CBCS SCHEME

USN | | | | | | | | | | |

17MAT31

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Engineering Mathematics – III

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Obtain the Fourier series of $f(x) = x(2\pi - x)$ in $0 \le x \le 2\pi$. (08 Marks)

b. Obtain the Fourier series for the function $f(x) = \begin{cases} 1 + 4\frac{x}{3} & \text{in } -\frac{3}{2} < x \le 0 \\ 1 - 4\frac{x}{3} & \text{in } 0 \le x < \frac{3}{2} \end{cases}$ (06 Marks)

c. Expand $f(x) = 2x - 1$ as a Cosine half range Fourier series in $0 < x < 1$. (06 Marks)

OR

2 a. Obtain the constant term and the coefficients of the first Cosine and Sine terms in the Fourier expansion of 'y' from the table

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(08 Marks)

b. Obtain the Fourier series of $f(x) = |x|$ in $-\pi \le x \le \pi$. (06 Marks)

c. Show that the sine half range series for the function $f(x) = \ell x - x^2$ in $0 < x < \ell$ is $\frac{8\ell^2}{\pi^3}\sum_{0}^{\infty}\frac{1}{(2n+1)^3}\text{Sin}\left(\frac{2n+1}{\ell}\right)\pi x$. (06 Marks)

Module-2

3 a. If $f(x) = \begin{cases} 1 & \text{for } |x| \le a \\ 0 & \text{for } |x| > a \end{cases}$, find the infinite Fourier transform of f(x) and hence evaluate $\int_0^\infty \frac{\text{Sin } x}{x} dx$. (08 Marks)

b. Find the Fourier Cosine transform of e^{-x}. (06 Marks)

c. Solve by using Z-transforms: $y_{n+2} - 4y_n = 0$, given $y_0 = 0$ and $y_1 = 2$. (06 Marks)

OR

4 a. Find the Fourier Sine transform of $\frac{e^{-ax}}{x}$, $a > 0$. (08 Marks)

b. Find the Z-transform of Sin (3n + 5). (06 Marks)

c. Find the inverse Z-transform of $\frac{2z^2 + 3z}{(z+2)(z-4)}$. (06 Marks)

Module-3

5 a. Find the coefficient of correlation for the data

x	1	3	4	2	5	8	9	10	13	15
y	8	6	10	8	12	16	16	10	32	32

(08 Marks)

b. Fit a straight line to the following data

Year	1961	1971	1981	1991	2001
Production (in tons)	8	10	12	10	16

(06 Marks)

c. Compute the real root of $x \log_{10} x - 1.2 = 0$ by Regula – Falsi method. Carry out three iterations in (2, 3). (06 Marks)

OR

6 a. Obtain the lines of Regression for the following values of x and y

x	1	2	3	4	5
y	2	5	3	8	7

(08 Marks)

b. Fit an exponential curve of the form $y = ae^{bx}$ for the following data

No. of petals	5	6	7	8	9	10
No. of flowers	133	55	23	7	2	2

(06 Marks)

c. Find a real root of x Sinx + Cosx = 0 near $x = \pi$. Correct to four decimal places, using Newton – Raphson method. (06 Marks)

Module-4

7 a. Given Sin 45° = 0.7071, Sin 50° = 0.7660, Sin 55° = 0.8192, Sin 60° = 0.8660, find Sin 57° using an appropriate interpolation formula. (08 Marks)

b. Use Newton's divided difference formula to find f(4) given the data

x	0	2	3	6
f(x)	–4	2	14	158

(06 Marks)

c. Using Simpsons 1/3rd rule, evaluate $\int_0^{\pi/2} \sqrt{\cos\theta}\, d\theta$ by dividing $[0, \pi/2]$ in to 6 equal parts. (06 Marks)

OR

8 a. From the following table find the number of students who have obtained less than 45 marks

