its complexity. [4]
- b) Find the cost of minimum spanning tree of the given group by using PRIM's algorithm. [4]





- Q3)** a) Write an algorithm for binary search. Derive its time complexity. [4]  
 b) Find an optimal solution to following instance of knapsack problem using Greedy Approach- [4]  
 $n = 6, m = 16, (p_1, p_2, p_3, p_4, p_5, p_6) = (6, 2, 1, 8, 3, 3)$   
 $(w_1, w_2, w_3, w_4, w_5, w_6) = (6, 10, 3, 5, 1, 3)$

- Q4)** a) Write short note on: [4]  
 i) Absolute Approximation  
 ii) Epsilon Approximation  
 b) Solve the following instance of Bin Packing using approximation algorithm. [4]  
 $L=10, n=6, (l_1, l_2, l_3, l_4, l_5, l_6) = (5, 6, 3, 7, 5, 4).$

- Q5)** a) Write an algorithm to compute convex hull using Graham's scan algorithm. [4]  
 b) Discuss the closest pair problem and any two its applications. [4]

- Q6)** a) What are the standard and slack forms of linear programming? [4]  
 b) State and prove Linear Translation theorem. [4]

- Q7)** a) The number of hardware failures of a computer system in a week of operation has the following probability mass function. [4]

No. of failures	0	1	2	3	4	5	6
Probability	0.18	0.28	0.25	0.18	0.06	0.04	0.01

Find the variance of the number of failures in a week.

- b) Explain Maximum Flow with suitable examples. [4]
- Q8)** a) What are randomized algorithms? Explain advantages and disadvantages of randomized algorithms. [4]  
 b) Define Expectation, Moments, and variance and give the significance of small and large variance. [4]



Total No. of Questions :8]

SEAT No. :

**P5222**

**[5562]-40**

[Total No. of Pages :3

**M.E. (Information Technology)**  
**NETWORK PROGRAMMING**  
**(2013 Pattern) (Semester-III) (514414)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

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

- Q1)** a) Discuss four segments required in TCP connection termination with diagram showing the working scenario of connection termination. [4]
- b) There are certain limits affect the size of datagrams, describe how these limits can affect the data transmits by an application? [4]
- c) List out different types of messages exchanged across a routing socket with brief descriptions. [2]
- Q2)** a) Write a program using TCP socket to perform operations like addition and subtraction of two integer numbers, where multiple clients can request to the concurrent server for a specific task to be performed. [4]
- b) What are the two actions performed by the listen function? Explain the working of listening socket with diagrammatic representation using two queues. [2]
- c) Using diagrammatic representation discuss UDP echo server and echo client with pseudo codes of client and server processes using UDP sockets. [4]

*P.T.O.*

- Q3)** a) Explain about the state transition diagram used for the description of working of TCP connection between client and server. List our different states separately for connection establishment and connection termination. [4]
- b) What is TIME\_WAIT state TCP with respect to network programming? Discuss the reasons due to which TIME\_WAIT state occurs in TCP connections. [4]
- c) Describe in brief about passive open and active open in client/server communication using TCP. [2]
- Q4)** a) Write different steps Ipv6 server uses in handling of Ipv4 TCP clients. [4]
- b) Discuss interoperability in communications of IPv4 applications and Ipv6 applications. Also describe about the combinations of clients and servers using either IPv4 or IPv6. [3]
- c) With clear diagrammatic representation describe IPv6 server on dual-stack host. [3]
- Q5)** a) Discuss about the working of unicast and broadcast with examples of unicast and broadcast UDP datagrams. [4]
- b) SNTP is used to synchronize clocks across a WAN or a LAN, how it works to provide clock synchronization in communication? Give some examples of NTP packet formats used for synchronization. [3]
- c) Write logical points about multicasting on a single LAN. How multicasting is beneficial on WANs, discuss with example in which five LANs connected with five multicast routers. [3]
- Q6)** a) Explain the working of SNTP with a detail example showing its use in the communications. [4]
- b) Describe the working of resolvers along with clients and name servers with appropriate diagrammatic representations. [4]
- c) Write in brief about the working of DNS to map between hostname and IP address. [2]

- Q7)** a) Discuss the issues related to thread specific data in detail. Also discuss about the working of POSIX threads in the networking environments. **[5]**
- b) Write a program using POSIX thread to implement echo server using one thread per client. Program should contain clear comment about the functions used in the program. **[5]**
- Q8)** a) With proper pseudo code and comments describe the working of TCP concurrent server and client. **[5]**
- b) Explain about TCP Preforked Server in detail with diagrams used to describe its working in the real networking environment. **[5]**



Total No. of Questions : 8]

SEAT No. :

**P5223**

**[5562]-41**

[Total No. of Pages : 2

**M.E. (Instrumentation & Control)**  
**(Process and Biomedical Instrumentation)**  
**MATHEMATICAL METHODS IN INSTRUMENTATION**  
**(2013 Pattern) (Semester-I)**

*Time : 2 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *Assume suitable data if necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of calculator is allowed.*

- Q1)** a) Define Euclidean inner product and Euclidean norm of a vectors. [2]  
b) Examine whether the set of vectors  $u = (2, 3, -1)$ ,  $v = (-1, 4, 2)$ ,  $w = (1, 18, -4)$  are linearly dependent or independent. [4]  
c) Determine basis and dimension of vectors  $(3, 8, -3, -5)$ ,  $(1, -2, 5, -3)$ ,  $(2, 3, 1, -4)$  in a vector space  $V = \mathbb{R}^4$ . [4]
- Q2)** a) Show that the set  $B = (\bar{u}_1, \bar{u}_2, \bar{u}_3)$  where  $\bar{u}_1 = (0, 1, 0)$ ,  $\bar{u}_2 = (1, 0, 1)$ ,  $\bar{u}_3 = (1, 0, -1)$  is an orthogonal basis of  $\mathbb{R}^3$ . [5]  
b) Obtain orthonormal vectors from the following vectors (Use Gram-Schmidt method)  $\bar{u}_1 = (1, -3)$ ,  $\bar{u}_2 = (2, 2)$ . [5]
- Q3)** a) Use Runge kutta method of fourth order to solve  $\frac{dy}{dx} = \sqrt{x+y}$ ,  $y(0) = 1$ , to find  $y$  at  $x = 0.2$  taking  $h = 0.1$ . [5]  
b) Solve by Gauss-Seidal iteration method. [5]  
 $27x_1 + 6x_2 - x_3 = 85,$   
 $6x_1 + 15x_2 + 2x_3 = 72,$   
 $x_1 + x_2 + 54x_3 = 110.$

*P.T.O.*

**Q4) a)** Determine the value of  $y$  when  $x = 0.1$ , by euler modified method, given that  $\frac{dy}{dx} = x^2 + y$ ,  $y(0) = 1$  and  $h = 0.05$ . [5]

- b) If the probability that an individual suffers a bad reaction from certain injection is 0.001, determine the probability that out of 2000 individual [5]
- exactly 3.
  - more than two individual.
  - None, will suffers a bad reaction.

**Q5) a)** A continuous random variable  $X$  has a probability density function given by  $f(x) = 2e^{-x}$ ,  $x > 0$  and  $f(x) = 0$ ,  $x \leq 0$ . [5]

Find

- $E(X)$
  - $E(X^2)$
- b) Explain the terms : [5]
- Moments.
  - Moments Generating Function.

**Q6) a)** A joint PDF of two continuous random variable  $X$  and  $Y$  is  $f(x, y) = cxy$ ,  $0 < x < 4$ ,  $1 < y < 5$  and  $f(x, y) = 0$ , otherwise [6]

- Find the value of constant  $C$ .
  - Find  $p[1 < x < 2, 2 < y < 3]$ .
  - Find  $p[x \geq 3, y \leq 2]$ .
- b) Explain Bay's theorem with suitable examples. [4]

**Q7) a)** Find singular value decomposition of the matrix  $A = \begin{bmatrix} 2 & -1 \\ 2 & 2 \end{bmatrix}$ . [5]

- b) Let  $R^4$  have a Euclidean inner product, Find the cosine of angle between the vectors  $\bar{u} = (-1, 2, 3, 4)$  and  $\bar{v} = (4, 1, 2, 1)$ . [5]

OR

**Q8) a)** The first four central moments of a distribution are 0, 2.5, 0.7 and 18.75. Comment on the skewness and kurtosis of the distribution. [5]

- b) If on an average one ship in every ten is wrecked, find the probability that out of five ship expected to arrive, 4 at least will arrive safely. [5]



Total No. of Questions : 7]

SEAT No. :

**P5224**

[Total No. of Pages : 2

**[5562]-43**

**M.E. (Biomedical Instrumentation & Control)**

**ANALYTICAL INSTRUMENTATION**

**(506203) (2013 Course) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Figure to the right side candidates indicate 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)** List Advantages and disadvantages of Instrumental method over chemical analysis method. **[5]**

b) Explain following term with suitable example (any one) **[5]**

i) Quantitative analysis

ii) Qualitative Analysis

**Q2) a)** List Various IR detector, Explain any one type of IR Detector with neat sketch. **[5]**

b) List Various Types of nebulizer, Explain Babington types nebulizer with sketch. **[5]**

