

# CBCS SCHEME

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21MATCS41

## Fourth Semester B.E. Degree Examination, June/July 2023 Mathematical Foundations for Computing, Probability and Statistics

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Define tautology. Determine whether the following compound statement is a tautology or not:  $\{(p \vee q) \rightarrow r\} \leftrightarrow \{\neg r \rightarrow \neg(p \vee q)\}$  (06 Marks)
- b. Determine whether the following argument is valid or not : (07 Marks)  
No engineering student of I & II semester studies logic  
Anil is an engineering student who studies logic  
 $\therefore$  Anil is not in II semester.
- c. Give direct proof and proof by contradiction for the statement "If  $n$  is an odd integer then  $n + 9$  is an even integer." (07 Marks)

### OR

- 2 a. Prove that the argument given below is a valid argument: (06 Marks)
- $$\begin{array}{l} p \rightarrow (q \rightarrow r) \\ \sim q \rightarrow \sim p \\ \hline p \\ \hline \therefore r \end{array}$$
- b. Prove that  $[\sim p \wedge (\sim q \wedge r)] \vee [(q \wedge r) \vee (p \wedge r)] \leftrightarrow r$  by using laws of logic. (07 Marks)
- c. Give a direct proof for each of the following, For all integers  $K$  and  $l$ , if  $K$  and  $l$  are both even, then (i)  $K + l$  is even (ii)  $Kl$  is even (07 Marks)

### Module-2

- 3 a. Consider  $f : \mathbb{R} \rightarrow \mathbb{R}$  defined by  $f(x) = 2x + 5$  and  $g : \mathbb{R} \rightarrow \mathbb{R}$  defined by  $g(x) = \frac{1}{2}(x - 5)$ .  
Prove that  $g$  is an inverse of  $f$ . (06 Marks)
- b. Let  $A = \{1, 2, 3, 4, 6\}$  and  $R$  be a relation on  $A$  defined by  $aRb$  if and only if "a is a multiple of b". Write down the relation  $R$ , relation matrix  $M(R)$  and draw its diagram. (07 Marks)
- c. Define: (i) Simple graph (ii) Complete graph (iii) Subgraph (iv) Spanning subgroup (07 Marks)

### OR

- 4 a. Let  $f$  and  $g$  be functions from  $\mathbb{R}$  to  $\mathbb{R}$  defined by  $f(x) = ax + b$  and  $g(x) = 1 - x + x^2$ , if  $(g \circ f)(x) = 9x^2 - 9x + 3$ , determine  $a$  and  $b$ . (06 Marks)
- b. Let  $A = \{1, 2, 3, 4\}$ ,  $R = \{(1, 3), (1, 1), (3, 1), (1, 2), (3, 3), (4, 4)\}$  be a relation on  $A$ . Determine whether the relation  $R$  is reflective, symmetric, anti-symmetric or transitive. Hence verify  $R$  is an equivalence relation or not. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- c. Define isomorphism of graph. Find whether the following graphs are isomorphic or not.

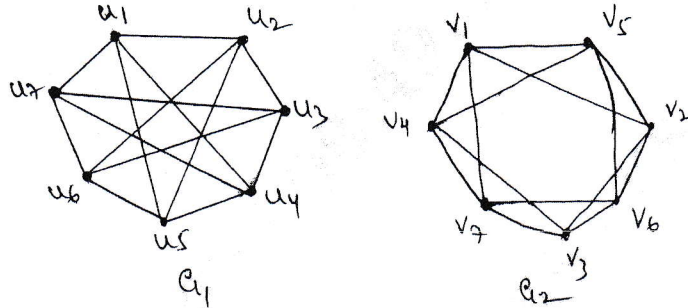


Fig.Q4(c)

(07 Marks)

**Module-3**

- 5 a. Fit a second degree parabola  $y = a + bx + cx^2$  in the least square sense for the following data:

x	0	1	2	3	4
y	1	1.8	1.3	2.5	2.3

(06 Marks)

- b. Obtain the lines of regression and hence find the coefficient of correlation for the data:

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

(07 Marks)

- c. The following are the percentage of marks in matrix (x) and statistics (y) of nine students. Calculate the rank correlation coefficient.

x	38	50	42	61	43	55	67	46	72
y	41	64	70	75	44	55	62	56	60

(07 Marks)

**OR**

- 6 a. Fit a least square geometric curve  $y = ax^b$  for the data:

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

(06 Marks)

- b. Given the equation of the regression lines  $x = 19.13 - 0.874y$ ,  $y = 11.64 - 0.5x$ . Compute the mean of x, y and the coefficient of correlation.