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

(08 Marks)

b. Using Lagrange's interpolation formula fit a polynomial of the form x = f(y)

x	2	10	17
y	1	3	4

(06 Marks)

c. Evaluate $\int_0^1 \frac{x}{1+x^2} dx$ by Weddle's rule taking seven ordinates. (06 Marks)

Module-5

9 a. Verify Green's theorem in a plane for $\oint_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$, where 'C' is the boundary of the region enclosed by $y = \sqrt{x}$ and $y = x^2$. **(08 Marks)**

b. Verify Stoke's theorem for $\vec{F} = (x^2 + y^2)i - 2xyj$ taken round the rectangle bounded by the lines $x = \pm a$, $y = 0$ and $y = b$. **(06 Marks)**

c. Derive Euler's equation $\frac{\partial t}{\partial y} - \frac{d}{dx}\left[\frac{\partial t}{\partial y^1}\right] = 0$. **(06 Marks)**

OR

10 a. Use Gauss divergence theorem to evaluate $\iint_S \vec{F} \cdot \hat{n}\, ds$ over the entire surface of the region above xy plane bounded by the cone $z^2 = x^2 + y^2$ the plane $z = 4$ where $\vec{F} = 4xz\,i + xy\,z^2 j + 3z\,K$. **(08 Marks)**

b. Prove that geodesics of a plane are straight lines. **(06 Marks)**

c. Find the extremal of the functional $\int_0^{\pi/2} (y^2 - y^{1^2} - 2y\,\mathrm{Sin}x)\,dx$ under the end conditions $y(0) = y(\pi/2) = 0$. **(06 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | 17CS32

Third Semester B.E. Degree Examination, Jan./Feb. 2021

Analog and Digital Electronics

Time: 3 hrs. Max. Marks: 100

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

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.

Module-1

1 a. Explain with the constructional details and characteristics curves, the working of n-channel JFET. **(08 Marks)**

b. Define the following op-amp parameters: (i) CMRR (ii) Slew Rate **(04 Marks)**

c. With circuit diagram, explain the operation of Astable Multivibrator using IC 555. **(08 Marks)**

OR

2 a. Design a voltage divider bias network using DE-MOSFET with supply voltage $V_{DD} = 16$ V, $I_{DSS} = 10$ mA, $V_p = -5$V to have Quiscent drain current of 5 mA and gate voltage of 4V (assume the drain resistance R_D to be 4 times the source resistor R_S) **(08 Marks)**

b. List the Ideal characteristics of op-amp. **(04 Marks)**

c. With circuit diagram and waveforms, explain the working of Relaxation Oscillator. **(08 Marks)**

Module-2

3 a. Explain positive logic and negative logic. **(07 Marks)**

b. Use K-map to simplify the following functions:

(i) $f(A, B, C, D) = \Sigma m(0, 2, 6, 10, 11, 12, 13) + d(3, 4, 5, 14, 15)$

(ii) $f(A, B, C, D) = \pi M(1, 2, 4, 5, 6, 7, 8, 10, 11, 13, 14)$ **(06 Marks)**

c. Explain Static-1 Hazard and Hazard cover with an example. **(07 Marks)**

OR

4 a. Write HDL code for the Boolean expression $Y = AB + CD$. **(08 Marks)**

b. Get the simplified expression of, $Y(A, B, C, D) = \Sigma m(0, 1, 3, 7, 8, 9, 11, 15)$. Using Quine Mc Clustery method. **(12 Marks)**

Module-3

5 a. Show how two 1:16 deMUX can be connected to get 1:32 deMUX. **(10 Marks)**

b. With IEEE symbol, logic symbol, explain NAND gate SR latch. Justify the Truth Table. **(10 Marks)**

OR

6 a. Explain the positive edge triggered JK flipflop. **(10 Marks)**

b. List the differences between PAL and PLA. Explain 7-segment decoder using PLA. **(10 Marks)**

