Q. P. Code: 35136

Time: 3 hours Total Marks : 80

N.B. (1). Question No.1 is compulsory.
(2). Out of remaining attempt any three.
(3). Assume & mention suitable data wherever required.
(4). Figures to right indicates full marks.

Q1 Write any **four** of the following 20

a) Explain pre-emphasis & de-emphasis
b) Explain shot noise & transit time noise in brief
c) State drawbacks of delta modulation system & how it is removed
d) Explain principles of Sky wave propagation in brief.
e) State and prove differentiation property in time domain of Fourier transform

Q2

a) Explain PWM generation & degeneration method in detail 10

b) Explain PCM Encoder & PCM decoder with block diagram 10

Q3

a) a sinusoidal carrier has an amplitude of 10 V & a frequency of 100 KHz. It is amplitude Modulated by a sinusoidal voltage of amplitude 3V & a frequency of 500 Hz. Modulated Voltage is developed across 75 Ω.

(i) Write the equation of modulated wave
(ii) Determine modulation index
(iii) Calculate total average power
(iv) Power carried by sidebands
(v) Spectrum of modulated wave 10

b) Explain in detail indirect method of generation of FM with suitable diagram 10

Q4

a) What is multiplexing in communication system? Draw and explain transmitter and Receiver of FDM 10

b) Explain with reference to AM receiver (i) fidelity (ii) selectivity (iii) sensitivity iv) Image frequency and its rejection. (v) Double spotting 10

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(25)

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Q5

a) Draw the ASK, FSK & PSK waveforms for digital data **11010011** 06

b) What do you mean by inter symbol interference & how it is avoided 08

c) What do you mean international standards for communication system?

How frequencies are allocated? 06

Q6 Write short notes on **(any four)** 20

a) friss formula b) sampling theorem c) line codes d) types of communication channel

e) Space wave propagation

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Q.P. Code :24475

(Time: 3 Hours) **[Marks: 80]**

N.B.: 1) Question No. 1 is compulsory.

2) Answer any three out of remaining questions.

3) Assume suitable data if necessary.

4) Figures to the right indicate full marks.

Q1. A). Define stack. Give its applications? 2

B). what are the different linear and non- linear data structures? 3

C). what is a Linked list? Explain its types. 3

D). Define asymptotic notation with an example. 3

E). what is Recursion? State its advantages and disadvantages. 3

F). Define minimum spanning tree. List the techniques to compute minimum spanning tree. 3

G). Define expression tree with example. 3

Q2. A). Write an algorithm to create doubly linked list and display the list? 10

B). Write an algorithm to implement Queue using array? 10

Q3. A). Write an algorithm to convert INFIX to POSTFIX expression? 10

B). Write the algorithm for merge sort. Comment on its complexity? 10

Q4. A). Write an algorithm to implement Priority queue? 10

B). Explain BFS and DFS algorithm with examples? 10

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Q5.A). Define Binary search tree. Explain the different operations on a binary search tree with examples? 10

B). What is minimum spanning tree? Explain Kruskal's Algorithm with an example. 10

Q6. Short notes on (any 4) 20

a. Selection Sort

b. Prim's Algorithm

c. Binary Search

d. Hashing techniques

e. Dijkstra's Algorithm

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Q. P. Code : 37942

(3 Hours) (Total Marks : 80)

Please check whether you have the right question paper.

N.B.: 1) Questions **No. 1** is **compulsory**.
2) Solve **any three** question out of remaining **five** questions.
3) Assume suitable **data** if **necessary**.
4) **Figures** to the **right** indicate **full marks**.

1 Solve any **four** out of five : **(20)**

a) Explain Input and Output characteristics of CE configuration of BJT.

b) Convert following decimal number to Binary, Octal, Hexadecimal and Gray code $(154)_{10}$.

c) Design EX-OR gate using only NOR gates.

d) Draw two truth tables illustrating the outputs of a full-adder, one table for the sum output

e) Covert S – R filp-flop to D flip-flop.