(07 Marks)

- c. Three judges A, B, C, give the following ranks. Find which pair of judges has common approach.

A	1	6	5	10	3	2	4	9	7	8
B	3	5	8	4	7	10	2	1	6	9
C	6	4	9	8	1	2	3	10	5	7

(07 Marks)

**Module-4**

- 7 a. A random variable x has the following probability distribution:

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	3K	3K	K <sup>2</sup>	2K <sup>2</sup>	7K <sup>2</sup> +K

- (i) Find K (ii) Find  $P(x < 6)$ ,  $P(x \geq 6)$  and  $P(3 < x \leq 6)$

(06 Marks)

- b. Derive the mean and standard deviation of binomial distribution.

(07 Marks)

- c. In a test on electric bulbs, it was found that the life time of a particular brand was distributed normally with an average life of 2000 hours and SD of 60 hours. If a firm purchases 2500 bulbs, find the number of bulbs that are likely to last for (i) more than 2100 hours (ii) less than 1950 hours (iii) between 1900 to 2100 hours.  $A(1.67) = 0.4525$ ,  $A(0.83) = 0.2967$ ,  $A(1.67) = 0.4525$ . (07 Marks)

OR

- 8 a. In a quiz contest of answering 'Yes' or 'No', what is the probability of guessing atleast 6 answers correctly out of 10 questions asked? Also find the probability of the same if there are 4 options for a correct answer? (06 Marks)
- b. The number of accidents in a year to taxi drivers in a city follows a Poisson distribution with mean 3. Out of 1000 taxi drivers find approximately the number of the drivers with :  
(i) no accident in a year (ii) more than 3 accidents in a year. (07 Marks)
- c. In a normal distribution 31% of the items are under 45 and 8% of the items are over 64. Find the mean and S.D. of the distribution.  $A(0.5) = 0.1915$ ,  $A(1.4) = 0.4192$ . (07 Marks)

Module-5

- 9 a. The joint distribution of two random variables x and y as follows:

	Y	-4	2	7
X				
1		$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
2		$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$

Find:  $E(X)$ ,  $E(Y)$  and  $E(XY)$  (ii)  $\text{cov}(X, Y)$  (iii)  $\rho(X, Y)$  (06 Marks)

- b. A die is thrown 9000 times and a throw of 3 or 4 was observed 3240 times. Show that the die cannot be regarded as an unbiased one. (07 Marks)
- c. A certain stimuluX administered to each of the 12 patients resulted in the following changes of blood pressure. 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4. Can it be concluded that the stimulus will increase the blood pressure, ( $t_{0.05} = 2.201$  for 11 d.f) (07 Marks)

OR

- 10 a. A fair coin is tossed thrice. The random variables X and Y are defined as follows:  
 $X = 0$  or 1 according as head or tail occurs in first toss.  
 $Y =$  Number of heads.  
(i) Determine the distribution of X and Y.  
(ii) Determine the joint distribution of X and Y. (06 Marks)
- b. Explain: (i) Null hypothesis (ii) Significance level (iii) Type I and Type II Errors (07 Marks)
- c. Five dice were thrown 96 times and the numbers 1, 2 or 3 appearing on the face of the dice follows the frequency distribution as below :

Number of dice showing 1, 2 or 3	5	4	3	2	1	0
Frequency	7	19	35	24	8	3

Test the hypothesis that the data follows a binomial distribution. ( $\chi_{0.05}^2 = 11.07$  for 5 d.f.)

(07 Marks)

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# CBCS SCHEME

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21MAT41

## Fourth Semester B.E. Degree Examination, June/July 2023 Complex Analysis, Probability and Statistical Methods

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Use of Statistical table is permitted.*

### Module-1

- 1 a. Derive Cauchy – Riemann equations in Cartesian form. (06 Marks)  
 b. Show that  $f(z) = \sin z$  is analytic and hence find its derivative. (07 Marks)  
 c. Evaluate  $\int_{(0,3)}^{(2,4)} (2y + x^2)dx + (3y - x)dy$ , along the parabola  $x = 2t, y = t^2 + 3$  (07 Marks)

OR

- 2 a. Determine the analytic function  $f(z) = u + iv$ , whose imaginary part is  $(x^2 - y^2) + \frac{x}{x^2 + y^2}$  by Milne – Thompson method. (06 Marks)  
 b. State and prove Cauchy’s integral theorem. (07 Marks)  
 c. Evaluate  $\int_c \frac{dz}{z^2 - 4}$  over  $c : |z| = 1$  (07 Marks)

