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# TMC–101/TMI–101

**M. C. A./M. SC. (IT) (FIRST SEMESTER)**

**MID SEMESTER EXAMINATION, NOV., 2021**

COMPUTER FUNDAMENTALS AND PROGRAMMING

METHODOLOGY USING 'C'

**Time : 1½ Hours**

**Maximum Marks : 50**

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Write a program to print the following series :

   1 2 2 3 3 3 4 4 4 4 5 5 5 5 5 ......... upto *n*. (CO3)

   OR

   (b) What do you understand by the term operator ? Discuss bitwise operators with examples. (CO3)

2. (a) Present a comparative study of storage classes. (CO2)

   OR

   (b) Explain the following terms briefly : (CO3)

   (i) Keyword

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(ii) Variable

(iii) Constant

(iv) Data type

(v) Conditional operator

3. (a) An equation of the form $ax^2 + bx + c = 0$ is known as quadratic equation. The values of $x$ that satisfy this equation are known as roots of the equation. The roots are given by the following formulae :  (CO4)

$$\text{root } 1 = \frac{-b + \text{sqrt}\left(b^2 - 4ac\right)}{2a}$$

$$\text{root } 2 = \frac{-b - \text{sqrt}\left(b^2 - 4ac\right)}{2a}$$

Write a program to evaluate these roots. The program requests the user to input the values of $a$, $b$ and $c$ and outputs root 1 and root 2.

OR

(b) Draw a flow chart for the following pattern :  (CO2)

$$a$$
$$b\ b$$
$$c\ c\ c$$
$$d\ d\ d\ d$$

4. (a) Write a C program to calculate the volume of the following shapes : Cube, Cuboid, Sphere, Cylinder and Cone.

Ask the user which one s/he wants to calculate, and take the appropriate required inputs. Then print the result.

Example :

If the user chooses the option for cube, only one input is required i.e., the side. The volume is then calculated and printed.

If the user chooses the option for cube, only three inputs are required i.e., length, breadth and height. The volume is then calculated and printed. (CO3)

OR

(b) Explain invention of C language. Also include discussion on whether C is low level, middle level, or high level programming language. (CO1)

5. (a) Draw a flowchart to print maximum of three numbers using if-else statement. (CO2)

OR

(b) Write a program to demonstrate use of integer arithmetic to convert a given number of days into months and days. (CO3)

# TMC–102/TMI–103

## M. C. A./M. SC. (IT) (FIRST SEMESTER)

## MID SEMESTER EXAMINATION, NOV., 2021

### COMPUTER ORGANIZATION AND ARCHITECTURE

**Time : 1½ Hours**

**Maximum Marks : 50**

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Convert the decimal $(495)_{10}$ into binary, octal and hexadecimal number system. Verify the answer by reverse conversion. 10 Marks (CO1, CO3)

OR

(b) Explain the $r$'s and $(r - 1)$'s complement. Subtract $900 - 500$ using 10's complement. Write the steps for subtraction also. 10 Marks (CO1, CO3)

2. (a) Prove that NAND and NOR are universal gates. 10 Marks (CO1)

OR

(b) Simplify the function F using don't care condition $d$ : 10 Marks (CO1)

$$F (w, x, y, z) = \Sigma (0, 3, 7, 8, 9, 11, 12, 13) d$$

$$d (w, x, y, z) = \Sigma (1, 4, 14, 15)$$

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3. (a) Prove the De Morgan's law for three variables. Also express the function $F = B'D + A'D + BD$ in sum of min terms.    10 Marks (CO2)

OR

(b) Differentiate between encoder and decoder. Design a $3 \times 8$ decoder using two $2 \times 4$ decoders.    10 Marks (CO2)

4. (a) Describe flip-flop and its application. Draw and explain the working of JK flip-flops.    10 Marks (CO2)

OR

(b) Why is it a common bus system required ? Draw a common bus system for four register of 4 bits using multiplexer.    10 Marks (CO2)

5. (a) Calculate $-7X - 3$ using Booth's algorithm. Draw flowchart of the procedure also.    10 Marks (CO3, CO6)

OR

(b) Design and explain 4-bit bidirectional shift register with parallel load.