**Q3) a)** Explain Single beam fluorimeter with neat sketch. **[5]**

b) Explain Direct coupled plasma (ICP) with neat sketch. **[5]**

**Q4) a)** Explain Magnetic deflection mass spectrometer with neat sketch. **[5]**

b) Explain with neat sketch Raman Spectrometer. **[5]**

**P.T.O.**

- Q5)** a) Explain Gas Chromatography With neat sketch. [5]  
b) Explain Reciprocating pump used in HPLC with neat sketch. [5]
- Q6)** a) Explain the term Chemical Shift used in NMR Spectroscopy with neat sketch. [5]  
b) Explain Proportional counter with neat sketch. [5]
- Q7)** a) Explain NMR Spectroscopy with neat sketch. [5]  
b) Explain the experimental setup of Voltametry with neat sketch . [5]





Total No. of Questions : 6]

SEAT No. :

**P5225**

**[5562]-44**

[Total No. of Pages : 1

**M.E. (Instrumentation & Control) (Process & Biomedical)**

**RESEARCH METHODOLOGY**

**(2013 Pattern) (Semester - I) (506104)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Solve any five questions.*
- 2) *Neat diagram must be drawn whenever necessary.*
- 3) *Figure to the right indicates full marks.*
- 4) *Use of electronic pocket calculator.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) What is the relevance of Setting objectives in research? [5]  
b) How are the objectives set? [5]
- Q2)** a) How do objectives help in hypothesis formulation? Explain and illustrate. [5]  
b) Discuss interview as a technique of data collection. [5]
- Q3)** a) Explain in brief role of DSP in removing noise from collected data. [5]  
b) Explain criteria of good research. [5]
- Q4)** a) What are static and dynamic characteristics of instruments used in experimental setup? [5]  
b) What is the procedure for testing hypothesis? [5]
- Q5)** a) Which method of primary data, do you think, is the best and why? [5]  
b) Explain different plots to shows the performance curves in research study. [5]
- Q6)** a) Discuss in brief Principal component analysis. [5]  
b) Write note on: Design of the research project. [5]



Total No. of Questions : 5]

SEAT No. :

**P5226**

**[5562]-45**

[Total No. of Pages : 1

**M.E.(Instrumentation & Control) (Biomedical)**

**TRANSDUCER DESIGN**

**(2013 Pattern) (Semester - II) (506207)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*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) *Use of electronic pocket calculator.*
- 5) *Assume suitable data, if necessary.*

**Q1)** Attempt any two of the following.

- a) Explain general design guidelines for transducers design. [5]
- b) Explain importance of sensors and transducers in biomedical measurements. [5]
- c) Discuss radioactive radiations detector used in biomedical applications. [5]

**Q2)** Attempt any two of the following

- a) Explain design of capacitive level sensor. [5]
- b) With neat sketch explain importance of demodulator and low pass filter in design of LVDT. [5]
- c) Explain temperature measurement system by using RTD in detail. [5]

**Q3)** Attempt any two of the following

- a) Write note on torque measurement using strain gauge. [5]
- b) Give classification of level transducers and discuss any one in detail. [5]
- c) Explain different chemical sensors with their applications. [5]

**Q4)** Attempt any two of the following

- a) Explain working of electromagnetic flowmeter with its advantages. [5]
- b) List different biosensors with their biomedical applications. [5]
- c) What is MEMS? Explain manufacturing process for MEMS in detail. [5]

**Q5)** Attempt any two of the following

- a) Discuss design techniques for nano sensors. [5]
- b) List different gas sensors and explain any two in detail. [5]
- c) Explain LASER application in printing operations. [5]



Total No. of Questions : 8]

SEAT No. :

**P5227**

**[5562]-46**

[Total No. of Pages : 2

**M.E. (Instrumentation and Control) (BioMedical)**

**DIGITAL IMAGE PROCESSING**

**(2013 Course) (Semester-II) (506208)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Solve any five questions.*
- 2) *Assume suitable data if necessary.*
- 3) *Use of Calculators, log tables, charts is allowed.*
- 4) *Figures to the right indicate full marks.*

**Q1) a)** Explain hardware used in digital image processing. **[5]**

b) Explain the characteristics of image digitizer. **[3]**

c) Draw the block diagram of fundamental steps in digital image processing system. **[2]**

**Q2) a)** Explain brightness adaptation and discrimination. **[4]**

b) Explain pixel connectivity. **[4]**

c) Define path and length of path. **[2]**

**Q3)** Obtain the 2D DFT and 2D DCT of the following image. **[10]**

1 2 3  
4 5 6  
7 8 9

**Q4) a)** Enhance the following image using Laplacian derivative filter. **[5]**

1 2 3  
4 5 6  
7 8 9

b) Explain image enhancement in frequency domain. **[5]**

**P.T.O.**

- Q5)** a) Explain weiner filter. [5]  
 b) Explain digital image resoration system. [3]  
 c) List image restoration techniques. [2]

- Q6)** a) Explain discontinuities detetction techniques with suitable examples. [5]  
 b) Explain fourier discriptors. [3]  
 c) Write soble and canny operators for edge detection. [2]

- Q7)** a) Enhance the following image using average low pass filter. [5]

1 2 3  
 4 5 6  
 7 8 9

- b) Detect edges in the following image using sobel operator. [5]

1 0 1  
 0 1 0  
 1 0 1

- Q8)** a) Explain minimum, maximum and median filters for image enhancemnet. [5]  
 b) Enlist boundry descriptors and explain any one with suitable example. [5]



Total No. of Questions : 8]

SEAT No. :

**P5228**

[Total No. of Pages : 2

[5562] - 47

**M.E. (Instrumentation & Control) (Biomedical Engineering)**  
**COMMUNICATION PROTOCOLS FOR INSTRUMENTATION**  
**(2013 Course) (Semester - II) (506209)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Solve any 5 questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat diagram wherever necessary.*
- 4) *Assume suitable data if necessary.*

- Q1)** a) List and explain the information contained in Segment drawings. [4]  
b) Explain the hierarchical communication model in Process Automation. Also discuss the Network requirements at different levels. [4]  
c) Explain the following network blocks: [2]  
i) Switches  
ii) Bridge
- Q2)** a) Explain the Frequency Hopping Spread Spectrum in Bluetooth Protocol. [4]  
b) How does redundancy handle failure of physical medium in Fieldbus? [4]  
c) Explain Synchronous Communication with neat waveform. [2]
- Q3)** a) Explain the requirements of the sensor level networks and list any two protocols used in this level. [4]  
b) Explain the role of Ethernet in Communication Protocols. [4]  
c) List any two physical network design rules applying to spurs in Profibus PA. [2]
- Q4)** a) List and explain any four teams involved along with their responsibilities in implementing Fieldbus on a sizable automation project. [4]  
b) List any four technical specifications of Data Highway Plus. [4]  
c) Explain the token passing method used for bus arbitration. [2]

**P.T.O.**

- Q5)** a) Explain the Resource block, Transducer block and function block in Fieldbus devices. [5]  
b) Draw and explain the various topologies applied to networks. [3]  
c) Explain the classes of HART Commands. [2]
- Q6)** a) With a neat diagram explain the typical Profibus control network in a processing facility. [5]  
b) Explain the role of Ethernet in communication protocol. [3]  
c) Explain terminations and its use with respect to Fieldbus devices. [2]
- Q7)** Write short notes:
- a) Wi Fi [5]  
b) Grounding Schemes for IEC 61158-2 segment [5]
- Q8)** a) Write a short note on MODBUS RTU protocol. [5]  
b) Explain the applications of Fieldbus in Hazardous and Non Hazardous area. [5]



Total No. of Questions : 8]

SEAT No. :

**P5229**

**[5562]-48**

[Total No. of Pages : 2

**M.E. (Biomedical Instrumentation)**  
**MEDICAL IMAGING TECHNIQUES**  
**(2013 Course) (Semester-III) (606201)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any FIVE questions.*
- 2) *Use of scientific calculator is allowed.*
- 3) *Draw diagrams wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**SECTION-I**

- Q1)** a) Explain the role of energy in medical imaging. [4]  
b) Explain how viewing conditions affect image visibility. [4]  
c) What is Confusion Matrix? [2]
- Q2)** a) Describe the Schlieren system used to visualize the ultrasound field. [5]  
b) What is the function of a collimator in an X-ray machine. Explain with the help of a neat diagram. [5]
- Q3)** a) Define Optical Density. Elaborate the concept for radioopaque and radioluscent materials. [5]  
b) What is the need of automatic exposure control in Mammography unit? [3]  
c) What is Selective filtration? How it is achieved? [2]

***P.T.O.***

- Q4)** a) Define Free Induction Decay. How does it help in identifying the problem? [4]  
b) Explain the calibration procedure used for CT Scanner. [4]  
c) What is Doppler Effect in ultrasound? [2]
- Q5)** a) Describe Imaging pulse sequence in MRI. [5]  
b) Write short note on 'Xero Radiography'. [5]
- Q6)** a) What is the need of compression in Mammography? [3]  
b) What are the three basic parameters measured in ultrasound and how do they help in image formation. [5]  
c) What is the purpose of guide wire in Angiography? [2]
- Q7)** a) List the transmission modes of ultrasound. Explain Pulsed Doppler mode of transmission. [4]  
b) What are the advantages of Nuclear magnetic resonance over other imaging techniques. [4]  
c) What is the need of mechanical matching in ultrasound transducer? How it is achieved? [2]
- Q8)** a) Explain the principle of Positron Emission Tomography. With the help of a diagram describe various building blocks of PET scanner. [5]  
b) What different types of particles are emitted in radioactive emission? Explain the difference between X-ray and gamma emission. [5]