### Module-2

- 3 a. Show that  $J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \cos x$  (06 Marks)  
 b. If  $\alpha$  and  $\beta$  are the two roots of  $J_n(x) = 0$  then prove that  $\int_0^1 x J_n(\alpha x) J_n(\beta x) dx = 0$  if  $\alpha \neq \beta$ . (07 Marks)  
 c. Express  $f(x) = 2x^3 - x^2 - 3x + 2$  in terms of Legendre polynomials. (07 Marks)

OR

- 4 a. Obtain the series solution of Bessel’s differential equation  $x^2 y'' + xy' + (x^2 + n^2)y = 0$  leading to  $J_n(x)$ . (06 Marks)  
 b. Show that  $J_{+\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$  (07 Marks)  
 c. Prove that,  $x^3 + 2x^2 - 4x + 5 = \frac{2}{5} P_3(x) + \frac{4}{3} P_2(x) - \frac{17}{5} P_1(x) + \frac{17}{5} P_0(x)$  (07 Marks)

### Module-3

- 5 a. Find the Karl Pearson’s coefficient correlation for the following two groups.

A	92	89	87	86	83	77	71	63	53	50
B	86	83	91	77	68	85	52	82	37	57

(06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- b. Fit a straight line of the form  $y = ax + b$  for the data by the least squares method.

x	0	1	2	3	4	5
y	9	8	24	28	26	20

(07 Marks)

- c. Using the method of least squares fit a curve  $y = ax^b$  for the data

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

(07 Marks)

OR

- 6 a. Ten students got the percentage of marks in two subjects x and y. Compute their rank correlation coefficient.

Marks in x	78	36	98	25	75	82	90	62	65	39
Marks in y	84	51	91	60	68	62	86	58	53	37

(07 Marks)

- b. Compute the means  $\bar{x}$ ,  $\bar{y}$  and the coefficient of correlation r from the given regression lines  $2x + 3y + 1 = 0$ ,  $x + 6y - 4 = 0$ .

(07 Marks)

- c. Fit a second degree parabola  $y = ax^2 + bx + c$  in the least square sense for the following data and hence estimate y at  $x = 6$ .

x	1	2	3	4	5
y	10	12	13	16	19

(06 Marks)

Module-4

- 7 a. A random variable X has the following probability function :

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	$k^2$	$2k^2$	$7k^2 + k$

Find k and evaluate  $P(X \geq 6)$ ,  $P(3 < X \leq 6)$ .

(06 Marks)

- b. Find the mean and standard deviation of Poisson distribution.

(07 Marks)

- c. The probability that a person aged 60 years will live upto 70 is 0.65. What is the probability that out of 10 persons aged 60 atleast 7 of them will live upto 70?

(07 Marks)

OR

- 8 a. Find a constant K such that

$$f(x) = \begin{cases} kx^2, & 0 \leq x \leq 3 \\ 0, & \text{otherwise} \end{cases} \text{ is a pdf.}$$

Also, compute : (i)  $P(1 < x < 2)$  (ii)  $P(x \leq 1)$  (iii)  $P(x > 1)$ 

(06 Marks)

- b. Find the mean and standard deviation of Binomial distribution.

(07 Marks)

- c. In a test of electric bulbs it was found that the lifetime of bulbs of a particular brand was normally distributed with an average life of 2000 hours and standard deviation of 300 hours. If a firm purchases 2500 bulbs, find the number of bulbs that are likely to last for

- (i) More than 2100 hours  
 (ii) Less than 1950 hours  
 (iii) Between 1900 and 2100 hours

Given that,  $\phi(1.67) = 0.4525$  ;  $\phi(0.83) = 0.2967$ 

(07 Marks)

**Module-5**

- 9 a. The joint probability distribution of the random variables X and Y are given as follows:

X \ Y	1	3	9
2	$\frac{1}{8}$	$\frac{1}{24}$	$\frac{1}{12}$
4	$\frac{1}{4}$	$\frac{1}{4}$	0
6	$\frac{1}{8}$	$\frac{1}{24}$	$\frac{1}{12}$

Find (i)  $E(X)$  (ii)  $E(Y)$  (iii)  $E(XY)$  (iv)  $\text{Cov}(X, Y)$   
 (v) Marginal distribution of X and Y

**(06 Marks)**

- b. Define (i) Null hypothesis (ii) Type-I and Type-II error (iii) Level of Significance  
**(07 Marks)**
- c. A sample of 100 tyres is taken from a lot. The mean life of tyres is found to be 40,650 kms with a standard deviation of 3260. Can it be considered as a true random sample from a population with mean life of 40,000 kms (use 0.05 level of significance). (Given  $z_{0.05} = 1.96$ ,  $z_{0.01} = 2.58$ )  
**(07 Marks)**

**OR**

- 10 a. The joint probability distribution of two random variables X and Y are as follows:

X \ Y	-2	-1	4	5
1	0.1	0.2	0	0.3
2	0.2	0.1	0.1	0

Determine : (i) Marginal distribution of X and Y (ii) Find  $E(X)$ ,  $E(Y)$  and  $E(XY)$   
 (iii) Covariance of X and Y **(06 Marks)**

- b. In the experiment of pea breeding the following frequencies of seeds were obtained.

