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# Shivaji University, Kolhapur

## Oct. Nov. 2023 Examination

## S.Y B.Tech, (Electronics & Computer Science) (Part-II)

## (Semester-III) Examination,

## Digital Electronics (New)

## Sub. Code: 91971

**Day and Date : Tuesday, 09-01-2024** **Total Marks : 70**

**Time : 10:30 am to 01:00 pm**

**Instructions:**

1) Q.1 is compulsory
2) Solve any 4 questions from remaining questions.
3) Use non-programmable calculator is permissible.
4) Figures to the right indicate full marks.
5) Assume suitable data, if required.

**Q. 1 Solve MCQ's (1 marks each)**

a) The binary number of decimal number 32 is _____

i) (100000)2 ii) (101100)2

iii) (111111)2 iv) (010101)2

b) _____ and _____ Gates are universal gutes

i) NAND and AND ii) NAND and NOR

iii) NAND and OR iv) None of the above

c) 3 bits full adder contains _____

i) 3 combinational inputs ii) 4 combinational inputs.

iii) 6 combinational inputs iv) 8 combinational inputs



[P.T.O.]

d) How much input and output needed for demultiplexer?

i) Many outputs to one input
ii) One input may outputs
iii) One input one output
iv) None of these

e) When does a negative level triggered flip-flop in Digital Electronics changes its state?

i) When the clock is negative
ii) When the clock is positive
iii) When the inputs are all zero
iv) When the inputs are all one

f) What is the standard form of PIPO?

i) Parallel In Parallel Out
ii) Parallel Out Parallel In
iii) Positive Input Positive Out
iv) None of these

g) Output values of Moore type FSM are determined by its _____

i) Input values
ii) Output values
iii) Clock input
iv) Current state

h) In Moore machine, output is produced over the change of

i) Transitions
ii) States
iii) All of the mentioned
iv) None of the mentioned

i) Which of the following is not a common logic family

i) TTL
ii) CMOS
iii) ECL
iv) LED

j) Which operator is used for concatenation operation in Verilog?

i) &  ii) |

iii) ^  iv) { }

**Q.2** a) What is Octal number system? Solve the following **(7M)**

i) (10101111001.0111)2 = (  ) 8

ii) (105.15)10 = (  ) 2

iii) (5C7)16 = (  ) 10

b) Explain De Morgan's theorem with neat gate diagram and truth table. **(8M)**

**Q.3** a) Define Integrated Circuit and briefly explain MSI, LSI and VLSI. **(7M)**

b) Explain Half adder and Full adder with truth table and logic gate diagram **(8M)**

**Q.4** a) What is edge triggered flip flop? Explain the operation of positive edge trigged D flip flop with NAND gate. **(7M)**

b) Explain asynchronous counter with block diagram and signal diagram **(8M)**

**Q.5** a) Differentiate between Mealy and Moore machine **(7M)**

b) Classify the logic families and detine noise margin, propagation delay and power dissipation **(8M)**

**Q.6** a) Explain how to instantiate a module with full adder example **(7M)**

b) Explain any four verilog arithmetic operators with example **(8M)**

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# SHIVAJI UNIVERSITY, KOLHAPUR

## S.Y B. Tech. (Electronics & Computer Science)

## (Part-II) (Semester - III)

## Examination, Oct./Nov. 2023

## DATA STRUCTURE & ALGORITHM (New)

## Sub. Code: 91972

**Day and Date : Saturday, 06-01-2024** **Total Marks : 70**

**Time : 10.30 a.m. to 01.00 p.m.**

**Instructions :**

1) Q.1 is compulsory.
2) Solve any 4 questions from remaining questions.
3) Use non-programmable calculator is permissible.
4) Figures to the right indicate full marks.
5) Assume suitable data, if required.