Total No. of Questions :8]

SEAT No. :

**P5230**

**[5562]-49**

[Total No. of Pages :2

**M.E. (Instrumentation and Control) (Biomedical Instrumentation)**

**ADVANCED DIGITAL SIGNAL PROCESSING**

**(2013 Pattern) (Semester-III) (606202)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Solve any five.*
- 2) *Figures to the right side indicate full marks.*

- Q1)** a) Define Wigner Ville Distribution and state its properties. [4]  
b) Define Time frequency Distribution. Discuss its need with suitable application. [4]  
c) Define STFT. [2]
- Q2)** a) Obtain the UP sampling of the causal signal  $x(n)=n/2$ , by the factor of 4. [5]  
b) Explain Decimation with polyphase filters. [5]
- Q3)** a) Discuss SSS and WSS processes. [5]  
b) Explain behaviour of linear systems with stochastic signals. [5]
- Q4)** a) Explain Blackman-Tueky method of PSD estimation. [4]  
b) Define PSD and ESD. [2]  
c) Explain AR models for PSD estimation. [4]
- Q5)** a) Explain LMS algorithm for adaptive filter design. [5]  
b) Explain Echo cancellation in communication channels using adaptive filters. [5]

*P.T.O.*

- Q6)** a) Explain International broadcasting standards. [5]  
b) Explain lossy and lossless of data compression [5]
- Q7)** a) Explain polyphase filters for multirate systems. [5]  
b) Explain the need of data compression with suitable example. [5]
- Q8)** a) Discuss spectral factorization. [5]  
b) Discuss power spectrum estimation. [5]



Total No. of Questions : 6]

SEAT No. :

**P5188**

**[5562]-5**

[Total No. of Pages : 2

**M.E.(Computer Engineering)**  
**HIGH PERFORMANCE DATABASE**  
**(2013 Course) (Semester - I) (End Sem.) (510102)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *All six questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Assume suitable data, if necessary.*

**Q1)** a) Why is database tuning important? What are the technique and when should we apply them; settling for a weaker normal form, de-normalization and horizontal and vertical decomposition. **[4]**

b) Discuss the Metrics used to evaluate database system? Why do we have standardized database benchmarks. **[4]**

**Q2)** a) Explain Advanced transaction models for Distributed Database Framework. **[4]**

b) Explain with example how global queries are fragmented for distributed databases. **[4]**

**Q3)** a) Why is automatic index tuning a hard problem? Give an example. **[4]**

b) Write a short note on (Any One) **[4]**

i) Transaction Management in Multidatabases

ii) Main Memory Database

**Q4)** a) Write XML representation of the following nested-relational schema **[5]**

*Customer = (ename, ChildrenSet setof(Children), SkillsSet setof(Skills))*

*Children = (name, Birthday)*

*Birthday - (date, month, year)*

*Skills - (type, ExamsSet setof(Exams))*

*Exams = (year, city)*

**P.T.O.**

Write following queries in XQuery

- i) Find the names of all customers who have a child who has a birthday in July.
  - ii) Find those customers who took an examination for the skill type “typing” in the city “Mumbai”
- b) Explain storage of XML data with suitable example. [3]
- Q5)** a) Design the requirements for any Multimedia Database application which consist of semi structured and unstructured data. [5]
- b) Explain Mobility and Personal Databases with suitable example. [4]
- Q6)** a) Discuss large scale data management with Hadoop for suitable business application. [5]
- b) Write a short note on (Any one) [4]
- i) E-Commerce
  - ii) Semi-structured Database



Total No. of Questions : 8]

SEAT No. :

**P5232**

**[5562]-53**

[Total No. of Pages : 2

**M.E. (Petroleum Engineering)**  
**RESEARCH METHODOLOGY**  
**(2013 Pattern) (Semester - I) (512104)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Illustrate your answers with suitable examples and diagrams, wherever necessary.*
- 4) *Write relevant question number before writing the answer.*

- Q1)** a) Define the term Research Methodology. Explain in brief its significance. [4]  
b) Discuss research process in brief with suitable examples. [3]  
c) Explain the steps in process of engineering research work. [3]
- Q2)** a) Discuss the criteria of a good research problem. Explain in brief role of hypothesis in research process. [4]  
b) Choose any one research problem from Petroleum Engineering that is in the news, now-a-days, to conduct research. To find why this problem arises and what could be its effects on a society, prepare a research plan. [4]  
c) Distinguish between primary and secondary data in research work. [2]
- Q3)** a) Discuss various sources of data collection. Explain with example. [4]  
b) Define research design. Discuss in detail the various types of research design. [4]  
c) Discuss how Interview method of research is conducted. Briefly outline the problem faced in conducting interview method. [2]
- Q4)** a) Write a format of a good report indicating different parts and their positioning in the report. [4]  
b) Critically examine the qualitative and quantitative research methods. Elaborate your answer by giving suitable example. [4]  
c) Explain the importance of data interpretation in research. [2]

*P.T.O.*

- Q5)** a) What are the requirements of a good research paper? Explain in brief, the structure of research paper. [4]
- b) What is mean by Research Design? Critically examine the various types of sampling design techniques. [4]
- c) State different components of Research report. [2]
- Q6)** a) Empirical research in India in particulars creates so many problems for the researchers. State the problems that are usually faced by such researchers. [4]
- b) Describe some of the major projective techniques and evaluate their significance as tools of scientific research. [4]
- c) Write a brief note on : “Ethics in Research”. [2]
- Q7)** a) Discuss the various tools and techniques of data collection and analysis used in research. [5]
- b) Discuss different types of Probability distributions. [5]
- Q8)** a) Write notes on : [5]
- i) ANOVA.
- ii) IPR and Technology Transfer.
- b) Bring out the differences between questionnaire and schedule and describe the different types of questions that may go into a questionnaire and schedule? [5]



Total No. of Questions : 8]

SEAT No. :

**P5233**

**[5562]-54**

[Total No. of Pages : 2

**M.E.(Petroleum Engineering)**  
**ADVANCED RESERVOIR ENGINEERING**  
**(2013 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

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

- Q1)** a) What are the five types of reservoirs that are encountered? Explain with appropriate figures. [5]  
b) Calculate the mass of methane gas contained at 1000 psi and 68 degree F in a cylinder with volume of 3.20 cu ft. Assume that methane is an ideal gas. [3]  
c) Calculate the density of methane, at the conditions given in above problem? [2]
- Q2)** a) What do you mean by reserves? Explain all types of reserves in detail.[5]  
b) What do you mean by areal and vertical sweep efficiency? Explain with figures. [3]  
c) What do you mean by the z-factor? Explain its relevance. [2]
- Q3)** a) Explain how is chemical EOR methods are different than thermal EOR methods. [5]  
b) Write a detailed note on MEOR. [3]  
c) What do you mean by ASP flooding? What is the contribution of each of the individual elements? [2]
- Q4)** a) Write a detailed note on in-situ combustion, along with an appropriate diagram. [5]  
b) What do you mean by CO<sub>2</sub> flooding? How different is it from inert gas flooding? [3]  
c) Explain in detail, how interfacial tension is important in EOR? What are its units, and how does it affect the transition zone. [2]

**P.T.O.**

- Q5) a)** What do you mean by wettability, and how does it affect an EOR strategy? [5]
- b) What do you mean by reaction kinetics? Explain its relevance. [3]
- c) Explain what do you mean by transient, pseudo-steady and steady state flow regimes in detail. [2]

- Q6) a)** What do you mean by relative permeability and relative permeability ratio? Explain with diagrams. [4]
- b) What is the difference between SAGD and Huff-and-puff method? Explain in detail. [4]
- c) Write a short note on saturation and effective permeability. [2]

- Q7) a)** Dry air is a gas mixture consisting essentially of Nitrogen, oxygen, and small amounts of other gases. Calculate the apparent molecular weight of air, given its composition: [5]

Component	Composition, mole fraction
Nitrogen	0.78
Oxygen	0.21
Argon	0.01

- b) Thermal EOR, with its screening criteria. [5]

- Q8) a)** Explain in detail, what do you mean by LTO and HTO. [5]
- b) Calculate the partial pressure exerted by Methane in the following gas, when the gas is at a pressure of 750 psia. Assume that the gas is a mixture of ideal gases: [5]

Component	Composition, mole fraction
Methane	0.85
Ethane	0.10
Propane	0.05





Total No. of Questions : 8]

SEAT No. :

**P5234**

**[5562]-55**

[Total No. of Pages : 2

**M.E. (Petroleum Engineering)**  
**ENVIRONMENTAL TECHNOLOGY IN**  
**PETROLEUM ENGINEERING**  
**(2013 Pattern) (Semester-II) (512108) (Credit)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) Attempt any five questions.*
- 2) Figures to the right side indicate full marks.*
- 3) Illustrate your answers with suitable examples and diagrams, wherever necessary.*
- 4) Write relevant question number before writing the answer.*

- Q1)** a) Explain significance of Environmental Management System. [4]  
b) Explain different types of spills and its treatment methods. [3]  
c) Write a note on 'DDM' and Kyoto protocols. [3]
- Q2)** a) What is down hole oil water separator? Discuss about types and advantages of down hole oil water separator. [4]  
b) What are the causes of oil spills? Describe chemical methods to prevent oil spills. [3]  
c) What are the allowable limits for disposal of wastewater on to the land, in to sea and river as per the IS standards? [3]
- Q3)** a) Discuss about environmental control technology in drilling fluid and produced water. [4]  
b) Discuss in details chemical and Biological methods of oil spill control in marine environment. [3]  
c) Describe waste water treatment technology in oil industry. [3]

***P.T.O.***

- Q4)** a) What is meant by mud dispersibility? Explain how selection of mud based on environmental friendly decisions combat borehole stability problems? [4]
- b) Explain the method of sludge for removal of heavy metals form wastewater? [3]
- c) Discuss about potential impacts of oil industry on the environment. [3]
- Q5)** Write notes on : [10]
- a) Disaster management
- b) QRA (Qualitative Risk Analysis)
- Q6)** a) What do you mean Environmental impact assessment? Explain in brief with suitable example. [4]
- b) What are the different chemicals used in bulk in drilling muds? How do they affect the environment? [3]
- c) Explain in brief responsibilities of team members in typical HAZOP study. [3]
- Q7)** a) Describe various types of audits involved in environment management of oil industry. [5]
- b) Discuss in brief various Environmental Regulations, Health and safety laws applicable in Oil and Gas Industries. [5]
- Q8)** Write notes on [10]
- a) Risk Analysis and management
- b) Petroleum site assessment for environment impact.