Round and Yellow	Wrinkled and Yellow	Rounded Green	Wrinkled and Green	Total
315	101	108	32	556

Theory predicts that the frequencies should be in proportions 9:3:3:1. Examine the correspondence between theory and experiment. (Given  $\chi_{0.05}^2 = 7.815$  for 3df). **(07 Marks)**

- c. A group of 10 boys fed on a diet A and another group of 8 boys fed on a different diet B for a period of 6 months recorded the following increase in weight (lbs).

Diet A :	5	6	8	1	12	4	3	9	6	10
Diet B :	2	3	6	8	10	1	2	8	5	5

Test whether diets A and B differ significantly regarding their effect on increase in weight. (Given  $t_{0.05}$  for 16 df = 2.12) **(07 Marks)**

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## Fourth Semester B.E. Degree Examination, June/July 2023 Design & Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Explain the algorithm design and analysis process in detail. (10 Marks)  
 b. Explain the asymptotic narrations with example. (10 Marks)

OR

- 2 a. Explain the general plan of mathematical analysis of recursive algorithm with example. (10 Marks)  
 b. Design an algorithm to search an element in an array using sequential search. Discuss the Best-case, worst-case and average-case efficiency of this algorithm. (10 Marks)

### Module-2

- 3 a. Explain the concept of Divide and Conquer. Write the recursive algorithm to perform Binary search on the list of elements. (10 Marks)  
 b. Apply Quick sort algorithm to sort the list of characters : P, R, O, G, R, A, M, M, I, N, G. Draw the tree of recursive calls made while tracing. (10 Marks)

OR

- 4 a. Develop a recursive algorithm to find the minimum and maximum element from the list. Illustrate with an example. (10 Marks)  
 b. Define Topological sorting. Illustrate the topological sorting for the following graph:

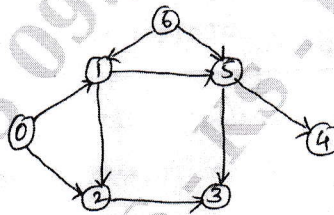


Fig. Q4 (b)

(10 Marks)

### Module-3

- 5 a. Solve the following instance of greedy knapsack problem where  $n = 4$ ,  $m = 10$ ,  $p = \{40, 42, 25, 12\}$  and  $w = \{4, 7, 5, 3\}$ . (10 Marks)  
 b. Apply Dijkstra's algorithm to find single source shortest path for the given graph by considering 'S' as the source vertex. (10 Marks)

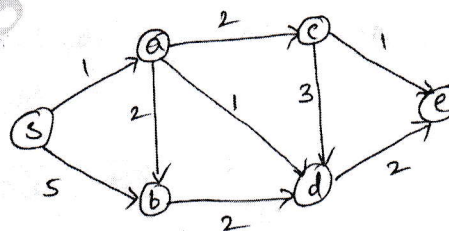


Fig. Q5 (b)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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OR

- 6 a. Construct a Huffman Tree and resulting code word for the following :

Character	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

Encode the text ABACABAD and Decode the text 100010111001010.

(10 Marks)

- b. Write a C++/Java program to find minimum cost spanning tree of a given connected graph using Kruskal's algorithm. Use Union-Find algorithm in your program. (10 Marks)

**Module-4**

- 7 a. Find a minimum-cost path from S to T in the given multistage graph.

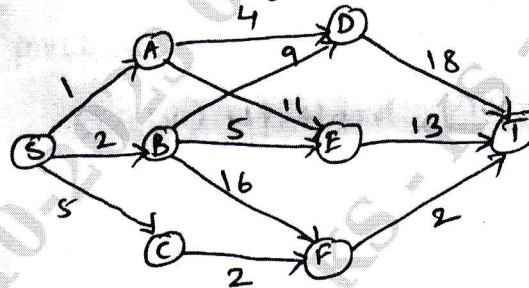


Fig. Q7 (a)

(10 Marks)

- b. Write Floyd's algorithm and apply the same to trace the following graph.