2. **a)** Implement following using only one 8: 1 Multiplexer and few gates : **(10)**

$$f(A, B, C, D) = \sum m(1, 2, 3, 5, 6, 9, 10, 11, 14)$$

b) Using Quine McCluskey Method determine Minimal SOP form for **(10)**

$$f(A, B, C, D) = \sum m(1, 3, 5, 6, 8, 9, 12, 14, 15) + \sum d(4, 10, 13)$$

3. **a)** Explain Collector to base bias Circuit with its stability factor. **(10)**

b) With neat diagram explain operation of ALU IC74181. **(10)**

4. **a)** Design a Mod 10 synchronous counter using S-R Flip-flop. **(10)**

b) Minimize the following four variable logic function using K-map : **(10)**

$f(A, B, C, D) = \sum m(0, 2, 3, 5, 6, 7, 8, 10, 11, 14, 15)$ and design using only NAND gates.

5. **a)** Simplify following equation using Boolean algebra and Design using basic gates **(10)**

$f(A, B, C) = A'B + BC' + BC + AB'C'.$

b) Explain Entity in VHDL and Write VHDL program for half subtractor circuit. **(10)**

6. Solve the following **(Any Four)** : **(20)**

a) Explain working of Universal Shift Register.

b) Working of T flip flop.

c) Explain working of Differential Amplifier.

d) Write VHDL program for EX-NOR gate.

e) Explain working of Encoder and Decoder.

Q. P. Code: 37783

(3 Hours) **Marks : 80**

N.B. : 1. Question **no. 1** is **compulsory**.

2. Solve any **Three** questions out of remaining **Five** questions.sss

Q 1 a Explain Role of DBA ? 5

b List all the functional dependencies satisfied by the relation. 5

X	Y	Z
X1	Y1	Z1
X1	Y2	Z1
X2	Y2	Z1
X2	Y2	Z1

c What is the difference between unique key and primary key? 5

d Explain different types of attributes with examples? 5

Q 2 a Explain static hashing technique with example? 10

b Define Normalization? Explain 1NF, 2NF and 3NF with examples? 10

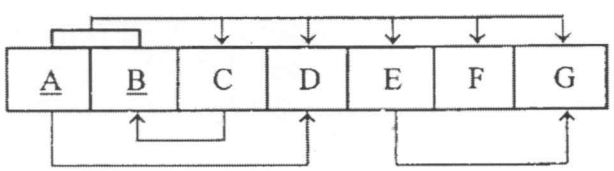
Q 3 a Consider the following employee database. 10

Employee(empname, street, city, date_of_joining)
Works(empname, company_name, salary)
Company(company_name, city)
Manages(empname, manager_name)
Write SQL queries for the following statements:

i) Modify the database so that employee "Sachin " now lives in "Mumbai"
ii) Find number of employees in each city with date_of_joining as "01-Aug-2017"
iii) List the name of companies starting with letter "A"
iv) Display empname , manager_name , city of those employees whose date_of_joining is greater than "01-01-2014"

b Explain DBMS architecture 10

Q 4 a Construct a dependency diagram of relation R and normalize it up to the BCNF Normal form 10



b Explain different types of relational algebra operations. 10

Q 5 a Explain Cursors and its types with example 10

b Draw EER diagram for Hospital Management System showing constraints on generalisation and specialisation 10

Q 6 Write a short note on:

a Types of Entities 5

b Authorization in SQL 5

c Views in SQL 5

d B- tree 5

QP CODE : 24396

(3 Hours) **Marks: 80**

Note: 1. Question no. **1** is compulsory.
2. Attempt any **three** questions out of remaining **five** questions.

Q.1.[a] Determine the constants a, b, c, d so that the function [5]
$f(z) = x^2 + axy + by^2 + i(cx^2 + dxy + y^2)$ is analytic.

