

**QP Code : 25251****Duration 3 hours****Total 80 marks**

- N.B: (1) Question No. 1 is compulsory.  
 (2) Attempt any four out of remaining six questions.  
 (3) Assume any necessary data but justify the same.  
 (4) Figures to the right indicate marks.  
 (5) Use of scientific calculator is allowed.

Q1) a) Write an algorithm for Selection sort. Consider the set of 8 numbers as :

10 8 2 5 -1 0 17 9

Show the steps to sort the elements using Selection sort. [10]

b) Define Linked list. Write an algorithm to:

- i) Sort the singly list elements in ascending order
- ii) Insert an element into the stack [10]

Q2) a) Write an algorithm to implement enqueue and dequeue operation in circular queue. [8]

b) What is heap? Construct max heap tree and apply heap sort for the following values.

10 4 3 2 20 8 12 [7]

Q3) a) What is Binary tree? Given the following traversals, construct a binary tree

Inorder : 4, 7, 2, 1, 5, 3, 6

Preorder : 1, 2, 4, 7, 3, 5, 6 [8]

b) Explain Threaded binary tree. [7]

Q4) a) Define AVL tree. Construct AVL tree for the following data.

35 45 55 1 2 4 12 16 5 [8]

b) Define M-way tree. Construct B tree of order 4 for the following data

10 20 30 5 6 12 40 50 [7]

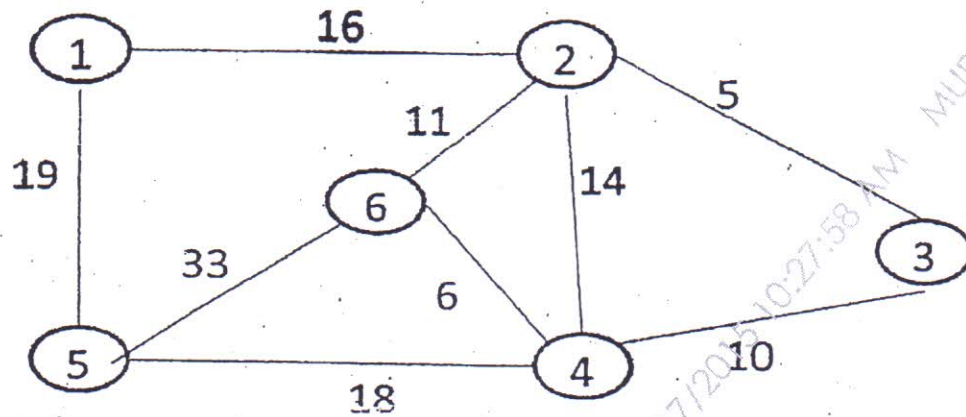
Q5) a) Define synonyms in hashing list. Using fold shift method and linear probing, store the keys shown below in hashing list of size 100

222333, 123789, 239012, 128902, 456789, 907654 [8]

b) Define Graph. Explain Adjacency list and adjacency matrix with the help of an example. [7]

**[TURN OVER]**

Q6) a) Define Minimum spanning tree. Give minimum spanning tree using Prim's algorithm for the graph given below: [8]



b) Define Stack. Explain any 2 applications of stack. [7]

Q7) Write short note on any 3 [15]

- a) Doubly linked list
- b) Dynamic programming
- c) Doubly ended queue
- d) Binary search and sequential search

QP Code : 25255

(3 Hours)

Note:

[80 Marks]

Question No.1 is Compulsory

Attempt any four Question between Question No.2 to 7

Q 1. A) What is an Operating System? Explain the components and services.

[10]

B) Consider the following snapshot of a system

[10]

Processes	Allocation			MAX			Available		
	R1	R2	R3	R1	R2	R3	R1	R2	R3
P0	0	1	0	7	5	3	3	3	2
P1	0	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Using Banker's algorithm

a) What is the context of matrix need?

b) Is the system in safe state? Give the sequences.

c) If the request from P1 arrives for (1, 0, 2) can the request be granted immediately?

Q 2. A) Consider the head of disk having 0-199 cylinders and currently is on track 100. Request Queue is 27, 129, 110, 186, 147, 41, 10, 64, 120. What are total head movements of the following algorithms?

[08]

a) SSTF b) SCAN c) CSCAN d) FCFS

B) What do you mean by process? Explain the 5-state process model in detail.

[07]

Q 3. A) Reference string 6 0 1 2 0 4 3 0 2 6 3 2 0 1 6 is given. How many page faults will occur for the following algorithms?