Module-4

7 a. What are the various ways of representing flip flop? Explain the various representation of JK, SR, D, T flip flop. **(10 Marks)**

b. Define Register. Explain SISO using four D- flip flops. Assume initial values of 4 flip flop QRST as 1010, write truth table and plot waveforms. **(10 Marks)**

OR

8 a. Design mod-3 counter using JK flip flop. Also draw state diagram and write the truth table. **(10 Marks)**

b. Explain Linear Feedback Shift Register [LFSR] for the polynomial $x^4 + x^3 + 1$. **(10 Marks)**

Module-5

9 a. Explain Digital Clock with block diagram. **(10 Marks)**

b. What is Binary ladder? Explain Binary ladder with digital input of 1000. **(10 Marks)**

OR

10 a. Explain Successive Approximation A/D converter. **(10 Marks)**

b. Write short note on A/D Accuracy and Resolution. **(04 Marks)**

c. Design mod-5 counter using JK flip flops. Write the truth table and draw the waveforms. **(06 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | **17CS33**

Third Semester B.E. Degree Examination, Jan./Feb.2021
Data Structures & Applications

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 four functions that support dynamic memory allocation. **(08 Marks)**

b. Write the pattern matching algorithm to compare given pattern P with each of the substring of T. **(08 Marks)**

c. Represent the following two polynomial diagrammatically using array and also declaration in C:

$A(x) = 5X^{14} + 3x^3 + 5$

$B(X) = X^3 + 10x^2 + 2$ **(04 Marks)**

OR

2 a. Write a C program with structure definition and variable declaration to read and display information about 10 items of super market using nested structure. Consider the following fields like Itemcode, Itemname, Itemprice, Itemexpirydate (DD,MM,YY). **(08 Marks)**

b. Define sparse matrix and explain triplet representation of sparse matrix with an example. **(07 Marks)**

c. Explain any two methods of storing strings. **(05 Marks)**

Module-2

3 a. Write a C program to implement stack operations. **(10 Marks)**

b. Convert the following infix expression into post fix form : $(A + B \uparrow D)/(E - F) + G$. **(05 Marks)**

c. Evaluate the following postfix expression,
1, 2, 3, +, *, 3, 2, 1, −, +, * **(05 Marks)**

OR

4 a. Define Ackermann's function and find the value of A(1, 3) using Ackermann's function. **(05 Marks)**

b. Write a C program to implement circular Queue operations. **(10 Marks)**

c. Explain the priority Queue and its operations. **(05 Marks)**

Module-3

5 a. Write a C functions to perform the following:
(i) To insert a newnode at the beginning of the Singly Linked List (SLL).
(ii) To delete a newnode at the end of Singly Linked List (SLL). **(10 Marks)**

b. With a neat diagram, explain the linked representation of sparse matrix,

$$\begin{bmatrix} 10 & 0 & 3 & 0 \\ 0 & 2 & 0 & 33 \\ 42 & 0 & 0 & 55 \\ 0 & 0 & 61 & 0 \end{bmatrix}$$

4×4 Sparse matrix **(10 Marks)**

OR

6 a. Write a C program to insert a newnode at a specified position in a Doubly linked list. (10 Marks)

b. Write a C program to implement Queue operations using Singly Linked List (SLL). (10 Marks)

Module-4

7 a. Draw the Binary Search Tree (BST) for the following data and traverse the tree using inorder, preorder, postorder techniques 14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 5 (10 Marks)

b. What are the advantages of threaded binary tree over binary tree? (04 Marks)

c. Explain the following with an example:
   (i) Complete binary tree.
   (ii) Height of the tree.
   (iii) Leaf node.
   (iv) Out degree of a node. (06 Marks)

OR

8 a. Construct the Binary Search Tree using given inorder and preorder sequence:
Inorder : A, D, E, F, G, H, J, M, P, Q, R, T
Preorder : J, D, A, G, E, F, H, R, M, P, Q, T (07 Marks)

b. Write a C function to search an element in a Binary Search Tree (BST). (07 Marks)

c. Write a C function to find minimum element in a Binary Search Tree. (06 Marks)