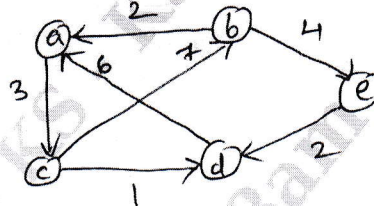


Fig. Q7 (b)

(10 Marks)

OR

- 8 a. Write Horspool's algorithm for string matching. Find the pattern BARBER. In the text : JIM\_SAW\_ME\_IN\_A\_BARBERSHOP. (10 Marks)

- b. Write a C++/Java program to solve 0/1 knapsack problem using Dynamic programming method. (10 Marks)

**Module-5**

- 9 a. Differentiate between Back tracking and Branch and Bound technique. Apply back tracking to solve the following instance of the subset-sum problem :  $S = \{1, 2, 3, 6, 8\}$ ,  $d = 9$ . (10 Marks)

- b. Solve the following assignment problem using branch and bound method. (10 Marks)

	Job 1	Job 2	Job 3	Job 4
Person a	9	2	7	8
Person b	6	4	3	7
Person c	5	8	1	8
Person d	7	6	9	4

OR

- 10 a. Explain the following with examples :

- (i) P problems
- (ii) NP problems
- (iii) NP-complete problems
- (iv) NP-Hard problems

(10 Marks)

- b. Design and implement C++/Java program to find all Hamiltonian cycles in a connected undirected graph G of n vertices using back tracking principle. (10 Marks)

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# CBCS SCHEME

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21CS43

## Fourth Semester B.E. Degree Examination, June/July 2023 Microcontroller and Embedded Systems

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

- 1 a. Mention the differences between:  
(i) Microprocessor and Microcontrollers (ii) CISC and RISC (10 Marks)  
b. With a neat diagram, explain embedded system hardware. (10 Marks)

OR

- 2 a. Explain in detail about Current Program Status Register (CPSR). (10 Marks)  
b. With a neat diagram, explain embedded system software. (10 Marks)

### Module-2

- 3 a. Explain different branch instruction in ARM processor. (10 Marks)  
b. Discuss different types of addressing modes for load store multiple instructions with example. (10 Marks)

OR

- 4 a. Explain single register load store addressing mode syntax, table, index mode with an example. (10 Marks)  
b. Discuss SWAP instruction with an example. (10 Marks)

### Module-3

- 5 a. Write a C program that prints the square of the integers between 0 to 9 using functions and explain how to convert this C function to an assembly function with command. (10 Marks)  
b. Discuss how instruction is scheduled in ARM. (10 Marks)

OR

- 6 a. Explain code optimization, profiling and cycle counting. (10 Marks)  
b. Discuss how Registers are allocated to optimize the program. (10 Marks)

### Module-4

- 7 a. Explain the purpose of embedded systems used in various domains. (10 Marks)  
b. Write a note on core of the embedded systems. (10 Marks)

OR

- 8 a. Explain different classification of embedded system. Give an example for each. (10 Marks)  
b. Write a note on sensors and actuators used in various embedded systems. (10 Marks)

### Module-5

- 9 a. Explain multi threading. (06 Marks)  
b. Explain the concept of deadlock with a neat diagram. (04 Marks)  
c. Write a note on message passing. (10 Marks)

OR

- 10 a. Write a note on multiprocessing and multi-tasking. (10 Marks)  
b. Explain the role of Integrated Development Environment (IDE) for Embedded Software Development. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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## Fourth Semester B.E. Degree Examination, June/July 2023 Operating System

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. With neat diagram, explain :
  - i) Operating System
  - ii) Dual Mode Operation in O.S. (08 Marks)
- b. Explain the Operating System services with respect to programs and the users. (06 Marks)
- c. What is a Process? Explain different states of a process with state diagram. (06 Marks)

**OR**

- 2 a. With neat diagram, explain the concept of Non virtual machine, Virtual machine and VMware architecture. (10 Marks)
- b. Define :
  - i) Context switching
  - ii) Direct and Indirect communication
  - iii) Automatic and Explicit buffering. (10 Marks)

### Module-2

- 3 a. What is Multithreaded process? Explain four benefits of Multithreaded programming. (06 Marks)
- b. Consider the set of process with Arrival time, CPU burst time (in milliseconds) and priority shown below (Lower number represents higher priority).

Process	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	1	1	1
P3	2	2	4
P4	3	1	5
P5	4	5	2

Write the Gantt chart and solve the Average waiting time and Average turnaround time for

- i) SJF Scheduling (Preemptive)    ii) Priority Scheduling (Preemptive).

(NOTE : Consider Arrival Time for both Algorithms).