[08]

a) LRU, b) FIFO, c) Optimal Replacement.

B) Explain bounded buffer, Reader Writer's, dining philosopher's problem in short.

[07]



- Q 4. A) For the process listed in the table, draw Gantt chart and find the average waiting time and average turnaround time using: [08]

a) FCFS, b) SJF(both preemptive and non-preemptive), c) Round Robin (quatum=2)

Process	Arrival Time	Processing Time
A	0	2
B	2	7
C	4	5
D	7	3

- B) Explain the disk structure with the diagram. What do you mean by disk reliability? [07]

- Q 5. A) Explain the file allocation methods in details with suitable example. [08]

- B) What do you mean by protection? Explain the access matrix. [07]

- Q 6. Write Short Notes( Any Three ) [15]

- System softwares
- Process control block
- Internal & External Fragmentation
- Context-switching
- DMA

- Q 7. A) What is deadlock? What are the necessary and sufficient conditions for deadlock occurrence? [08]

- B) What is the program threat? Explain the authentication and list the possible benefits. [07]

QP Code : 25258

(3 Hours)

[ Total Marks : 80

- N.B. :** (1) Question No. 1 is compulsory.  
 (2) Attempt any four from the remaining six questions.  
 (3) Assumptions should be made whenever required and should be clearly stated.  
 (4) Answers to sub questions should be answered together.  
 (5) Illustrate answers with diagrams wherever necessary.

1. (A) What are connecting devices? Explain the various connecting devices used at the various layers of the communication model. 10  
 (B) Explain the IEEE 802.5 standard. 10
2. (A) Explain the HTTP and the SMTP protocol used at the application layer. 8  
 (B) A CRC is constructed to generate a FCS for an 11-bit message. The generator polynomial is  $X^5 + X^2 + 1$  7  
 (i) Encode the data bit sequence 10011011100 using the generator polynomial and give the codeword.  
 (ii) Now assume that bit 7 (counting from LSB) in the code word is in error and show that the detection algorithm detects the error.
3. (A) What are the guided and unguided media? Explain the twisted pair and optical fibers as guided medium. 8  
 (B) Define Congestion. Discuss how is congestion handled by the TCP protocol. 7
4. (A) What are transmission impairments? Explain the various impairments effecting the wired medium. 8  
 (B) Write short notes on any two of the following 7  
 (i) Types of networks, (ii) UDP  
 (iii) M/M/1 as a packet processing Model
5. (A) Explain the MPLS as a mechanism to transmit IP data over a reliable network. 8  
 (B) What is autonomous system? Explain the OSPF and the BGP used as routing protocols autonomous system. 7
6. (A) What is ATM? explain how IP based traffic is routed on ATM networks 8  
 (B) What is QoS? Discuss the various methods used to achieve the required QoS 7
7. (A) What are the subnet IP address and broadcast TP address for host 15.169.114..179/19? 8  
 How many subnets can be gained by subnetting 172.28.48.0 into a /24 mask, and how many usable host addresses will there be per subnet?  
 (B) What is a router? Explain the internal working of a router. 7



QP Code : 25261

(3 Hours)

Total Marks: - 80

N.B.

1. Question no.1 is compulsory.
2. Attempt any four questions from the remaining six questions.
3. Assume any necessary data but justify the same
4. Figures to the right indicate full marks
5. Use of scientific calculator is allowed

- 1 (a) (i) If the letters of the word "LOGARITHM" are arranged at random, find the probability that the arrangement starts and ends with vowels (5)

- (ii) Find the mean and variance of Binomial Distribution (5)

- (b) (i) Calculate Spearman's rank correlation coefficient from the following data: (5)

Rank x	2	10	9	8	7	5	4	6	1	3
Rank y	7	8	10	2	4	5	6	9	3	1

- (ii) A coin is tossed 3 times. Calculate the expected value of the number of heads obtained (5)

- 2 (a) (i) The mean and standard deviation of 100 items are 40 and 10. If at the time of calculation two items are wrongly taken as 30 and 72 instead of 3 and 27, find the correct mean and standard deviation. (4)

- (ii) X is normally distributed and the mean of X is 12 and standard deviation is 4. Find (4)

•  $P(X \geq 20)$

•  $P(0 < X < 12)$

Given  $P(0 < x < 2) = 0.4772$  &  $P(0 < x < 3) = 0.4987$

- (b) If X and Y are two random variables having joint density function (7)