Module-5

9 a. Define graph and represent the graph using adjacency matrix. (05 Marks)

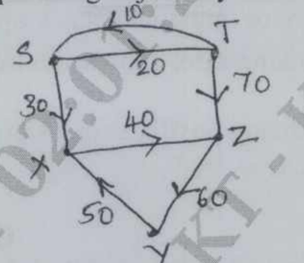

Fig. Q9 (a)

b. Explain hashing with an example. How do you resolve collision? (10 Marks)

c. Explain how does an append mode in a file operations differ from the write mode. (05 Marks)

OR

10 a. Write a C function to performa BFS of a graph. (08 Marks)

b. Summarise the features of relative file organization. (06 Marks)

c. Sort the following list of members using Radix sort,
1132, 8344, 2148, 5247, 6214, 9132, 0378, 3666, 4259, 7589 (06 Marks)

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CBCS SCHEME

USN | | | | | | | | | | **17CS34**

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Computer Organization

Time: 3 hrs. Max. Marks: 100

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

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.

Module-1

1 a. With a neat diagram, explain basic operational concept of computer. List the steps needed to execute the instruction Add LOCA, R_0. **(08 Marks)**

b. What is performance? Explain basic performance equation and overall SPEC rating of computer. **(07 Marks)**

c. Explain Big-Endian and Little-Endian methods with examples. **(05 Marks)**

OR

2 a. What is addressing mode? Explain any four addressing mode with example. **(08 Marks)**

b. What is stack? Explain how to implement push, pop, safepush, safepop operation with example. **(08 Marks)**

c. Write a program that reads line of character and display it. **(04 Marks)**

Module-2

3 a. What is an interrupt? With supporting diagram, explain the following:
i) Interrupt Nesting ii) Simultaneous request. **(08 Marks)**

b. What is DMA? With supporting diagram, explain different registers used in DMA interface. **(07 Marks)**

c. Define BUS arbitration? Explain any one approach of bus arbitration. **(05 Marks)**

OR

4 a. Define Exception. Explain kinds of exception. **(06 Marks)**

b. Explain the tree structure of USB. **(06 Marks)**

c. Explain keyboard to processor connection in interface circuit. **(08 Marks)**

Module-3

5 a. What is fast page mode? Explain internal organization of a 2M × 8 dynamic memory chip. **(08 Marks)**

b. What is Mapping function? Briefly explain any two mapping functions used in cache memory. **(08 Marks)**

c. Explain Hit rate and Miss penalty. **(04 Marks)**

OR

6 a. What is virtual memory technique? Explain virtual memory address translation. **(08 Marks)**

b. Explain following:
i) Memory controller
ii) Refresh overhead **(08 Marks)**

c. Write a short note on Read-Only-Memories. **(04 Marks)**

Module-4

7 a. Design the 16-bit carry-lookahead adder using 4-bit adder and also give the expression for carry variable Ci + 1 **(08 Marks)**

b. Perform the multiplication for -13 and +9 using Booth's algorithm. **(06 Marks)**

c. Explain IEEE standard for floating point number. **(06 Marks)**

OR

8 a. Write algorithm performs restoring division. Perform division using restoring algorithm Dividend = $(1000)_2$ Divisor = $(0011)_2$. **(08 Marks)**

b. Perform the operation on 5-bit signed numbers using 2^s compliment system and also indicate whether overflow has occurred.

i) (-10) + (-13) ii) (-10) – (-13) iii) (-2) + (-9) **(06 Marks)**

c. Explain Bit-pair recoding of Multipliers by using Multiplicand = +13, Multiplier = -6. **(06 Marks)**

Module-5

9 a. Explain single-bus organization of the data-path inside a processor with neat diagram. **(08 Marks)**

b. Write the control sequence for execution of the instruction Add (R_3), R_1. **(06 Marks)**

c. Explain in brief about control unit organization. **(06 Marks)**

OR

10 a. Explain Block diagram of Microwave oven. **(08 Marks)**

b. Discuss simplified block diagram of a digital camera. **(06 Marks)**

c. Briefly explain block diagram of an embedded processor. **(06 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | | **17CS36**

Third Semester B.E. Degree Examination, Jan./Feb.2021
Discrete Mathematical Structures

Time: 3 hrs.   Max. Marks: 100

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

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.