Total No. of Questions : 8]

SEAT No. :

**P5235**

[Total No. of Pages : 2

**[5562] - 56**

**M.E. (Petroleum Engg.)**

**ADVANCED PRODUCTION ENGINEERING**

**(2013 Pattern) (Semester - II) (512109)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of logarithmic tables, Slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Explain various emulsion treating methods that are used in oil field. [5]  
b) What is ALT? Classify different types of artificial lifting techniques. [3]  
c) Draw and explain typical VLP plot. [2]

- Q2)** a) Explain working of a GGS. [5]  
b) Which method of gas lifting you will recommend for low bhp, low P. I. wells? Explain it with neat schematic sketch. [3]  
c) Draw neat schematic sketch of any one kind of horizontal separator. [2]

- Q3)** a) Draw and explain petroleum production system. [4]  
b) Draw neat schematic sketch of a three phase vertical separator and write its advantages. [4]  
c) Write inflow and outflow equations for well head and bottom hole of a wellbore. [2]

- Q4)** a) Decide the sizing of a horizontal treater for a treating temperature of 120 °F, 140°F and 160°F. Values of tested oil viscosity are 10, 8 and 6 cp respectively at these temperature readings. Diameter of water droplet to be settled from oil at these temperature readings is given as 300, 200 and 100 microns respectively. Other data: Oil gravity 30° API. Oil flow rate 4000 bbl/day. Inlet oil temperature 80° F. Water sp. Gravity 1.01. Retention time required is 12 minutes. Inlet BS&W = 6%. Outlet BS&W=2%. [5]

***P.T.O.***

- b) Discuss those features of a separator, that are effective in separation of oil, gas and water inside it. [3]
- c) Write applications of three phase horizontal separator. [2]
- Q5)** a) Write usability of ESP only in terms of excellent/good/fair/poor in a tabular form for following well conditions. High PI, low GOR, adaptability to deviated wells, capability to produce sand, low volume lift capability and ability to handle paraffinic crude oil. [5]
- b) Write the working mechanism of intermittent gas lifting technique. [3]
- c) Classify and write, different types of storage tanks that are used in oilfield. [2]
- Q6)** a) Draw and explain in brief, surface or down hole ‘dynamometer card’, for various lift conditions, representing performance of SRP system.[4]
- b) Write and discuss the objectives of production optimization in stage separation process. [3]
- c) Discuss the working mechanism of PCP system. [3]
- Q7)** a) Neglect flowing frictional resistance and find FBHP required, in following cases. Given: Well depth = 5000 ft. Wellhead pressure, Pwh value is given below for each case. [5]
- i) Well is standing full of water, sp.gravity = 1.06. Pwh = 200 psi
- ii) Well is standing full of 38° API. Pwh = 400 psi.
- b) Draw typical schematic sketch of a subsea production system. [5]
- Q8)** a) Discuss casing pressure operated gas lift valve in detail. [5]
- b) Discuss general design procedure for any one type of oil and gas separator. [5]



Total No. of Questions : 8]

SEAT No. :

**P5236**

**[5562]-57**

[Total No. of Pages : 4

**M.E. (Petroleum Engineering)**  
**ADVANCED WELL TESTING**  
**(2013 Pattern) (Semester-III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculators is allowed.*
- 5) *Assume Suitable data if necessary.*

**Q1)** a) Which equations are used for deriving the diffusivity equation? And why? Explain the significance of each of the equation used. [5]

b) With diagrams, explain the difference between superposition in time and space. [3]

c) What is the difference between transient, pseudo steady state and steady state flow regime? Explain with appropriate diagrams. [2]

**Q2)** a) What do you mean by exponential integral function? Explain its significance in well testing. Draw the function and its log approximation vs.  $x$  on a semilog plot. [5]

b) Explain the concept of constant and changing wellbore storage. [3]

c) How is gas well testing different from oil well testing? Explain in detail. [2]

*P.T.O.*

**Q3) a)** Given is a dataset for a PBU test. Compute the skin factor, permeability and original reservoir pressure from the data: [7]

- i) Viscosity - 0.9 cp
- ii)  $R_w = 0.3$  ft
- iii)  $C_t = 17 \times 10^{-6}$  psi<sup>-1</sup>
- iv)  $P_{wf} = 1175$  psi
- v)  $B = 1.35$  rb/stb
- vi) Porosity = 20%
- vii) Flowrate ,  $q = 400$  stb/d
- viii) Net pay = 25 ft
- ix)  $T_p = 5$  days

Shut-in time, $\Delta t$ (hr)	$p_{ws}$ (psia)
0	1150
2	1794
4	1825
8	1857
16	1875
24	1895
48	1910

b) Explain DST with its different time phases, and a diagram. [3]

**Q4) a)** What is the difference between isochronal and modified isochronal test? [5]

b) Explain the various flow regimes which can be encountered during the interpretation of a typical well test data, along with their figures and the slopes. [3]

c) Explain what is meant by pseudo pressure. [2]

**Q5) a)** Following data was given for a drawdown test on a well, along with the pressure data given in the table: [7]

- i) Viscosity - 0.7 cp
- ii)  $R_w = 0.175$  ft
- iii)  $C_t = 15 \times 10^{-6}$  psi<sup>-1</sup>
- iv)  $P_i = 4000$  psi
- v)  $B = 1.121$  rb/stb
- vi) Porosity = 22%
- vii) Flowrate,  $q = 150$  stb/d
- viii) Net pay = 60ft

t(hours)	P <sub>wf</sub> (psia)
0	4412
0.12	3717
1.94	3633
2.79	3622
4.01	3611
4.82	3605
5.78	3600
6.94	3594
8.21	3580
9.95	3575
14	3570
17.3	3567
20.7	3561
24.9	3555
30	3549
36	3544
43.5	3535
51.5	3532
61.8	3526
74	3520

Find the permeability and skin from the above data.

b) Diagrammatically explain how pseudo-pressure function behaves with pressure. [3]

- Q6)** a) What slopes are observed in a derivative plot of a fractured horizontal well? [4]
- b) Explain Nodal Analysis. What is its use, and its application? [4]
- c) What happens when you change the node position in Nodal Analysis? Explain with graphs. [2]

- Q7)** a) A new oil well produced 400 stb/day for  $2 \pm$  days; then it was shut-in for a pressure buildup test, during which the data in Table below were recorded. The other data were:  $B_o = 1.25$ rb/stb,  $A = 20$  ft,  $\theta = 0.20$ ,  $r_w = 0.29$  ft,  $c, = 19.5 \times 10^6$ , and  $\mu_o = 1.1$  cP. From these data, estimate the formation permeability,  $k$ ,  $p_i$ , and skin factor  $s$ . [7]

Shut-in time, $\Delta t$ (hr)	Horner Time Ratio	$p_{ws}$ (psia)
0	-	1165
2	37.0	1801
4	19.0	1838
8	10.0	1865
16	5.5	1891
24	4.0	1905
48	2.5	1925

- b) Write short notes on Fetkovich and Blasingame decline curves. [3]

**Q8)** Explain in detail, what do you mean by:

- a) Type curves and its usage in well testing. [5]
- b) Bourdet derivative and its impact on pressure transient analysis. [5]





Total No. of Questions :8]

SEAT No. :

**P5237**

**[5562]-58**

[Total No. of Pages :3

**M.E. (Petroleum Engineering )  
ADVANCED WELL CONTROL  
(2013 Pattern) (Semester-III) (512114)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answers any five questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Black 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 blow out? Write and explain the difference between a well kick and blow out. Write the reasons for both to happen. Write also the preventive measures to control and prevent well kick and blow out. [5]
- b) What are well control barriers? Give examples. [3]
- c) Write your considerations for underbalanced drilling program. [2]
- Q2)** a) In view of well control operations explain, well swabbing phenomenon and role of ECD during drilling. [3]
- b) Explain normal pressure and abnormal pressure. List out few reasons for encountering abnormal pressures. [5]
- c) Pump pressure at 11 ppg is 3000 psi. What will be the new pump pressure if mud weight is increased to 12 ppg at same flow rate? [2]
- Q3)** a) What is SIDP, CSIP and kill mud? Explain, how to calculate kill mud weight. [4]
- b) Explain advantages and disadvantages of, 'wait and weight', well control method. [4]
- c) Draw any one diagram of BOPs stack arrangement. [2]

*P.T.O.*

- Q4) a)** What is primary and secondary well control? Explain. [5]
- b) Explain, bullheading and volumetric method of well control in brief. [3]
- c) When tertiary method of well control is used? Explain in brief. [2]

- Q5) a)** Given data: [5]

LOT mud density = 12 ppg

Well TVD = 9800 ft

Well MD = 11500 ft

Casing Shoe TVD = 7500 ft

Casing Shoe MD = 9500 ft

Surface Leak off pressure = 1200 psi

Calculate maximum allowable drill fluid density.

