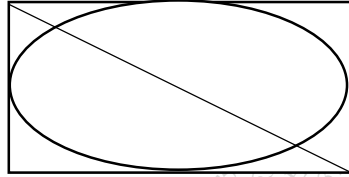


N.B 1) Question no. 1 is compulsory.

2) Attempt **any three from remaining** questions.

- Q. 1**
- a** Explain any five features of JAVA language [5]
 - b** Differentiate between abstract class and interface [5]
 - c** Write a program to find the largest of three integers accepted from command line [5]
 - d** Explain various access specifiers in JAVA. [5]
- Q. 2**
- a** Explain different types of relationships among entities. [10]
Define the relationships among the objects of given sentences:
 - 1) Employee works on project.
 - 2) Customer places order.
 - 3) WebOrder, TelephoneOrder is a kind of order.
 - b** What is the advantage of clause “finally” [10]
List any 2 exceptions defined in Java. Explain use of try, catch and use of multiple catch block.
- Q. 3**
- A** Create class Student (roll number, name). [10]
Class Test (mark1, mark2) inherit student class.
Create interface Sport with data member as sports_mark and method set_sportMark().
Create class Result which extends Test and implements Sport and has a method named calculate which finds total as (total=marks1+marks2+sports_mark) and method which display all the details.
Create an object of Result class and show result.
 - b** What role does “interface” play in multiple inheritance. Explain with example. [10]
Demonstrate use of interface to achieve polymorphism with example.

- Q. 4 a Write a JAVA program to count the number of upper case, lower case, blank spaces and digits in a string. [10]
- b Which are the two different ways to create a thread? Write a multithreaded program to show inter-leaving of actions from 2 threads and display ABABABABABABAB [5]
- c Write an applet program to display [5]



- Q. 5 a What is applet? Draw and explain lifecycle of an applet. [10]
- b Write a program to check if the year entered is leap or not. [5]
- c Compare Method Overloading and Method Overriding [5]
- Q. 6 a Explain Vectors and its operations (any four) with suitable example / program. [10]
- b Explain System.arraycopy() method with example. [5]
- c Write a program to implement bubble sorting algorithm for sorting numbers in descending order. [5]

(3 Hours)

[Total Marks: 80]

- N.B.: (1) Question No. 1 is **compulsory**.
 (2) Solve any **three** questions out of remaining **five**.
 (3) Figures to **right** indicate **full** marks.
 (4) Assume suitable **data** where **necessary**.

- Q1. Solve any four 20
- Explain block diagram of op-amp.
 - Explain working of Integrator with circuit diagram.
 - Convert following binary number to decimal ,Octal, Hexadecimal
 $(11010.11)_2$
 - Covert S-R flip flop to D flip flop.
 - State De Morgan's theorem & implement OR gate using NAND gate only.
- Q2. a) Draw the truth table of full adder and realized using 3:8 decoder. 10
 b) Explain Voltage Divider biasing Circuit with its stability factor. 10
- Q3. a) Implement following using only one 8:1 Multiplexer and few gates. 10

$$F(A,B,C,D) = \sum m(0,1,3,4,5,8,9,10,12,15)$$

 b) Draw circuit diagram and explain the operation of Astable Multivibrator using IC555. 10
- Q4. a) Reduce the expression $f(A,B,C,D) = \sum m(1,5,6,12,13,14) + d(2,4)$ using K map method. 10
 Implement the reduced expression using logic gates. 10
 b) Explain in brief Bidirectional Shift Registers. 10
- Q5. a) Write VHDL program for full subtractor. 10
 b) Design MOD- 11 ripple counter using suitable J-K flip-flop. 10
- Q6 Write short notes on any four 20
- Explain important features of differential amplifier.
 - Write comparison between FET and BJT.
 - Explain essential features of VHDL.
 - Draw diagram of a master slave JK flip-flop.
 - Explain working of LCD.

[Time: 3 Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B:
1. Question no.1 is compulsory.
 2. Attempt any three questions from remaining.
 3. Assume suitable data if needed.

- Q.1 a) Discuss the role of DBA. **05**
 b) Explain the importance of primary key in database. Explain how to crack primary key using sal. **05**
 c) Explain join operations in relational algebra. **05**
 d) Explain null value, and date functions in sal. **05**
- Q.2 a) Explain view serializability and conflict serialization with example. **10**
 b) Discuss the need of normalization in database design. Discuss all normal forms with examples. **10**
- Q.3 a) i) Explain create table command with primary key and not null constraints. **10**
 ii) Write a system to insert value in table (Assume any example)
 iii) Explain count(), sum() function in Sal.
 iv) Explain group by, having clause in Sal.
 v) Explain where clause with suitable examples.
 b) Explain deadlock mechanism in details. **10**
- Q.4 a) Discuss ER notations. Also draw ER diagram for E-learning system. **10**
 b) Explain Query optimization with detailed steps. **10**
- Q.5 a) Explain joins operation in detail. **10**
 b) What is view? How views are different then table. Discuss nested Query with example. **10**
- Q.6 Write a short notes (Any two) **20**
 i) Trigger
 ii) Specialization and Generalization in EER
 iii) ACID properties
 iv) Database Architecture

- N.B.:1) Question no.1 is compulsory.
 2) Attempt any three questions from Q.2to Q.6.
 3) Figures to the right indicate full marks.