[b] Let $A = \{1, 2, 3, 4\}, B = \{1, 2, 3, 4\}$ and "aRb if and only if a is not equal to b". Find R and its digraph. [5]

[c] For the sets A, B, C given that $A \cap B = A \cap C$ and $\bar{A} \cap B = \bar{A} \cap C$. Is it necessary that B = C? Justify. [5]

[d] Find Laplace transform of [5]
$f(t) = t \quad \text{for } 0 < t < 1$
$= 0 \quad \text{for } 1 < t < 2, \quad f(t+2) = f(t).$

Q.2.[a] 75 Children went to an amusement park where they can ride on the merry-go-round, roller coaster and ferris wheel. It is known that 20 of them have taken all 3 rides, and 55 of them have taken at least two of the 3 rides. Each ride costs 0.50 Rs and the total receipt of the amusement park was 70 Rs. Determine the number of children who did not try any of the rides. [6]

[b] Evaluate [6]
$$\int_0^\infty te^{-3t} J_0(4t)dt = \frac{3}{125} \text{ if } L\{J_0(t)\} = \frac{1}{\sqrt{s^2+1}}.$$

[c] (i) Functions f , g and h are defined as follows : [4]
$f : R \to R$, $g: R \to R$, $h: R \to R$, $f(x) = x + 4$, $g(x) = x - 4$
$h(x) = 4x$ for $x \in R$, where R is the set of real numbers.
Compute $f \circ g$; $g \circ f$; $f \circ g \circ h$; $h \circ h$.

(ii) Show that using Venn diagram $P \cap (Q - R) = (P \cap Q) - (P \cap R)$. [4]

Q.3.[a] If $f(z)$ and $|f(z)|$ are both analytic then show that $f(z)$ is constant. [6]

[b] Let R be a binary relation on the set of positive integers such that [6]
R = {(a,b) / a-b is an odd positive integer }. Is R reflexive ?
Symmetric ? Antisymmetric ? Transitive ? An equivalence relation ?
A partial ordering set ?

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[c] Evaluate (i) $L[te^{3t}\sin 4t]$ (ii) $L\left[\int_0^t\int_0^t\int_0^t t\sin t\,dt\,dt\,dt\right]$ [8]

Q.4. [a] Evaluate using Convolution theorem $L^{-1}\left[\frac{(s+2)}{(s^2+4s+8)^2}\right]$. [6]

[b] Find the transitive closure of R where R be the relation [6]

represented by $\begin{bmatrix}0&1&0&0\\0&0&1&0\\0&1&0&1\\0&0&0&0\end{bmatrix}$

[c] Find analytic function $f(z)=u+iv$ where $v=e^x(x\sin y+y\cos y)$.. [8]

Q.5.[a] Solve $\frac{dy}{dt}+2y+\int_0^t y\,dt=\sin t$ with $y(0)=1$. [6]

[b] Find bilinear transformation which maps the points z = 1,i,-1 onto $w=0,1,\infty$. Further show that under this transformation the unit circle In w plane is mapped onto a straight line in the z plane.

[c] In a bolt factory machines A, B, and C manufacture respectively 25%, 35% and 40% of the total. Of their output 5, 4, 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C? [8]

Q.6. [a] It is known that at the university 60% of the professors play tennis, 50% of them play bridge, 70% jog, 20% play tennis and bridge, 30% play tennis and jog, 40% play bridge and jog. If someone claimed that 20% of the professors jog and play bridge and tennis, would you believe this claim? Why? [6]

[b] Suppose repetitions are not permitted. [6]

(i) How many four- digit numbers can be formed from the digits 1, 2, 3, 5, 7, 8?

(ii) How many of the numbers in part (a) are less than 4000?

(iii) How many of the numbers in part (a) are odd ?

(iv) How many of the numbers in part (a) are multiples of 5?

[c] Evaluate (i) $L^{-1}\left[2\tanh^{-1}s\right]$ (ii) $L^{-1}\left[\frac{e^{4-3s}}{(s+4)^{\frac{5}{2}}}\right]$ [8]