(14 Marks)

**OR**

- 4 a. Explain with diagram :
  - i) Multithreading models
  - ii) Multilevel queue scheduling. (08 Marks)
- b. What is Critical – Section? How do you implement a monitor solution to the dining – philosophers problem? (12 Marks)

### Module-3

- 5 a. What is a Deadlock? What are the four necessary conditions for the deadlock to occur? (04 Marks)
- b. What are the two methods to eliminate deadlock? (02 Marks)

- c. Consider the following snapshot of a system :

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	2	0	0	1	4	2	1	2	3	3	2	1
P2	3	1	2	1	5	2	5	2				
P3	2	1	0	3	2	3	1	6				
P4	1	3	1	2	1	4	2	4				
P5	1	4	3	2	3	6	6	5				

Answer the following using Banker's algorithm.

- Is the system is in safe state? If so, what is the safe sequence?
- If request from process P2 (0, 1, 1, 1) is considered immediately, what is the System state and Sequence? **(14 Marks)**

**OR**

- Which are the commonly used strategies to select a free hole from the available holes? **(06 Marks)**
  - With suitable diagram, explain external fragmentation. **(04 Marks)**
  - With neat diagram, explain paging hardware with TLB. **(10 Marks)**

**Module-4**

- What is Demand Paging? Explain the steps in handling page fault using appropriate diagram. **(10 Marks)**
  - Consider the page reference string : 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with 3 frames. Determine the number of page faults using Optimal and LRU replacement algorithms. Which algorithm is most efficient? **(10 Marks)**

**OR**

- With neat diagram, explain Two – level and Three – level directory structure. **(08 Marks)**
  - Explain Contiguous and Linked disk space allocation methods with diagram. **(12 Marks)**

**Module-5**

- A drive has 200 cylinders 0 to 199. Head starts at 53 to serve the request queue : 98, 183, 37, 122, 14, 124, 65, 67. Draw disk head schedule diagram and explain for FCFS , SSTF, C – SCAN and C – LOCK. **(12 Marks)**
  - How the Access matrix model of protection can be viewed in OS? **(08 Marks)**

**OR**

- With neat diagram, explain SAN and MULTICS. **(08 Marks)**
  - Explain the components of a Linux System. **(06 Marks)**
  - Explain in brief fork ( ) and exec ( ) system calls in Linux / UNIX OS, also write a program to implement these system calls in C language. **(06 Marks)**

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# CBCS SCHEME

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21BE45

## Fourth Semester B.E./B.Tech. Degree Examination, June/July 2023 Biology for Engineers

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
<b>Q.1</b>	a.	What is a biomolecule? Explain the classification of biomolecule.	07	L2	CO1
	b.	Explain the role of DNA vaccine for rabies and RNA vaccine for COVID-19.	07	L2	CO1
	c.	Write a short note on cellulose based bio-filters.	06	L2	CO1
<b>OR</b>					
<b>Q.2</b>	a.	Explain the DNA finger printing in forensic applications.	07	L2	CO1
	b.	Explain the role of lipids and its application in cleaning agents.	07	L2	CO1
	c.	Write a short note on biosensors and bioplastics.	06	L2	CO1
<b>Module – 2</b>					
<b>Q.3</b>	a.	Explain brain as a CPU system.	07	L3	CO1
	b.	Explain eye as a camera system.	07	L3	CO1
	c.	Write a short note on cardiac pacemaker.	06	L2	CO1
<b>OR</b>					
<b>Q.4</b>	a.	Explain the robotic arms for prosthetics.	07	L3	CO1
	b.	Explain heart as a pump system.	07	L3	CO1
	c.	Write a short note on engineering solutions for Parkinson's disease.	06	L2	CO1
<b>Module – 3</b>					
<b>Q.5</b>	a.	Explain the lungs as a purification system.	07	L3	CO2
	b.	Explain the kidney as filtration system.	07	L3	CO2
	c.	Write a short note on spirometry and ventilator.	06	L2	CO2
<b>OR</b>					
<b>Q.6</b>	a.	Explain muscular and skeletal system as scaffolds.	07	L3	CO2
	b.	Explain bio-engineering solutions for muscular dystrophy and osteoporosis.	07	L3	CO2
	c.	Write a short note on Chronic Obstructive Pulmonary Disease (COPD).	06	L2	CO2
<b>Module – 4</b>					
<b>Q.7</b>	a.	Explain the terms Echolocation Ultrasonography and Sonars.	07	L3	CO3
	b.	Explain the process of Photosynthesis and Photovoltaic cells.	07	L3	CO3
	c.	Write a short note on Bionic leaf, GPS, Bird flight and aircraft.	06	L2	CO3
<b>OR</b>					
<b>Q.8</b>	a.	Explain the terms Lotus leaf effect, Plant Burrs and Super hydrophobic and self-cleaning surfaces.	07	L3	CO3
	b.	Explain the terms Spark skin and Swimsuits, Bullet train using biological concepts.	07	L3	CO3
	c.	Write a short note on Hemoglobin – Based Oxygen Carriers (HBOC's) and Perfluorocarbons (PFC).	06	L2	CO3
<b>Module – 5</b>					
<b>Q.9</b>	a.	Explain the DNA Organic and Biocomputing.	07	L3	CO4
	b.	Explain the Bioimaging and Artificial intelligence for Disease Diagnosis.	07	L3	CO4
	c.	Write a short note on Self healing Bioconcrete.	06	L2	CO4
<b>OR</b>					
<b>Q.10</b>	a.	Explain the importance of Bioimaging.	07	L3	CO4
	b.	Explain Bioremediation and Bio-Mining via microbial surface adsorption.	07	L3	CO4
	c.	Write a short note on Nanomedicines and Bioleaching.	06	L2	CO4