Module-1

1 a. Prove that $(p \vee q) \wedge \neg(\neg p \wedge q) \Leftrightarrow p$, using laws of logic. **(06 Marks)**

b. Establish the following argument by the method of proof by contradiction:
$[(p \to (q \wedge r)) \wedge (r \to s) \wedge (\neg(q \wedge s))] \to \neg p$ **(07 Marks)**

c. Negate and simplify : (i) $\forall x, [p(x) \to \neg q(x)]$ (ii) $\exists x, [\{p(x) \vee q(x)\} \to r(x)]$ **(07 Marks)**

OR

2 a. Verify that $[p \to (q \to r)] \to [(p \to q) \to (p \to r)]$ is a tautology. **(06 Marks)**

b. Test the validity of the argument :
"Rita is baking a cake. If Rita is baking a cake, then she is not practicing her flute. If Rita is not practicing her flute, then her father will not buy her a car. Therefore Rita's father will not buy her a car. **(07 Marks)**

c. Prove that for all real numbers x and y, If $x + y > 100$, then $x > 50$ or $y > 50$ by direct proof and contradiction proof. **(07 Marks)**

Module-2

3 a. Prove that for every positive integer n, 5 divides $n^5 - n$. **(06 Marks)**

b. Total of Rs 1500 is to be distributed to three students A, B and C. In how many ways the distribution can be made in multiple of Rs 100.
(i) If each gets at least Rs 300.
(ii) If A must gets at least Rs 500, B and C get at least Rs 400 each? **(07 Marks)**

c. Find the coefficient of $a^2b^3c^2d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$. **(07 Marks)**

OR

4 a. Let $a_0 = 1$, $a_1 = 2$, $a_2 = 3$ and $a_n = a_{n-1} + a_{n-2} + a_{n-3}$, for all positive integer $n \geq 3$. Then prove that $a_n \leq 3^n$ for all positive integer n. **(06 Marks)**

b. How many ways can 10 oranges be distributed among five children if, (i) there are no restrictions (ii) each child gets at least one (iii) the oldest child gets at least two oranges. **(07 Marks)**

c. Determine the number of integer solutions of $a + b + c + d = 32$, where
(i) a, b, c and d > 0   (ii) a, b ≥ 5 and c, d ≥ 7. **(07 Marks)**

Module-3

5 a. Define one-to-one function and onto function with example. Determine whether or not the relation $\{(x, y)/x, y \in R \text{ and } x = y^2\}$ is a function. **(06 Marks)**

b. Let $A = \{a, b, c, d, e\}$ and the relation $R = \{(a,a),(a,e),(b,c),(b,d),(c,c)(d,c),(e,d)(e,a)\}$, write the relation matrix and digraph of R. **(07 Marks)**

c. Draw the Hasse diagram for the subset relation on the power set of $A = \{a, b, c\}$. **(07 Marks)**

OR

6 a. For any sets A, B, C $\subseteq$ U, prove that $A \times (B - C) = (A \times B) - (A \times C)$. **(06 Marks)**

b. Show that if any (n + 1) numbers from {1, 2, 3.....2n} are chosen, then two of them will have their sum equal to (2n + 1). **(07 Marks)**

c. Let $A = \{1, 2, 3, 4, 5\}$ and R be a relation on $A \times A$ defined by (a, b) R (c, d) if and only if a + d = b + c. Show that R is equivalence relation. Determine the partition induced by R and the equivalence class [(2, 5)]. **(07 Marks)**