10 Marks (CO3, CO6)

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# TMC–103/TMI–105

## M. C. A./M. Sc. (IT) (FIRST SEMESTER)

## MID SEMESTER EXAMINATION, NOV., 2021

### OPERATING SYSTEMS

### Time : 1½ Hours

### Maximum Marks : 50

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Write your viewpoints in justification of the statement 'Operating Systems is core of a computer system and is also known as a resource manager".

### OR

(b) Define Process, Process Control Block (PCB) and Context Sitching.

2. (a) Write and explain key functions performed by the kernel and the shell of the OS.

### OR

(b) What is booting of an operating system ? Write and explain the booting process of traditional UNIX operating system.

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3. (a) Draw and describe a state transition diagram of a process.

OR

(b) Consider a system in which a process requires 40-time units of burst time. The multilevel feedback queue scheduling is used and time quantum is 2 units for the top queue and is incremented by 5 units at each level, then in what queue the process will terminate the execution ?

4. (a) An operating system uses the Shortest Remaining Time First (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes :

| Process | Execution time | Arrival time |
|---------|----------------|--------------|
| P1      | 20             | 0            |
| P2      | 25             | 15           |
| P3      | 10             | 30           |
| P4      | 15             | 45           |

What is the total waiting time for process P2 ?

OR

(b) Consider the following set of processes, and schedule them using the multilevel feedback queue CPU scheduling algorithm as used in UNIX SVR3 :

| Process | CPU Burst | Arrival time | Base Priority |
|---------|-----------|--------------|---------------|
| P1      | 2         | 0            | 60            |
| P2      | 1         | 1            | 60            |
| P3      | 3         | 2            | 60            |

5. (a) Consider the following set of processes with their CPU-burst times and arrival times mentioned here :

| Process | Arrival Time | Burst Time (ms) |
|---------|--------------|-----------------|
| P1 | 0 | 17 |
| P2 | 12 | 25 |
| P3 | 28 | 8 |
| P4 | 36 | 32 |
| P5 | 46 | 18 |

Consider a multilevel feedback queue scheduling with three queues, numbered as Q1, Q2 and Q3. The scheduler first executes processes in Q1, which is given a time quantum of 8 ms. If a process does not finish within this time, it is moved to the tail of the Q2. The scheduler executes processes in Q2 only when Q1 is empty. The queue Q2 is given a time quantum of 16 ms. If a process does not finish within this time, it is moved to the tail of the Q3. Processes in Q3 are run on an FCFS basis, only when Q1 and Q2 are empty.

A process that arrives in Q1 will preempt a process in Q2 and Q3, and a process that arrives in Q2 will preempt a process in Q3. Draw and describe a Gantt chart to show the multilevel feedback queue scheduling for the processes P1 to P5.

# TMC–104 / TMI – 102

## M. C. A. (FIRST SEMESTER)

## MID SEMESTER EXAMINATION, Nov., 2021

### DISCRETE STRUCTURE AND COMBINATORICS

### Time : 1½ Hours

### Maximum Marks : 50

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Let $A = \{a, b, c, d, e, f\}$ be any set and let R be a relation defined on set A as :

$R = \{(a, a), (a, e), (b, b), (b, c), (b, f), (c, b), (c, c), (c, f), (d, d), (e, a),$
$(e, e), (f, b), (f, e), (f, f)\}$.

Check R is an equivalence relation or not.     10 Marks

OR

(b) What do you understand by order of an element in a group ? Find the order of all elements in $(\mathbb{Z}_4, +_4)$.     10 Marks

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2. (a) Let $A = \{a, b, c, d\}$, $B = \{d, e, f, g\}$ and $C = \{a, e, i, o, u\}$. Find the following expressions : 10 Marks

   (i) $A \cup (B - C)$

   (ii) $(A - B) \cap C$

   OR

   (b) Show that set of rational numbers is found to be an Abelian group under the scalar multiplication. 10 Marks

3. (a) Define the relation and let $R = \{(a, b) : a + b$ is divided by $2; \forall a, b \in A\}$, where $A = \{1, 2, 3, 4, 5\}$. Is relation R equivalence relation ?

   10 Marks

   OR

   (b) Let $\mathbf{R}$ be the set of real numbers, then show that $[\mathbf{R}, \leq]$ is a poset.

   10 Marks

4. (a) What is POSET ? Give an example of partial ordering relation on any non-empty set. 10 Marks

   OR

   (b) Show that the set of integers $\mathbf{Z}$ is group under the addition.