$f(x, y) = 2$  ;  $0 < x < 1, 0 < y < x$

$= 0$  ; otherwise

- (i) Find the marginal density functions of X and Y

- (ii) Find conditional density function of Y given X and X given Y

- (iii) Check for independence of X and Y

- 3 (a) (i) A certain drug administered to 12 patients resulted in the following change in their blood pressure: 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4 (4)

Can we conclude that the drug increases in blood pressure? (t value for 5% level of significance and 11 degrees of freedom is 2.201)

Page1

- 3 (a) (ii) Find the coefficient of variation for the following

(4)

Age in years	20-25	25-30	30-35	35-40	40-45	45-50
Number of policyholders	2	7	5	2	4	5

- 3 (b) What is Sample Space? What are mutually likely events and Independent events?

(7)

A box contains 36 tags numbered 1 to 36. One tag is drawn at random. Find the probability that the number on the tag is either divisible by 3 or is a perfect square

- 4 (a) (i) Prove using laws of expectation:

(4)

- $E(aX+b) = aE(X) + b$
- $V(aX+b) = a^2V(X)$

- 4 (a) (ii) Sample survey was taken to check which newspaper (A, B, C) people read. In a sample of 100 people, the following results were obtained. 60 read A, 40 read B, 70 read C, 45 read A and C, 32 read A and B, 38 read B and C, 30 read A, B and C. If a person is selected at random, find the probability that he reads at least two newspapers. Also find the probability that he does not read any paper

(4)

- 4 (b) Calculate Bowley's coefficient of skewness for the following distribution.

(7)

Class	05-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	07	09	16	22	14	12	3

- 5 (a) (i) Calculate the mean deviation about the mean for the following data

(4)

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	12	8	5	10	7	3	2

- 5 (a) (ii) The number of hardware failures in a week of operation has the following data

(4)

Number 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 expectation and variance of the number of failures



- 5 (b) Prove with an example that three events may be mutually independent but need not be pairwise independent (7)

- 6 (a) (i) The following figures show the distribution of digits in numbers chosen at random from a telephone directory: (4)

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

Test if the digits may be taken to occur equally frequently in the directory. (Chi Square value at 5% level of significance at 9 degrees of freedom is 16.919)

- 6 (b) (ii) Find the mode for the following distribution (4)

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	8	7	12	28	20	10	10

- 6 (b) (iii) State and prove Baye's theorem. The chances that doctor A will diagnose a disease X correctly is 60%. The chances that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease X, died. What is the chance that his disease was diagnosed correctly? (7)

- 7 (a) (i) Prove the memoryless property of Geometric Distribution (4)

- 7 (a) (ii) An urn contains 6 white, 4 red and 9 black balls. If 3 balls are drawn at random, find the probability that (4)
- Two of the balls drawn are white
  - One is of each color
  - None is red
  - At least one is white

- 7 (b) (iii) The ages of husbands and wives in seven couples were as follows (7)

Age of Husband	45	44	50	53	66	30	48
Age of Wife	42	40	41	42	56	30	43

Find Karl Pearson's coefficient of correlation



Q.P. Code : 25265

(3 Hours)

[ Total Marks : 80

- N.B. : (1) Questions No.1 is compulsory.  
 (2) Attempt any four questions out of the remaining.  
 (3) Answer to the questions should be grouped and written together.  
 (4) Figures to the right indicate full marks.

1. (a) Explain Cash Flow statement. Enumerate any five examples of sources of Cash Flow from Operations. 10

(b) From the Following Trial Balance of Shri S.S. Joglekar, Prepare Trading & Profit & Loss A/c for the year 31<sup>st</sup> March 2015 and Balance Sheet as on that date. 10

Trial Balance as on 31/03/2015

Particulars	Debit Amt. ₹	Credit Amt. ₹
Sales		7,00,000
Sales Returns	30,000	
Plant & Machinery	1,20,000	
Rents, Rates & Taxes	20,000	
Freight	4,000	
Debtors	1,70,000	
Opening Stock	4,20,000	
Purchases	2,30,000	
Purchase Return		10,000
Discount Paid	5,000	
Interest on Bank Loan	5,000	
Salaries (for 14 months)	70,000	
Bank Loan		1,50,000
Capital		1,81,500
Creditors		40,000
Bills payable		26,000
Legal Charges (for 5 months)	500	
General Expenses	8,000	
Cash Bank	25,000	
<b>Total</b>	<b>11,07,500</b>	<b>11,07,500</b>

TURN OVER

**Adjustments :**

- (i) Interest on Bank Loan outstanding ₹ 7,000.  
(ii) Closing Stock on 31<sup>st</sup> March 2015 ₹ 1,40,000.