- b) Explain early warning signs of increasing formation pressure while drilling. [3]

- c) Given data: [2]

Well TVD = 1000 ft

Well MD = 11500 ft

Casing Shoe TVD = 7200 ft

Casing Shoe MD = 8700 ft

Gas bubble pressure = 900 psi

Gas volume = 12 bbls

New pressure of gas bubble = 400 psi

Calculate new volume of gas bubble

- Q6) a)** Given data: [4]

Original Mud Weight = 11.7 ppg

Well TVD = 11500 ft

Well MD = 12800 ft

Casing Shoe TVD = 8500 ft

Casing Shoe MD = 9200 ft

SCR@30 SPM = 400 psi

SIDPP = 600 psi

SICP = 750 psi

Calculate kill Fluid Density

- b) Explain gas influx behavior in water based mud and oil based mud. [3]
- c) Write the general design considerations for offshore well control equipment or system such as drilling riser, riser tensioning system etc.[3]
- Q7)** a) Draw neat schematic sketch of an onshore drilling system or operation. Indicate various features and components of it. [5]
- b) Given data: [5]
- Maximum allowable Drilling Fluid Density = 14.0 ppg
- Current Fluid Density = 11.5 ppg
- Well TVD = 9800 ft
- Well MD = 10600 ft
- Casing Shoe TVD = 7500 ft
- Casing Shoe MD = 8600 ft
- Calculate MAASP with current mud.
- Q8)** a) Explain necessary well control measures during drilling, mud circulation, cementation and well completion in brief. [5]
- b) Draw neat schematic sketch of a typical Blow out preventer closing unit arrangement (hydro-pneumatic well control system) Show main components such as accumulators, pumps, Valve, fluid reservoir etc.[5]



Total No. of Questions : 8]

SEAT No. :

**P5238**

**[5562]-59**

[Total No. of Pages : 3

**M.E. (Polymer)**

**MATHEMATICAL AND STATISTICAL METHODS**

**(2013 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt any five questions.*
- 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)** Solve the following system of equations using Gauss-Seidel method :[5]

$$8x_1 + 3x_2 + 2x_3 = 13$$

$$x_1 + 5x_2 + x_3 = 7$$

$$2x_1 + x_2 + 6x_3 = 9$$

b) Use power method to determine the largest eigen value and the corresponding eigen vector of the following matrix A. [5]

$$A = \begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$$

Choose initial vector as  $\bar{X} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ .

**Q2) a)** Find Z-transform of the following (any two) : [6]

i)  $5^k + 6^k, k \geq 0.$

ii)  $k4^k, k \geq 0.$

iii)  $e^{-2k} \sin 3k, k \geq 0.$

*P.T.O.*

b) Find inverse Z-transform of the following (any one) : [4]

i)  $\frac{3z^2 + 2z}{(z-2)(z-1)}$ .

ii)  $\frac{10z}{(z-2)(z-1)}$  using inversion integral method.

**Q3)** a) Solve the difference equation : [5]

$$f(k+1) + \frac{1}{2}f(k) = \left(\frac{1}{2}\right)^k, k \geq 0, f(0) = 0.$$

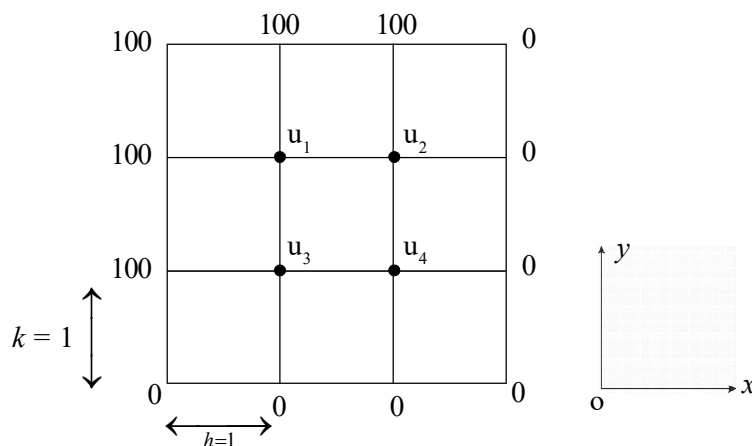
b) Use Gauss-Quadrature three point formula to evaluate  $\int_0^1 \frac{1}{(x+2)} dx$ . [5]

**Q4)** a) Use Runge-Kutta Fourth order method to find  $y$  at  $x = 1.2$ . [5]

Given  $\frac{dy}{dx} = x^2 + y^2, y(1) = 1.5, h = 0.1$ .

b) The values of  $u(x, y)$  on the boundary of the square given below. Evaluate the function  $u(x, y)$  at nodal points 1, 2, 3 and 4 where  $u(x, y)$  satisfies

the equation  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0, h = k = 1$ . [5]



**Q5) a)** Solve the boundary value problem using finite difference scheme. [5]

$$x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 1, y(1) = 0, y(1.4) = 0.0566, h = 0.1.$$

b) Explain explicit finite difference scheme to solve one dimensional heat flow equation. Discuss the stability of the method. [5]

**Q6) a)** Find the extremal of  $\int_0^1 (y')^2 + 12xy \, dx$  with  $y(0) = 0$  and  $y(1) = 1$ . [5]

b) Apply Galerkin's method to solve the boundary value problem  $y'' + y + x = 0$  ( $0 \leq x \leq 1$ ),  $y(0) = y(1) = 0$ , Assuming the approximate solution  $\bar{y}(x) = c_1 x(1-x) + c_2 x^2(1-x)$ . [5]

**Q7) a)** Reduce the following matrix into tridiagonal form using Householder's method : [5]

$$A = \begin{bmatrix} 3 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}.$$

b) Solve the following system of equations using LU decomposition method : [5]

$$\begin{aligned} 3x_1 + x_2 + x_3 &= 4 \\ x_1 + 2x_2 + 2x_3 &= 3 \\ 2x_1 + x_2 + 3x_3 &= 4 \end{aligned}$$

**Q8) a)** The following table gives the number of books issued from a certain library on the various days of the week. [5]

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Number of	120	130	110	115	135	100

books issued

Test at 5% level of significance, whether issuing the book is day dependent.  $\chi_{5;0.05}^2 = 11.07$ .

b) A sample of 6 children in a class revealed an average daily eating of 10, 12, 8, 9, 16, 5 chocolates. The average level of eating chocolates in the class has to be estimated at 90% level of significance using t-distribution. Given  $t = 2.015$  for 5 degree of freedom. [5]



Total No. of Questions : 6]

SEAT No. :

**P5189**

**[5562]-6**

[Total No. of Pages : 2

**M.E. (Computer Engineering)**  
**ADVANCED COMPUTER ARCHITECTURE**  
**(2013 Pattern) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answers to the sections should be written in books.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**Q1)** Explain the Flynn's classification of computer architecture based on the instruction & data stream. **[9]**

OR

Explain the levels of parallelism in program execution. Comment on the grain parallelism. **[9]**

**Q2)** Derive the Amdahl's law for speedup performance. What is proposed for scaled problem in Gustafson's law? **[8]**

OR

Explain the architecture of VLIW & pipelining concept in Very Long Instruction Word architecture. **[8]**

**Q3)** What is virtual memory? Explain the two memory model for multiprocessor systems. **[8]**

OR

Discuss the information related to memory hierarchy. Explain the three dimensions of locality property. **[8]**

**P.T.O.**

**Q4)** What is the importance of arbitration mechanism. Explain the Daisy chain bus arbitration techniques. [8]

OR

State the vector chaining. Explain the SIMD computer organization using distributed memory model. [8]

**Q5)** State the basic mechanism for interposes communication. Discuss message passing techniques in parallel programming. [8]

OR

Explain the various language features for the parallel programming with existing compiler development. [8]

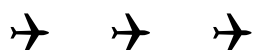
**Q6)** Explain services are provided by grid at layers: [9]

- a) Fabric
- b) Connectivity
- c) Collective
- d) Resource
- e) Application

OR

Explain in brief the following architectures w.r.t. distributed parallel processing: [9]

- a) Cloud computing.
- b) Bimolecular Computing.
- c) Quantum computing.