**Q.1 Solve MCQ's** **(1 marks each)**

i. To perform level-order traversal on a binary tree, which of the following data structure will be required?

a) Hash table b) Queue

c) Binary search tree d) Stack

ii. Which of the following data structure is required to convert arithmetic expression in infix to its equivalent postfix notation?

a) Queue b) Linked list

c) Binary search tree d) None of above

iii. The time complexity of quicksort is.....

a) O(n) b) O(logn)

c) O(n2) d) O (n logn)

iv. ..... form of access is used to add and remove nodes from a queue

a) LIFO, Last in First Out b) FIFO, First in First Out

c) Both a and b d) None of these

v. Which data structure is the best for implementing a priority queue?

a) Heap b) Array

c) Linked list d) Stack

vi. Which of following is contained by the header of the linked list?

a) The address of the first node

b) The address of the last node

c) Pointer to the last record of the actual data

d) Middle record of the actual data

vii. Which of the following data structures is indexed structure?

a) Array b) Structure

c) Stack d) Queue

viii. The data structure required for Breadth First Traversal on graph is

a) queue b) stack

c) tree d) array

ix. An adjacency matrix representation of a graph cannot contain information of:

a) Nodes b) Edges

c) Direction of edges d) Parallel edges

X. Which one of the following is not the application of the Queue data structure?

a) Resource shared between various systems

b) Data is transferred asynchronously

c) Load balancing

d) Balancing of symbols

Q.2 a) What is data structure? Explain types of data structure with example [7]

b) Define Stack? With help of suitable example, explain working of PUSH and POP operation of stack. [8]

Q.3 a) Define Linked List? How to represent Linked List. Compare Linked List V/S Arrays. [7]

b) Construct algorithm for following operations on a Singly Linked List. [8]

I. Create

II. Deleting at End

III. Counting

IV. Inserting at start

Q.4 a) Define tree, explain basic tree terminologies. [7]

b) Write C program or Pseudo code for following operations on a binary tree: [8]

i) insert a new node to the tree

ii) Pre order traversal

iii) Post order traversal

Q.5 a) Write in detail of algorithm. Write an algorithm to factorial of a number. [7]

b) Explain following graph Representation: [8]

i) Adjacency Matrix

ii) Adjacency Lists

Q.6 a) Explain Linear Search algorithm with algorithm. [7]

b) Write C Program to implement Insertion Sort & Bubble Sort. [8]

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# SHIVAJI UNIVERSITY, KOLHAPUR

## S.Y B. Tech. (Electronics & Computer Science)

## (Part-II) (Semester - III)

## Oct. / Nov. 2023 Examination,

## ENGINEERING MATHEMATICS -III

## Sub. Code: 91969

**Day and Date : Tuesday, 02-01-2024** **Total Marks : 70**

**Time : 10.30 a.m. to 01.00 p.m.**

**Instructions :**

1) Q.1 is compulsory.
2) Solve any 4 questions from remaining questions.
3) Use non-programmable calculator is permissible.
4) Figures to the right indicate full marks.
5) Assume suitable data, if required.

**Q1 Solve MCQ's (2 marks each)**

i. The complete solution of $(D^3 - 3D^2 + 3D - 1)y = 0$ .....

A) $y = (C_1 + C_2x + C_3x^2)e^x$

B) $y = C_1 + (C_2 + C_3x)e^{-x}$

C) $y = C_1e^{-x} + (C_2 + C_3x)e^x$

D) $y = (C_1 + C_2x)e^x + C_3e^{-2x}$

ii. The curl of vector field $f(x, y, z) = x^2 i + 2zj - yk$ is

A) -3j B) -3k

C) -3i D) 0

iii. If $A(x) = \frac{1}{x+2}$, where x = {0l,2,3,4} then scalar cardinality of A.....

A) 2.2818 B) 1.4689

C) 1.2833 D) 2.1896

iv. In Fourier expansion of $f(x) = 2 - \frac{x^2}{2}; 0 \le x \le 2$ the value of constant $a_0$ is .....

A) $\frac{1}{2}$ B) $-\frac{1}{2}$

C) $\frac{4}{3}$ D) $\frac{-4}{3}$

v. 10% of the tools produced in a certain manufacturing process turned out to be defective. Find the probabilities that out of 20 selected at random there are exactly 2 are defective.

A) 0.2345 B) 0.2020

C) 0. 2852 D) 0.1923

**Q.2** a) Solve $(D^2 + D + 2)y = 1+x$ **[7]**

b) Solve, $(D^2 - 3D + 2)y = x^2 e^{2x}$ **[8]**

**Q.3** a) If $\bar{a}, \bar{b}$ *are constants and* $\bar{r} = \bar{a}cosnt + \bar{b}\sin nt$, P.T.

i) $\bar{r} X \frac{d\bar{r}}{dt} = n(\bar{a}X\bar{b})$, *ii)* $\frac{d^2\bar{r}}{dt^2} + n^2\bar{r} = 0$ **[7]**

b) Prove that $\nabla\left(\frac{\bar{r}}{r^3}\right) = 0$ **[8]**

**Q.4** a) Find Laplace Transform of i) $t^2 \sin at$, ii) Find $L^{-1}\left[\frac{1}{s^2(s+1)}\right]$ **[ 7]**

b) Obtain half range Fourier cosine and sign series for $f(x) = e^x$ in $(0, \pi)$. **[8]**