2. (a) Mr. Khalid commenced business as on 1<sup>st</sup> Jan, 2015. Following transactions for the month are to be journalized. 10

2015		₹
January 01	Invested cash	3,00,000
January 02	Purchased Machinery	1,10,000
January 02	Wages Paid for installation of Machinery	10,000
January 05	Bought Computer from Ramanpreet	28,600
January 06	Bought Goods from Mongia & Co.	17,000
January 08	Paid Ramapreet by Cheque in Full Settlement	28,000
January 10	Sold Goods to Anil Shinde	12,000
January 12	Anil Shinde cleared his account by paying Cash	11,500
January 22	Sold old Newspaper	150
January 27	Salaries paid	3,000
January 31	Cash withdraw for Personal use	2,000

- (b) What is Double Entry System of Book Keeping? Explain its Advantages. 5
3. (a) Enlist different Accounting concepts. Elaborate each. 10
- (b) Explain Features and Functions of Journal. 5

TURN OVER



Q.P. Code : 25265

3

- (a) From the following prepare Triple Columnar.

March 2015	
1	Cash in hand ₹ 20,000 and Bank OD ₹ 30,000
3	Issued a cheque in favor of Mahendra Kawde for ₹ 2,500 in full settlement of ₹ 2,600
5	Received a cheque from Sidhiraj for ₹ 3,250 in full settlement of ₹ 3,300 & deposited the Cheque
7	Received an advice from the bank stating that, Bank has paid ₹ 250 on account of Life Insurance Premium.
9	Paid Petty Cashier ₹ 100
11	Made Cash Sales ₹ 3,500 & Cash Purchase ₹ 900
15	Purchase Machinery ₹ 7,000 the amount paid by Cheque
19	Direct deposit by Shemin Maknojia ₹ 20,800
26	Received crossed Cheque from Rohan Vedak ₹ 2,000 in full settlement ₹ 2,200
29	Paid Office Rent by Cheque ₹ 350

10

- (b) Explain the following terms :

- (i) Goodwill
- (ii) Closing Stock
- (iii) Bad Debts
- (iv) Fixed Assets
- (v) Combined Entry

5

TURN OVER

5. (a) (i) Calculate current ratio and quick ratio for PQR as well as XYZ :

10

Particulars	PQR ₹	XYZ ₹	Particulars	PQR ₹	XYZ ₹
Equity Share Capital	30,00,000	30,00,000	Fixed Assests	25,00,000	30,00,000
Retained Earning	10,00,000	20,00,000	Marketable Securities	10,00,000	20,00,000
Long Term Loans	5,00,000	20,00,000	Inventories	20,00,000	20,00,000
Creditors	20,00,000	20,00,000	Cash	10,00,000	20,00,000
<b>Total</b>	<b>65,00,000</b>	<b>90,00,000</b>	<b>Total</b>	<b>65,00,000</b>	<b>90,00,000</b>

(ii) Calculate Gross Profit Ratio Net Profit Ratio :

Particulars	₹
Sales	64,00,000
Opening Stock	30,00,000
Purchases	20,00,000
Wages	50,000
Carriages Inward	50,000
Closing Stock	19,00,000
Rent	10,000
General Expenses	40,000
Salary	5,40,000
Sundry Expenses	40,000
Printing & Stationary	10,000

(b) What is Contra Entry and explain with any one example using Triple Columnar format.

5

TURN OVER



Q.P. Code : 25265

5

- (a) From the following data prepare a cash budget for three months from April to June : 10

Month	Sales (₹)	Credit Purchases (₹)	Wages (₹)	Expenses (₹)
February	10,00,000	4,00,000	80,000	60,000
March	8,00,000	5,00,000	80,000	70,000
April	9,60,000	5,20,000	90,000	70,000
May	10,00,000	6,00,000	1,00,000	80,000
June	12,00,000	5,00,000	1,20,000	90,000

**Additional Information :**

- (i) Cash in bank on 1st April (estimated) ₹ 9,50,000.
- (ii) Period of credit allowed by suppliers is two month.
- (iii) 25% of sale is for cash and the period of credit allowed to customer is one month.
- (iv) Delay in payment of wages and expenses is one month.

- (b) What is Ratio Analysis? Explain any two ratio with respect to "Solvency". 5

- (a) What is Cash Budget. Give basic Proforma of Cash Budget. 10

- (b) With example, explain Golden rule of Accounting. 5

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