Total No. of Questions : 8]

SEAT No. :

**P5239**

**[5562]-60**

[Total No. of Pages : 2

**M.E.(Polymer Engineering)  
PRINCIPLES OF MANAGEMENT  
(2013 Course) (Semester - I) (Credit)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Attempt Any Five questions.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Illustrate your answers with suitable examples and diagrams, wherever necessary.*
- 4) *Write relevant question number before writing the answer.*

- Q1)** a) Explain any four characteristics of management. [4]  
b) List down the managerial functions. [4]  
c) Give the difference between sales and marketing. [2]
- Q2)** a) Explain the importance of planning. [4]  
b) Write a short note on 'Incentives and Motivation'. [4]  
c) State the objectives of process layout. [2]
- Q3)** a) On 1 Jan 2011, Company 'A' purchased a vehicle costing Rs.20,000. The company expects the vehicle to be operational for 4 years and at the end of which it can be sold for Rs.5,000. Calculate depreciation expense for the year ended 31 Dec. 2014. [4]  
b) Explain the product labeling and packaging with its importance. [4]  
c) Define fixed cost, variable cost and total cost. [2]
- Q4)** a) What is industrial fatigue? Give the methods to reduce fatigue. [4]  
b) Explain the choice and objectives of the technological forecasting. [4]  
c) Give brief idea regarding formal and informal organization. [2]
- Q5)** a) Define organization and types of organization. [4]  
b) What is branding? Give its importance in marketing. [4]  
c) State the objectives of inventory of materials. [2]

*P.T.O.*

- Q6)** a) Explain the financial management with its importance. [4]  
b) What is material inspection? Give its importance in the development of organization. [4]  
c) Give the importance of monitoring in R&D department. [2]
- Q7)** a) From the following particulars, calculate [5]  
i) Breakeven point in terms of sales value and in units.  
ii) Number of units that must be sold to earn profit of Rs.90,000.  
Fixed cost = Rs.72,000  
Selling price per unit = Rs.24  
Variable cost per unit = Rs. 15  
b) What is decision making? Explain the steps involved in decision making. [5]
- Q8)** a) Write notes on: (Any Two) [5]  
i) Product life cycle  
ii) Sources and utilization of funds  
iii) Units of command and direction  
b) What is Market segmentation? Explain its types. [5]



Total No. of Questions : 8]

SEAT No. :

**P5240**

[Total No. of Pages : 2

**[5562]-61**

**M.E. (Polymer Engineering)**  
**ADVANCE POLYMER TECHNOLOGY**  
**(2013 Course) (Semester-I)**

*Time : 3Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

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

**Q1) a)** Write a note on crosslinking. What is gel point? **[5]**

b) What are chiral polymers? Explain their characteristics. **[5]**

**Q2) a)** What is oxidative coupling? Explain with reactions. **[5]**

b) Discuss any one polymer from renewable resources. **[5]**

**Q3) a)** What do you understand by self- assembly in polymers? Explain its importance. **[10]**

**Q4) a)** Write a note on silicone rubbers. **[5]**

b) Explain the concept behind free energy equation. **[5]**

**P.T.O.**

- Q5)** a) What are the structural requirements for light sensitive polymers? [5]  
b) Write a note on acrylic rubbers. [5]
- Q6)** a) Explain phase transfer polymerization. [5]  
b) What is smectic phase? Explain. [5]
- Q7)** a) Write down the structures of any three liquid crystalline compounds. [5]  
b) Explain the applications of polymer thin films. [5]
- Q8)** a) Which are the units that contribute towards heat resistance in polymers? Explain. [5]  
b) Define biopolymers. Give three examples. [5]



Total No. of Questions : 8]

SEAT No. :

P5241

[5562]-62

[Total No. of Pages : 2

**M.E. (Polymer Engineering)**  
**RESEARCH METHODOLOGY**  
**(2013 Pattern) (Semester - I) (509124)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*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 indicates full marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Use of logarithmic tables, slide rule, electronic pocket calculator is allowed.*

- Q1)** a) Discuss the qualities of a researcher and explain different research approaches. [5]  
b) Explain the term Hypothesis and what are the characteristics features of a hypothesis. Explain various objectives of research. [5]

- Q2)** a) Define research and state the significance of research. [6]  
b) Write a note on “Types and Importance of Research Design”. [4]

- Q3)** a) Explain the different sections/formats in a project proposal. [3]  
b) Calculate median from the following data using continuous series. [4]

Marks	No. of students	Marks	No. of students
Less than 5	29	Less than 30	644
Less than 10	224	Less than 35	650
Less than 15	465	Less than 40	653
Less than 20	582	Less than 45	655
Less than 25	634		

- c) What are the agencies for submitting the project proposal? [3]

- Q4)** a) Explain the term Regression Coefficient and calculate the correlation Coefficient if two Regression lines of a sample are  $X + 6Y = 6$  and  $3X + 2Y = 0$  [7]  
b) Explain how to carry out linear regression analysis using computer program. What is the significance of  $R^2$  value. [3]

*P.T.O.*

- Q5) a)** Find coefficient of correlation for the following by Karl Pearson method. [6]

Cost (X)	39	65	62	90	82	75	25	98	36	78
Sales (Y)	47	53	58	86	62	68	60	91	51	84

- b) Weights of 50 year old mothers with 20 year old daughters are given below. Find the weight of the daughter whose mother's weight is 70 kg. [4]

Weight of mothers X	71	65	66	71	70	70	73	72	68	66	67
Weight of daughters Y	62	59	62	69	65	65	64	66	64	65	63

- Q6) a)** Explain general outline relating the presentation of report. [5]  
 b) Discuss in short framework of a research report. Give Dos and Don'ts of Report writing. [5]

- Q7) a)** Explain in detail the process of filing a patent. [3]  
 b) With suitable examples, comment on the relevance of IPR in research field. [4]  
 c) List at least three criteria for patentability. [3]

- Q8) a)** Write a short note on reviewing literature and writing a literature survey. [3]  
 b) Write a note on "Types of Reports". [4]  
 c) Explain Impact Factor of a journal. [3]



Total No. of Questions : 8]

SEAT No. :

**P5242**

**[5562]-63**

[Total No. of Pages : 2

**M.E.(Polymer Engineering)**  
**POLYMER PROCESSING AND TESTING**  
**(2013 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Solve any 5 questions from total 8 questions.*
- 2) *Neat diagram 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) Write a note on contiguous melting model. [4]  
b) Write a note on reactive extrusion. [3]  
c) List the types of products made by the process of rotational molding.[3]
- Q2)** a) Write a detailed note on flood feeding during extrusion and its advantages and disadvantages. [5]  
b) Discuss the test method used for determination of volume and surface resistivity. [3]  
c) Explain the Izod impact test method in details. [2]
- Q3)** a) List the various techniques of switch over in injection molding. Explain any two in details. [5]  
b) Explain the three point and four point bending test used for determining flexural properties of plastics. [3]  
c) List various faults observed in injection moulded products. Suggest remedies for any two. [2]
- Q4)** a) Explain the test method for determining heat distortion temperature and vicat softening point. [4]  
b) Discuss complete line for sheet extrusion with neat figure. [3]  
c) Explain the various arrangements of calendar rolls used in calendaring process with neat sketches. [3]

***P.T.O.***

- Q5)** a) Explain the test method for determining [4]  
i) Flash and self ignition temperature determination  
ii) Limiting oxygen index  
b) Write a note on injection molding of thermosets. [3]  
c) Explain the test method used for determining barrier properties of films. [3]
- Q6)** a) Explain the process of vacuum forming and plug assist thermoforming in details with neat sketches. [5]  
b) Write a note on parison programming. [3]  
c) Explain the test method for determining accelerated ageing test for plastics. [2]
- Q7)** a) Explain the complete line for extrusion of blown film in details with neat figure. [5]  
b) Explain environmental stress cracking for plastics. Describe test method for determination of environmental stress cracking resistance. [5]
- Q8)** a) Explain injection stretch blow molding process in details with reference to PET. [5]  
b) List the non destructive test methods. Explain their importance. Discuss any one in details. [5]





Total No. of Questions : 8]

SEAT No. :

**P5243**

**[5562]-64**

[Total No. of Pages : 2

**M.E. (Polymer Engineering)**  
**POLYMER PHYSICS AND CHARACTERIZATION**  
**(2013 Course) (Semester - II) (Back log)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Solve any 5 questions from total 8 questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume Suitable data, if necessary.*

- Q1)** a) Write a short note on methods used for sample preparation in FTIR technique. [6]  
b) Elaborate about universal calibration plot used in GPC technique. [4]
- Q2)** a) Write a short note on molecular configurations in solution. [4]  
b) With the help of neat diagram explain how the birefringence measurement is carried out. [6]
- Q3)** a) Explain the term theta solvent. Elaborate about its importance. [5]  
b) Explain working principle of scanning electron microscopy. Draw suitable diagram. [5]
- Q4)** a) Elaborate about spin - spin interactions and chemical shifts with respect to NMR. [5]  
b) Write a short note on optical microscopy. [5]
- Q5)** a) Explain how surface tension is measured by contact angle measurement technique. [5]  
b) Explain the term molecular weight distribution and its importance in polymer field. [5]

**P.T.O.**

- Q6)** a) Enlist various modes of polymer degradation. Explain any one in detail. **[6]**  
b) How percent crystallinity of given polymer sample can be calculated from DSC data? **[4]**
- Q7)** a) Explain how thermal stability of polymer can be measured by using TGA technique. **[5]**  
b) Explain in detail how WLF equation is used in predicting transition temperatures. **[5]**
- Q8)** a) Write a short note on proton NMR characterization technique. **[5]**  
b) Explain in detail thermo-mechanical technique used for polymer characterization. **[5]**



Total No. of Questions : 8]

SEAT No. :

**P5244**

[Total No. of Pages : 2

**[5562] - 65**

**M.E. (Polymer Engineering)**

**POLYMER STRUCTURE AND PROPERTIES**

**(2013 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Solve any 5 questions from total 8 questions.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