- Q1. a)** Find the Laplace transform of $e^{-t}t \cosh 2t$. [5]
- b)** Find the half-range cosine series for $f(x) = \begin{cases} 1 & , 0 < x < \frac{a}{2} \\ -1 & , \frac{a}{2} < x < a \end{cases}$ [5]
- c)** Find $\nabla \left(\bar{a} \cdot \nabla \frac{1}{r} \right)$ where \bar{a} is a constant vector. [5]
- d)** Show that the function $f(z) = z^3$ is analytic and find $f'(z)$ in terms of z . [5]
- Q2. a)** Find the inverse Z-transform of $F(z) = \frac{3z^2-18z+26}{(z-2)(z-3)(z-4)}$, $3 < z < 4$. [6]
- b)** Find the analytic function whose imaginary part is $\tan^{-1} \left(\frac{y}{x} \right)$. [6]
- c)** Obtain Fourier series for the function $f(x) = \begin{cases} \frac{\pi}{2} + x & , -\pi < x < 0 \\ \frac{\pi}{2} - x & , 0 < x < \pi \end{cases}$, [8]
- Hence, deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$ and $\frac{\pi^4}{96} = \frac{1}{1^4} + \frac{1}{3^4} + \frac{1}{5^4} + \dots$
- Q3. a)** Find $L^{-1} \left[\frac{s^2}{(s^2+1)(s^2+4)} \right]$ using convolution theorem. [6]
- b)** Show that the set of functions $\phi_n(x) = \sin \left(\frac{n\pi x}{l} \right)$, $n = 1, 2, 3 \dots$ is orthogonal in $[0, l]$. [6]
- c)** Using Green's theorem evaluate $\oint_C (e^{x^2} - xy)dx - (y^2 - ax)dy$ where C is the circle $x^2 + y^2 = a^2$. [8]
- Q4. a)** Find Laplace transform of $f(t) = \begin{cases} \frac{t}{a} & , 0 < t \leq a \\ \frac{(2a-t)}{a} & , a < t < 2a \end{cases}$ and $f(t) = f(t + 2a)$. [6]
- b)** Prove that a vector field \bar{f} is irrotational and hence find its scalar potential $\bar{f} = (y \sin z - \sin x) i + (x \sin z + 2yz)j + (xy \cos z + y^2)k$. [6]
- c)** Obtain the Fourier expansion of $f(x) = \left(\frac{\pi-x}{2} \right)^2$ in the interval $0 \leq x \leq 2\pi$ and $f(x + 2\pi) = f(x)$. Also deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$ [8]
- Q5.a)** Use Gauss's Divergence Theorem to evaluate $\iint_S \bar{N} \cdot \bar{F} ds$ where $\bar{F} = 4xi + 3yj - 2zk$ and S is the surface bounded by $x=0, y=0, z=0$ and $2x+2y+z=4$. [6]
- b)** Find the Z-transform of $f(k) = ke^{-ak}$, $k \geq 0$. [6]
- c)** i) Find $L^{-1} \left[\frac{s+2}{s^2(s+3)} \right]$. [8]
 ii) Find $L^{-1} \left[\log \left(\frac{s+a}{s+b} \right) \right]$.
- Q6.a)** Solve using Laplace transform $(D^2 + 3D + 2)y = 2(t^2 + t + 1)$, with $y(0) = 2$ and $y'(0) = 0$. [6]
- b)** Find the bilinear transformation which maps the points $Z=1, i, -1$ onto the points $W=i, 0, -i$. [6]
- c)** Find Fourier sine integral of $f(x) = \begin{cases} x & , 0 < x < 1 \\ 2-x & , 1 < x < 2 \\ 0 & , x > 2 \end{cases}$ [8]

Duration: 3 Hours

Marks: 80

Please check whether you have got the right question paper.

- N.B: 1. Question No 1 is compulsory
2. Answer any three from the remaining.

1. Attempt any four from the following. **(20)**
 - (a) Draw and explain basic analog communication system.
 - (b) Explain Noise Figure and derive friss formula.
 - (c) Explain Super heterodyne receiver.
 - (d) How to generate PPM.
 - (e) Explain FDM with neat diagram.

2.
 - (a) What is thermal noise? Derive the expression for root mean square voltage of thermal noise? **(06)**
 - (b) Explain shot noise. **(04)**
 - (c) Derive the AM expression and explain each term. **(10)**

3.
 - (a) Explain Ratio detector with neat diagram. **(10)**
 - (b) State and prove sampling theorem. **(10)**

4.
 - (a) Explain ADM Transmitter and receiver with neat block diagrams. **(10)**
 - (b) Explain BPSK generation and detection with neat block diagrams. **(10)**

5.
 - (a) Explain line coding with five data formats with examples. **(10)**
 - (b) What is Image signal and how to reject it? Also define selectivity, sensitivity and fidelity of a receiver. **(10)**

6. Answer any four **(20)**
 - (a) Need for modulation.
 - (b) State and prove time shifting property of Fourier Transform.
 - (c) Explain any method to generate SSB SC AM.
 - (d) Digital communication with block diagram.
 - (e) Explain BASK generation.