   10 Marks

5. (a) Let $f(x) = $ greatest integer function $[x]$ ; and $g(x) = \frac{1 - |x|}{2} \forall x \in \left\{ \frac{1}{2}, -\frac{1}{3} \right\}$. Find the given values for each value of $x$,

   (i) $g \circ f$

   (ii) $f \circ g \circ f$ 10 Marks

   OR

   (b) Define Group and Subgroup with the help of a suitable example.

   10 Marks

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# TMC–105

## M. C. A. (FIRST SEMESTER)
## MID SEMESTER EXAMINATION, NOV., 2021
### STATISTICAL DATA ANALYTICS WITH R
### Time : 1½ Hours
### Maximum Marks : 50

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Define Statistics. What does a statistician do with the help of statistics ? Define population and sample with the help of an example.

10 Marks (CO1)

### OR

(b) What is data ? What are the different types of data used in Statistics ?

10 Marks (CO1)

2. (a) What is measure of location (also called central tendency) ? List out various measures of location used in summary statistics. Find mean, mode and median for the given data : 10 Marks (CO1)

21, 23, 23, 54, 67, 21, 25, 21, 54, 72, 75, 41, 42, 43, 44

### OR

(b) What is quartiles ? Find the interquartile range of odd sets :

10 Marks (CO1)

1, 2, 5, 6, 7, 9, 12, 15, 18, 19, 27

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3. (a) Create a frequency distribution table by including classes for the list of IQ scores : 10 Marks (CO1)

118, 123, 124, 125, 127, 128, 129, 130, 130, 133, 136, 138, 141, 142, 149, 150, 154

OR

(b) What is measures of spread ? List out various measures of spread used in summary statistics. 10 Marks (CO1)

4. (a) Define Sampling. List out various categories of sampling.
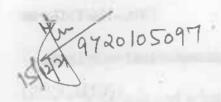
10 Marks (CO1)

OR

(b) What is Probability Distribution ? Define random variable with respect to probability distribution. A coin is tossed 10 times. What is the probability of getting exactly 6 heads ? Find probability using binomial distribution. 10 Marks (CO2)

5. (a) What is probability and what are the rules and formulas used in basic probability theory ? 10 Marks (CO1)

OR

(b) Write short notes on any *three* of the following : 10 Marks (CO2)

(i) Descriptive Statistics

(ii) Inferential Statistics

(iii) Variables

(iv) Normal Distribution

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# TMC–106/TMI–106

## M. C. A./M. SC. (IT) (FIRST SEMESTER)

## MID SEMESTER EXAMINATION, NOV., 2021

### SCRIPTING LANGUAGES

### Time : 1½ Hours

### Maximum Marks : 50

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) Discuss logical and physical tags with suitable example. (CO1, CO2)

OR

(b) Design a web page to display the following : (CO1, CO2)

| Time Table | | | | | |
|---|---|---|---|---|---|
| | Mon. | Tues. | Wed. | Thurs. | Fri. |
| Hours | Science | Maths | Science | Maths | Arts |
| | Science | Maths | Science | Maths | Arts |
| Lunch | | | | | |
| | Science | Maths | Science | Maths | Project |
| | Science | Maths | Science | Maths | |

2. (a) What are lists in HTML ? Discuss the attributes associated with them.

(CO1, CO2)

OR

(b) Design a web page to display an online registration form for a school website. (Use at least *five* different controls for the form).   (CO1, CO2)

3. (a) Design a web page to show drop cap effect as shown in the given example.                                            (CO2, CO3)

> **A**fter 25 years of drought and two days of too much rain, Philadelphia has its championship. It felt like a dream, but it wasn't. You are wide awake and the Phillies really are World Series champions. They beat the weather and the Tampa Bay Rays, 4-3 to earn just the second title in franchise history.

OR

(b) Explain with the help of suitable example different ways to include CSS man HTML page. What will be the precedence in which the CSS will be applied ?                                            (CO2, CO3)

4. (a) Discuss Box model properties using an example.        (CO1, CO2)

OR

(b) Design a web page to display an image as a watermark.   (CO1, CO2)

5. (a) Discuss positioning properties of CSS. Which position value is applied as default and what is stack order and how is it imposed ? (CO2, CO3)

OR

(b) Design a web page to change the size of font and background color of a paragraph when mouse hovers on it. (CO2, CO3)