- Q1)** a) Crystallinity of flexible chain homopolymer (e.g. PE) depends on preparation method. Justify the statement. [5]  
b) With reference to polypropylene explain the concept of tacticity and its effect on properties. [5]
- Q2)** a) What is cross-linking of polymers? Explain how it affects mechanical properties. [6]  
b) Discuss about the structure development in injection moulding process. [4]
- Q3)** a) Briefly explain various factors which affect polymer crystallization. [4]  
b) Comment on the bond responsible for hygroscopic nature of linear aliphatic polyamides i.e. nylons. [3]  
c) Discuss about dependency of adhesion properties on polar nature of polymer. Give suitable examples. [3]
- Q4)** a) Write a short note on dendrimers. [5]  
b) What do you mean by hydrogen bonding? How does it affect mechanical properties? [5]
- Q5)** a) Discuss in detail the concept of semi-compatible blends. [6]  
b) Explain in brief the concept of orientation and its relevance in polymer applications. Discuss about importance of molecular mobility during orientation. [4]

**P.T.O.**

- Q6)** a) Comment on the role of polymer backbone in defining properties. [4]  
b) What do you understand by orientation induced crystallization? [6]
- Q7)** a) Comment about effect of additives like plasticizers on mechanical and thermal properties. [5]  
b) Briefly explain free volume theory of glass transition temperature. [5]
- Q8)** a) Briefly explain various thermal transitions in polymers. [5]  
b) Explain the concept of molecular flexibility. With suitable example explain the effect of double bond and resonance on polymer flexibility/rigidity. [5]



Total No. of Questions : 8]

SEAT No. :

**P5245**

**[5562]-66**

[Total No. of Pages : 2

**M.E. (Polymer Engineering)**  
**POLYMER RHEOLOGY**  
**(2013 Pattern) (Semester-III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) Solve any 5 questions from total 8 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)** Discuss creep and stress relaxation phenomenon. **[5]**

b) Derive an expression for velocity profile and shear rate at wall for a Ellis fluid through a circular cross section. **[5]**

**Q2) a)** Write a detailed note on Rouse theory. **[6]**

b) Discuss the effect of molecular weight and molecular weight distribution on polymer melt rheology. **[4]**

**Q3) a)** Explain the construction and working of capillary rheometer in details. **[5]**

b) Analyze creep and stress relaxation behavior of viscoelastic materials using Maxwell model. **[5]**

**Q4) a)** Derive an expression for velocity profile through parallel plate for a power law fluid. **[4]**

b) Explain the terms storage modulus, loss modulus and loss tangent. **[6]**

**P.T.O.**

- Q5)** a) Discuss power law model in details. [5]  
b) Discuss WLF equation in details. [5]
- Q6)** a) Discuss the application of isochronous, isometric and creep plots. [5]  
b) Explain the construction and working of a concentric cylinder rheometer. [5]
- Q7)** a) Analyze creep and stress relaxation behavior of viscoelastic materials using Standard linear model. [5]  
b) Explain construction and working of a cone and plate rheometer. [5]
- Q8)** a) Discuss time dependent and time independent types of fluids with examples. [5]  
b) Discuss time-temperature superposition details. [5]



Total No. of Questions :8]

SEAT No. :

**P5246**

**[5562]-67**

[Total No. of Pages :2

**M.E. (Polymer Engineering)**

**TRANSPORT PHENOMENON IN POLYMERS**

**(2013 Pattern) (Semester-III) (509134)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any 5 questions from the following.*
- 2) *Figures to the right side indicate full marks.*
- 3) *Illustrate your answers with suitable examples and diagrams, wherever necessary.*
- 4) *Write relevant question number before writing the answer.*

- Q1)** a) Explain with examples Newtonian and Non-Newtonian fluids. [4]  
b) Define the fundamentals of Transport Phenomena in Polymers. [3]  
c) Discuss the choice of solvent for extraction. [3]
- Q2)** a) Derive the expression for momentum flux distribution for flow through circular pipe. [8]  
b) Define applications of extraction. [2]
- Q3)** a) An oil has a kinematic viscosity of  $3 \times 10^{-4} \text{ m}^2/\text{sec}$  and density of  $0.9 \times 10^3 \text{ kg/m}^3$ . What should be mass rate of flow of this film down a vertical wall will be in order to have a film thickness of 3.5 mm? [5]  
b) Discuss the applications of diffusion for barrier packaging. [5]
- Q4)** a) Write a note on heat and mass transfer without phase change. [4]  
b) Explain multistage cross-current extraction operation. [6]
- Q5)** a) Explain the following terms with suitable example. [6]  
i) Liquid-liquid extraction  
ii) Solid-liquid extraction  
b) Define membranes. How membranes are useful in mass transfer operations? [4]

*P.T.O.*

- Q6)** a) Define and explain the Cauchy's principles. [5]
- b) The feed of 100 kmol/h is liquid and it contains 45 mole % benzene and 55% toluene and enters at 327.6K. A distillate contains 95% benzene and 5 mole % toluene and bottoms contain 10 mole% benzene and 90 mole % toluene are to be obtained. Calculate kmol/h of distillate and bottom product. [5]
- Q7)** a) Define mixing and explain residence time distribution. [5]
- b) Carbon disulphide ( $\text{CS}_2$ ) is used to extract iodine from its saturated aqueous solution. The distribution of iodine between carbon disulphide and water at equilibrium is given by ( $K=X/Y = 588.2$ ).
- Calculate the concentration of iodine in the aqueous phase if 1 litre of a saturated aqueous solution of  $\text{CS}_2$  at 293 K containing 0.3 grams of iodine per 1 litre of water is stirred with 50 ml of carbon disulphide. [5]
- Q8)** a) Derive the expression for momentum flux distribution and velocity distribution for steady incompressible flow in annulus. [5]
- b) Write a short note on Mass transfer in polymeric systems. [5]





Total No. of Questions : 6]

SEAT No. :

**P5247**

[Total No. of Pages : 2

**[5562] - 68**

**M.E. (Production Engg.) (CAD/CAM)**

**OPTIMIZATION TECHNIQUES**

**(2013 Course) (Semester - II) (511309)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 & Q6 are compulsory.*
- 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)** Minimize  $f(\mathbf{X}) = \frac{1}{2}(x_1^2 + x_2^2 + x_3^2)$

Subjected to

$$g_1(\mathbf{X}) = x_1 - x_2 = 0$$

$$g_2(\mathbf{X}) = x_1 + x_2 + x_3 - 1 = 0$$

by Lagrange multiplier method.

**[8]**

b) Define Saddle Point.

**[2]**

OR

**Q2) a)** Find the minimum of the function  $f(\lambda) = \frac{\lambda}{\log \lambda}$  by using Newton-

Raphson method. Assuming starting point as  $\lambda = 1$ .

**[6]**

b) Explain steps for Fibonacci method for one dimensional minimization problem.

**[4]**

**Q3)** Write short note on any two :

**[10]**

- a) Conjugate Gradient Method
- b) Simplex search method
- c) Steepest Descent Method

OR

**P.T.O.**

**Q4)** Construct the 'Ø' function, according to (a) interior and (b) exterior penalty function methods for the following problem. **[10]**

Maximize  $f = 2x$

Subjected to  $2 \leq x \leq 10$

**Q5) a)** Illustrate the working principles of real coded Genetic Algorithms with an example of unconstrained optimization method. **[8]**

b) Explain working principles of Artificial Neural Networks. **[7]**

**Q6) a)** Explain Five Focusing Steps (The 5FS) of TOC. **[8]**

b) Briefly describe Optimized Production Technology (OPT). **[7]**



Total No. of Questions : 6]

SEAT No. :

**P5248**

**[5562]-69**

[Total No. of Pages : 1

**M.E. (Production Engineering) (CAD/CAM)  
ADVANCED STRESS ANALYSIS  
(2013 Course) (Semester-III) (511313)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Question no. 5 & 6 are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of logarithmic tables, slide rule and non-programmable electronic pocket calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

**Q1)** Discuss Airy's stress function with suitable example. **[10]**

OR

**Q2)** Compare X-ray techniques and holography. **[10]**

**Q3)** Explain the terms isoclinics and isochromatics in photoelasticity. What is their physical significance in measurement of stresses? **[10]**

OR

**Q4)** A semicircular surface crack in a pressure vessel is 10 mm deep. The crack is on the inner wall of the pressure vessel and is oriented such that the hoop stress is perpendicular to the crack plane. Calculate  $K_I$  if the local hoop stress = 100 MPa and the internal pressure = 40 MPa. Assume that the wall thickness  $\gg 10$  mm. **[10]**

**Q5) a)** Consider an unnotched specimen with an endurance limit of 150 MPa. If the specimen was notched such that  $K_f = 1.6$ , what would be the factor of safety against failure for  $N > 10^6$  cycles at a reversing stress of 105 MPa. **[10]**

i) Solve by reducing  $S'e$ .

ii) Solve by increasing the applied stress.

b) Write note on Linear elastic fracture mechanics (LEFM). **[5]**

**Q6) a)** Determine complex formulation of the plane elasticity problem. **[10]**

b) Describe the stages in crack growth. **[5]**



Total No. of Questions : 6]

SEAT No. :

**P5190**

[Total No. of Pages : 2

[5562]-7

**M.E. (Computer Engineering)**

**RESEARCH METHODOLOGY**

**(2013 Course) (510104) (Semester-I)**

*Time : 3Hours]*

*[Max. Marks : 50*

*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) *Assume suitable data if required.*