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Question Paper Version : A

**Fourth Semester B.E./B.Tech. Degree Examination, June/July 2023**  
**Universal Human Values**

Time: 1 hr.]

[Max. Marks: 50

**INSTRUCTIONS TO THE CANDIDATES**

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

- 
1. Harmony should be maintained in  
a) Between body and life  
c) Between life and environment  
b) Between self and society  
d) All of these
  2. Basic human aspirations are  
a) Continuous Happiness  
c) Both a and b  
b) Prosperity  
d) None of these
  3. Purpose of value education is  
a) Foster universal core values  
c) Develop values in individuals  
b) Make the syllabus easy  
d) All of these
  4. Knowing means having the  
a) Self exploration  
c) Right understanding  
b) Self evaluation  
d) Having knowledge of all
  5. Happiness means  
a) To be in a state of harmony  
b) Fulfillment of desired expectations from others  
c) Fulfillment of desired feelings from others  
d) Fulfillment of desired sensations from body
  6. \_\_\_\_\_ is called foundation value  
a) Respect  
b) Affection  
c) Love  
d) Trust
  7. The Human goal at the level of nature is  
a) Prosperity  
c) Co-existence  
b) Fearlessness  
d) Right understanding
  8. The outcome of justice is \_\_\_\_\_  
a) Right understanding  
c) Trust and Fearlessness  
b) Prosperity  
d) Coexistence with nature

9. Society means  
 a) Family  
 c) Few individuals  
 ✓ b) All human beings  
 d) None of these
10. Feeling for those who have made effort for excellence is \_\_\_\_\_  
 a) Excellence  
 ✓ c) Glory  
 b) Reverence  
 d) None of these
11. An individual people aspiring for the universal human order will be  
 ✓ a) More responsible socially and ecologically  
 c) More powerful  
 b) More rich  
 d) More well travel
12. A harmonious world is created by values at 4 levels there are  
 a) Home, Family, Society, Universe  
 c) School, Home, Office, Temple  
 ✓ b) Individual, Family, Society, Universe  
 d) None of these
13. "What is the innateness of Tulsi-Plant (or any plant)?  
 a) Existence + Growth  
 ✓ c) Nurture/Worsen  
 b) Cruelty/non-cruelty  
 d) Will to live in self
14. As individual people anticipates for the universal human order may be  
 a) More rich  
 ✓ c) More responsible socially and ecologically  
 b) More Powerful  
 d) More well-travelled
15. Understanding of human values leads to the practice of  
 a) Responsibilities  
 c) Profession  
 ✓ b) Ethics  
 d) Professional ethics
16. "Seeing the self by the self" means  
 ✓ a) The consciousness observing the consciousness  
 b) The consciousness observing the material  
 c) The consciousness observing the co-existence  
 d) None of these
17. Education-Right living leads to \_\_\_\_\_  
 ✓ a) Right understanding  
 c) Doubts  
 b) Confusions  
 d) None of these
18. There are \_\_\_\_\_ dimensions of living  
 a) Six (6)  
 ✓ b) Four (4)  
 c) Nine (9)  
 d) Five (5)
19. The second order of nature is \_\_\_\_\_  
 a) Material order  
 c) Animal order  
 ✓ b) Bio order  
 d) Human order
20. The innateness of material order is \_\_\_\_\_  
 ✓ a) Existence  
 c) Growth  
 b) Cruelty/Non-cruelty  
 d) Nurture/Worsen
21. Comprehensive human goal at the level of individual  
 a) Prosperity  
 ✓ c) Co-existence  
 b) Fearlessness  
 ✓ d) Right understanding
22. The fourth order of nature is  
 a) Material  
 b) Bio order  
 c) Animal order  
 ✓ d) Human order