**Q.5** a) $\alpha$-cut and strong $\alpha$-cut. Find $\alpha$-cut and strong $\alpha$-cut for $\alpha$ =0.2, 0.3, 0.4 for the Fuzzy set defined by

$C(x) = \frac{x}{x+1}, x \in \{1,2,3,4,5\}$. **[7]**

b) Define Fuzzy cardinality. Find the fuzzy cardinality of

$A(x) = \frac{35-x}{15}$ *on* X= {20,22,24,26,28,30,32,34} **[8]**

**Q.6** a) Fit a Poisson's distribution to the following data **[7]**

| X | 0 | 1 | 2 | 3 | 4 | Total |
|---|---|---|---|---|---|---|
| f | 192 | 100 | 24 | 3 | 1 | 320 |

b) Customer accounts of a certain departmental store have an average balance Rs.120 and a standard deviation Rs.40, assuming that the distribution of account balance is normal. Find the proportion of account i) over Rs.150 ii) between Rs.100 & Rs.150 iii) between Rs.60 & Rs.90 (Given area from $z = 0$ to $z = 0.5$ is 0.1915, from $z = 0$ to $z = 0.75$ is 0.2734 and from $z=0$ to $z = 1.5$ is 0.4332) **[8]**

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# SHIVAJI UNIVERSITY, KOLHAPUR

## S.Y B. Tech. (Electronics & Computer Science) (Part-II)

## (Semester - III) Examination, Oct./Nov.-2023

## Subject Name: Electronics Device (New)

## Subject Code: 91970

**Day and Date : Thursday, 04-01-2024** **Total Marks : 70**

**Time : 10.30 a.m. to 01.00 p.m.**

**Instructions :**

1) Q.1 is compulsory.
2) Solve any 4 questions from remaining questions.
3) Use non-programmable calculator is permissible.
4) Figures to the right indicate full marks.
5) Assume suitable data, if required.

**Q.1 Solve MCQ's** **(1 marks each)**

i) The battery connections require to forward bias a P-N junction diode is .....

A) +ve terminal to P and -ve terminal to N

B) -ve terminal to N and +ve terminal to N

C) -ve terminal to P and +ve terminal to N

D) None of these

ii) The..... impurity is called as an accepter impurity

A) Trivalent B) Tetravalent

C) Pentavalent D) None of these

iii) ..... are minority carrier in N-type semiconductor.

A) Electrons B) Holes

C) Ions D) both a and b

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# SHIVAJI UNIVERSITY, KOLHAPUR

## S.Y B. Tech. (Electronics & Computer Science) (Part-II)

## (Semester - III) Examination, Oct./Nov.-2023

## Subject Name: Electronics Device (New)

## Subject Code: 91970

**Day and Date : Thursday, 04-01-2024** **Total Marks : 70**

**Time : 10.30 a.m. to 01.00 p.m.**

**Instructions :**

1) Q.1 is compulsory.
2) Solve any 4 questions from remaining questions.
3) Use non-programmable calculator is permissible.
4) Figures to the right indicate full marks.
5) Assume suitable data, if required.

**Q.1 Solve MCQ's** **(1 marks each)**

i) The battery connections require to forward bias a P-N junction diode is .....

A) +ve terminal to P and -ve terminal to N

B) -ve terminal to N and +ve terminal to N

C) -ve terminal to P and +ve terminal to N

D) None of these

ii) The..... impurity is called as an accepter impurity

A) Trivalent B) Tetravalent

C) Pentavalent D) None of these

iii) ..... are minority carrier in N-type semiconductor.

A) Electrons B) Holes

C) Ions D) both a and b

iv) The ripple factor of a full wave rectifier is .....

A) 1.21 B) 0.48

C) 0.24 D) 0.61

v) The filter capacitor is placed in .....

A) Series with load B) parallel with load

C) Vicinity with load D) None of these

vi) The ..... layer has highest doping concentration in BJT

A) Base B) Emitter

C) Collector D) both a and b

vii) The common Emitter (CE) forward amplification factor $\beta_{dc}$ is given by .....