**Q1) a)** Briefly describe the different steps involved in a research process. [8]

OR

b) What do you mean by research? Explain its significance in modern times. [8]

**Q2) a)** What is mean by literature review? State and explain the different sources of literature and types of publications [9]

OR

b) Justify the statement “Understanding the reported research is very important step to define the Problem” [9]

**Q3) a)** Explain the meaning and significance of a Research design. [8]

OR

b) Give your understanding of a good research design. Is single research design suitable in all research studies? If not, why? [8]

*P.T.O.*

**Q4) a)** Explain Various data collection methods used in research [8]

OR

**b)** Explain the following in detail [8]

- i) sign test
- ii) paired ranking test
- iii) chi-square test
- iv) Pearson correlation

**Q5) a)** What is mean by hypothesis testing. Explain type 1 and type 2 error in detail with example. [8]

OR

**b)** Discuss in brief the use of Statistical Packages in research [8]

**Q6) a)** State in brief layout of research report and what precautions one should take for writing research report [9]

OR

**b)** What is mean by Optimization? State different methods of optimization [9]



Total No. of Questions : 8]

SEAT No. :

**P5249**

[Total No. of Pages : 2

[5562]-70

**M. E. (Civil) (Structures Engineering)**

**DESIGN OF R.C.C. & PRESTRESSED CEMENT CONCRETE  
BRIDGES**

**(2013 Course) (601015) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *Answer any five questions.*
- 2) *All answers should be written in same book.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of IRC-5, 6, 18, 27, 45, 78 & 83 codes, IS 1343, IS 456-2000 is allowed.*
- 5) *Mere reproduction of theory from IS or IRC codes as answer will not get full credit.*
- 6) *Neat diagrams must be drawn wherever necessary.*
- 7) *Assume any other data if necessary.*

**Q1) a)** Write detailed note on classification of bridges. **[5]**

b) State and explain with sketches-Component parts of bridges. **[5]**

**Q2) a)** Differentiate between IRC Class A and Class B loading. **[5]**

b) Explain Impact load on road bridges. **[5]**

**Q3)** Design only slab of the slab culvert with the data: **[10]**

Clear span of the culvert = 4.5m

Clear carriage way width = 7.5m

Size of kerb = 150 mm × 400 mm

Average thickness of wearing coat 80mm

Use material M25, Fe 500

Loading class AA

Draw the cross section showing details of reinforcement at mid-span and at junction of the slab are kerb.

**Q4)** Design the only the deck slab supported on RCC girders for the following  
Effective span = 12m, width of carriageway = 7.5m, No. of beams 3, equally

**P.T.O.**

spaced along the carriageway width, Spacing of cross girders = 3m c/c, width of footpath on either side of carriageway = 1.2m loading class = IRC class AA, kerb size = 150 × 600mm, Material M25 & TMT for both deck slab and girder. Draw the details of reinforcement in slab. [10]

- Q5)** a) Describe different factors affecting the design of rigid frame bridge. [5]  
b) Explain with sketches, how rigid frame bridges are different from simply supported bridges. [5]

**Q6)** Design a reinforced elastomeric bearing to support aPSC girder of a bridge with following data. [10]

Maximum vertical load = 350 kN

Dynamic vertical load = 60 kN

Transverse lateral load = 40 kN

Longitudinal load = 50 kN

Longitudinal total translation 12 mm

Rotation at support  $0.003^\circ$

Shear modulus of elastomeric bearing =  $1.2 \text{ N/mm}^2$

Allowable comp. stress for concrete =  $8 \text{ N/mm}^2$

Allowable comp. stress for elastomer =  $10 \text{ N/mm}^2$

- Q7)** a) Explain selection criteria for wing wall for bridges. [5]  
b) Explain with sketches, the merits and demerits precast wing wall with geotextile. [5]

**Q8)** Design a well foundation for a pier having base dimensions  $8\text{m} \times 5\text{m}$  founded in sandy soil for the following: [10]

Top width of pier = 1.2m

Height of bearing above scour level = 15m

Height of pier = 7m

Total DL Reaction including Wt. of well abutment and considering buoyancy effect = 60,000kN

Total LL Reaction = 40,000kN

Total lateral force at scour level = 150kN

C/C distance of bearing on either side of centre line of pier = 1m

BM in traffic direction due to unequal DL & LL = 500 kN-m

Material of pier and footing = M40 & Fe500

Submerged Unit wt. of soil =  $10 \text{ kN/m}^3$

Velocity of water current = 3m/s consider the cross current also



Total No. of Questions : 12]

SEAT No. :

**P5191**

**[5562]-8**

[Total No. of Pages : 2

**M.E.(Computer Engineering)  
OPERATING SYSTEM DESIGN  
(2013 Course) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

- 1) *All six questions are compulsory.*
- 2) *Neat diagram must be drawn whenever necessary.*
- 3) *Assume suitable data, if necessary.*

**Q1)** a) What are different scheduling criteria? Explain the different type of scheduling. [5]

b) What does it mean to name a device with the file naming system? What does it mean for a program to be device independent? [4]

OR

**Q2)** a) Explain the interaction between the CreateProcess, Wait, Exit system calls. [5]

b) State and explain the set of operating-system services provided that are helpful to the user. [4]

**Q3)** a) What are the two main subsystems of the simple operating system and what are their functions? [4]

b) Relate the term race condition, Atomic action, critical section and mutual exclusion. [4]

OR

**Q4)** a) What does it mean when the timer interrupts? State this in terms of what is going on in the simple operating system. [4]

b) What is meant by shortest job first scheduling? What is the advantage of highest response ratio next scheduling over shortest job first scheduling. [4]

**Q5)** a) Why is indirection useful? How can indirection help in memory management. [4]

b) Explain how a state machine could be used in a formal program. [4]

OR

**Q6)** a) Give an analysis between messages and semaphores, why are semaphores more efficient than message priority? [4]

b) What happens to processes that leave the processor scheduling system? When if ever, do they come back. [4]

*P.T.O.*



- Q7)** a) Why lazy creation is useful? Give some example of late bindery. [4]  
b) What is the difference between placement of a block of allocated memory and replacement of a block allocated memory? Compare local and global page replacement. What are the advantages of each? [4]

OR

- Q8)** a) What is paging daemon, what does it do? Relate it with polly, interrupt and holes. [4]  
b) Do pages and page frames have to be the same size? why or why not?[4]

- Q9)** a) What makes caching works? How does dynamic programming use caching? [4]  
b) Give an example of adjoined name space. In the context of adjoined directories what does shadowing mean? Give an example of shadowing? [4]

OR

- Q10)a)** In hierarchical naming system, a path name consists of a series of component name separated by separation character. State the separator character used in UNIX and MS/DOS? What is mean by obsolete path?[4]  
b) State and explain the difference between caching and hinting. [4]

- Q11)a)** What is cryptography? Explain following terms in cryptography [5]  
i) Message  
ii) Plaintext  
iii) Cipher text  
iv) Encryption key  
v) Decryption key  
b) How software protection mechanism is implemented in operating system? [4]

OR

- Q12)a)** How to use cryptography to solve the following problem: [5]  
create a message that can be read if any two of three people cooperate, but cannot be read by any one of them acting alone. Use only the public keys of three people  
b) What is the relationship between users and processes in terms of protection? Why protection of resources is important? [4]



Total No. of Questions : 6]

SEAT No. :

**P5192**

[Total No. of Pages : 2

**[5562]-9**

**M. E. (Computer Engineering)**

**SOFTWARE DESIGN AND ARCHITECTURE**

**(2013 Pattern) (510108) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

- 1) *Solve question number 1 or 2, 3 or 4 and 5 or 6.*
- 2) *Neat diagram must be drawn wherever necessary.*
- 3) *Black figures to the right indicate full marks.*
- 4) *Assume suitable data, if necessary.*

**Q1) a)** Explain performance and maintainability quality attributes in detail. In a Distributed System, a Shared File Store is used for Backend Storage. For the Architecture of the File Store we may choose between. **[8]**

- i) Centralized Client-Server
- ii) Distributed Peer-to-Peer solution (in which each client stores part of the file system).

Which of the two solutions mentioned above are more appropriate for the following quality attributes. Justify your Answer.

- i) Performance
- ii) Maintainability

**b)** Describe the design viewpoints for software design notation. **[8]**

OR

**Q2) a)** When and why is it important to describe multiple Architectural Views? Explain Execution architecture view and code architecture view. **[8]**

**b)** Describe the concepts of Heterogenous architecture and Data flow architecture. Evaluate the benefits and limitations of both. **[8]**

**P.T.O.**

- Q3)** a) List and explain archetype patterns. [8]
- b) Explain Views, Viewtypes and Styles. For a particular system how are the relevant views identified? Explain with an example. [8]

OR

- Q4)** a) Discuss the major phases of the software design process and illustrate the characteristics of an exceptional designer. [8]
- b) List and explain the quality factors for assessing design quality? [8]
- Q5)** a) Differentiate between reference architecture and an architectural pattern with suitable example. [9]
- b) Why should an enterprise implement Customer Relationship Management (CRM). List and explain various modules of CRM for a University. [9]

OR

- Q6)** a) Explain design patterns? How they are documented using a template? [9]
- b) Describe the concepts of the Interaction oriented software architecture. Discuss the benefits and limitations of the Interaction oriented software architecture. [9]