23. \_\_\_\_\_ is the basic unit of human society.  
 a) Group                       b) Individual                      c) Nature                      d) Society
24. Which of the following is a positive value?  
 a)  Self respect                      b) Anger  
 c) Fear                      d) Narrow mindedness
25. What is the nature of self?  
 a)  Conscious                      b) Physio-Chemical  
 c) Biochemical                      d) Semi-Conscious
26. Self exploration is seeing beyond  
 a) Universe                      b) House                      c) Box                       d) Your senses
27. Human to human interaction is called as  
 a) Work                       b) Behaviour                      c) System                      d) None of these
28. "All are our own, all are interconnected, interdependent" means.  
 a)  Oneness                      b) Worship                      c) Ease                      d) None of these
29. Prosperity means  
 a)  Feeling of having more than required physical facility  
 b) Feeling of having less physical facility  
 c) Feeling of having more physical facility  
 d) Deprived of physical facility
30. Realization is the activity of  
 a)  Self                      b) Body  
 c) Both self and Body                      d) None of these
31. Who is responsible for happiness and unhappiness?  
 a)  Self                      b) Body  
 c) Outside situation                      d) Society
32. Value education helps to  
 a) Removes our contradictions  
 b) Remove our confusions  
 c) Bring harmony at all levels of human living  
 d) All of these
33. Undivided society is ensured by  
 a)  Right understanding                      b) Physical facilities  
 c)  Relationship with right understanding                      d) None of these
34. The third order of nature is \_\_\_\_\_  
 a) Material order                      b) Bio order  
 c) Animal order                      d) Human order
35. Which is the complete value?  
 a) Love                      b) Respect                      c) Trust                      d) Care
36. Body is a \_\_\_\_\_ unit while the self is a \_\_\_\_\_ unit.  
 a) Material, Consciousness                      b) Consciousness, Material  
 c) Material, Material                      d) Consciousness, Consciousness

37. Society is an extension of \_\_\_\_\_,  
 a) Human Being      ~~b) Family~~      c) Nature      d) Existence
38. In value education Sanyam mans \_\_\_\_\_  
 a) Self-exploration      b) Self-evolution  
~~c) Self-regulation~~      d) None of these
39. To fulfill human aspirations \_\_\_\_\_ are necessary  
~~a) Both values and skills~~      b) Values  
 c) Skills      d) None of these
40. The innateness of Bio order is \_\_\_\_\_  
 a) Existence      b) Cruelty / Non-cruelty  
~~c) Growth~~      ~~d) Nurture / Worsen~~
41. The feelings for those who have made effort for my excellence is \_\_\_\_\_  
 a) Excellence      b) Reverence      ~~c) Gratitude~~      d) Glory
42. There are \_\_\_\_\_ comprehensive human goals  
 a) Eight (8)      b) Six (6)      c) Four (4)      ~~d) Nine (9)~~
43. The first order of nature is \_\_\_\_\_  
~~a) Material order~~      b) Bio order  
 c) Animal order      d) Human order
44. Developing ethical competence in the profession is the only effective way to ensure  
 a) Responsibilities      b) Ethics  
 c) Profession      ~~d) Professional ethics~~
45. Ensuring justice in relationship, on the basis of values leads to \_\_\_\_\_ in society.  
 a) Fearlessness      b) Trust  
~~c) Fearlessness and Trust~~      d) None of these
46. Human goal → match correctly  
 A Right understanding      1 Individual  
 B Prosperity      2 Family  
 C Fearlessness (Trust)      3 Society  
 D Co-existence      4 Nature/Existence  
 a) 1 - D, 2 - A, 3 - B, 4 - C      b) 1 - B, 2 - C, 3 - D, 4 - A  
~~c) 1 - A, 2 - B, 3 - C, D - 4~~      d) 1 - C, 2 - D, 3 - A, 4 - B
47. The human goal at the level of family is  
~~a) Prosperity~~      b) Fearlessness  
 c) Co-existence      d) Right understanding
48. Sah-astitua means \_\_\_\_\_  
~~a) Co-existence~~      b) Co-operation  
 c) Co-option      d) Corporate identity
49. Acceptance of excellence in others is called  
~~a) Reverence~~      b) Guidance  
 c) Glory      d) Gratitude
50. Each human being is co-existence of  
 a) Spirit and Sanyam      b) Health and prosperity  
~~c) Self and Body~~      d) Mind and Soul

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