A) $I_C / I_E$ B) $I_C / I_B$

C) $I_E / I_B$ D) $I_B / I_E$

viii) $\alpha$ of transistor is 0.9, calculate $\beta$

A) 0.9 B) 90

C) 9 D) 0.09

ix) MOSEFT is a ..... controlled device

A) Current B) Voltage

C) Field D) both a and b

x) In P-channel JFET, current flows due to the .....

A) Holes B) Electrons

C) Ions D) both a and c

**Q.2** a) What is diode? Explain zero, forward, reverse biasing of diode with neat sketch. **[7]**

b) Explain V-I characteristics of diode and write its applications. **[8]**

**Q.3** a) What are the types of breakdowns in diodes? Explain Avalanche effect. **[7]**

b) What is clipper and clamper circuited? Explain the series negative clipper with relevant diagram. **[8]**

**Q.4** a) Explain common emitter (CE) configuration of BJT. **[7]**

b) Campare P-N junction diode and Zener diode and write applications of Zener diode. **[8]**

**Q.5** a) What is filter? and what are types of filter circuit, explain anyone. **[7]**

b) What is rectifier? Explain half wave rectifier with center tapped transformer. **[8]**

**Q.6** a) Calculate the emitter current Ie for a transistor connected in Common emitter (CE) configuration, given $\beta=45$ and $I_B=15\mu A$. **[7]**

b) Explain construction, symbol, working principle and V-I characteristic of LED. **[8]**

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# Shivaji University, Kolhapur

## Oct. Nov. 2023 Examination

## S.Y B. Tech. (Electronics & Computer Science)

## (Part-II) (Semester - III)

## Database Management System

## Sub. Code: 91973

**Day and Date : Thursday, 11-01-2024** **Total Marks : 70**

**Time : 10:30 am to 01:30 pm**

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**Instructions:**

1) Q.1 is compulsory.
2) Solve any 4 questions from remaining questions.
3) Use non-programmable calculator is permissible.
4) Figures to the right indicate full marks.
5) Assume suitable data, if required.

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**Q.1 Solve MCQ's (1 marks each)**

i. Which of the following refers to the number of attributes in a relation?

A) Degree B) Row

C) Column D) All the above

ii. Which of the following makes the transaction permanent in the database?

A) View B) Rollback

C) Commit D) Flashback

iii. By normalizing relations or sets of relations, one minimizes

A) Data B) Field

C) Database D) Redundancy



[P.T.O.]

iv. Which of the following command is a type of Data Definition language command?

A) Create
B) Update
C) Merge
D) Delete

v. In E-R Diagram multivalued attributes are represented by _____

A) Rectangle
B) Ellipse
C) Double Ellipse
D) Diamond

vi. The result of the UNION operation between R1 and R2 is a relation that includes

A) all the tuples of R1
B) all the tuples of R2
C) all the tuples of R1 and R2
D) all the tuples of R1 and R2 which have common columns

vii. In case of entity integrity, the primary key may be _____

A) Not Null
B) Null
C) Both Null and not Null
D) Any Value

viii. The language which has recently become the defacto standard for interfacing application programs with relational database system is ___

A) Oracle
B) SQL
C) DBase
D) 4GL

ix. The statement in SQL, which the allow to change definition of table is ___

A) Alter
B) Update
C) Create
D) Select

x. The operator is used to compare a value to a list of literals values that have been specified

A) Any B) In

C) All D) Between

**Q.2** a) Explain Set operation in SQI. with example of each. **[7]**

b) Explain the following terms **[8]**

i. Entity and its types.

ii. Attribute its types.

**Q.3** a) Explain the different datatypes used in SQL... **[7]**

b) Define Data Independence? Explain the types of Data Independence. **[8]**

**Q.4** a) Explain ACID Transaction properties with example. **[7]**

b) Explain Aggregate function with sytax and example. **[8]**

**Q.5** a) Draw ER diagram for library management system considering issue and return, fine collection facility. Consider appropriate entities. **[7]**

b) With reference to relational database, explain the following terms **[8]**

i. Table

ii. Tuple

iii Domain

iv. Attribute domain

v. Data types.

vi. Fields

**Q.6** a) Explain Conflict Serializability and view Serializability. **[7]**

b) Explain log-based recovery mechanism. **[8]**

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