Module-4

7 a. Determine the number of positive integers n where $1 \le n \le 100$, and n is not divisible by 2, 3 or 5. **(06 Marks)**

b. An apple, a banana, a mango and an orange are to be distributed for four boys A, B, C, D. The boys A and B do not wish to have apple. C does not want banana or mango and D refuses orange. In how many ways the distribution can be made so that no boy is displeased? **(07 Marks)**

c. Solve $2a_n = 7a_{n-1} - 3a_{n-2}$ for $n \ge 2$ and $a_0 = 2$, $a_1 = 5$. **(07 Marks)**

OR

8 a. Define the principle of inclusion and exclusion and generalization of the principle. **(06 Marks)**

b. Find the rook polynomial of the chess board. (Refer Fig. Q8 (b)). **(07 Marks)**

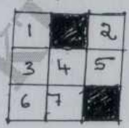

Fig. Q8 (b)

c. Solve $a_n = 2a_{n-1} - 2a_{n-2}$ for $n \ge 2$ and $a_0 = 1$, $a_1 = 2$. **(07 Marks)**

Module-5

9 a. Discuss the Konigsberg-bridge problem and solution. **(06 Marks)**

b. Define Isomorphic graphs. Show that the following two graphs are isomorphic. (Refer Fig. Q9 (b)) **(07 Marks)**

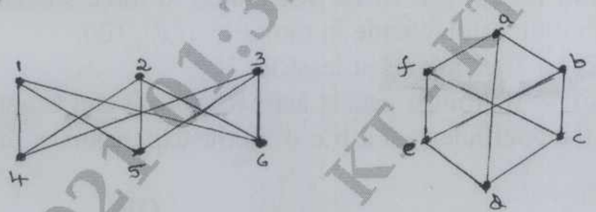

Fig. Q9 (b)

c. Construct an optimal prefix code for the symbols a, b, c, d, e, f, that occur with respective frequencies 20, 28, 4, 17, 12, 7. **(07 Marks)**

OR

10 a. Find the number of spanning sub graphs of the graph given below. How many of them are connected. How many are spanning trees? **(06 Marks)**

b. Prove that for every tree $T \equiv (V, E)$, if $|V| \ge 2$ then T has at least two pendent vertices. **(07 Marks)**

c. Define directed tree, rooted tree, binary rooted tree, complete binary tree, m-ary tree complete m-ary tree, leaf. **(07 Marks)**

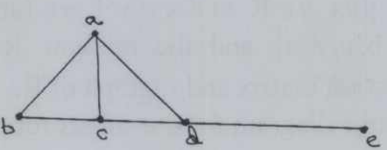

Fig. Q10 (a)

CBCS SCHEME

USN | | | | | | | | | | |

17CPH39/49

Third/Fourth Semester B.E. Degree Examination, Jan./Feb. 2021

Constitution of India and Professional Ethics and Human Rights

(COMMON TO ALL BRANCHES)

Time: 2 hrs.] [Max. Marks: 30

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the thirty 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.

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1. When the Indian Constitution given effect
   a) 26.10.1949 b) 26.12.1949
   c) 26.01.1950 d) 26.01.1949

2. Which of the following word was added in the Preamble of the Constitution by 42nd Amendment Act 1976
   a) Socialist b) Sovereign
   c) Federal d) Republic

3. The President power to suspend death sentence temporarily is called
   a) Respite b) Reprieve
   c) Remission d) Constitution

4. The Preamble of the Constitution has been amended so far
   a) 4 times b) 3 times
   c) Twice d) Once

5. Which one of the following is not one of the 3 organs of the state/union?
   a) Executive b) Press
   c) Judiciary d) Legislation

6. Which one of the following states constitution has been removed by the Parliament?
   a) West Bengal b) Nagaland
   c) Sikkim d) J & K

7. Which one of the landmark judgment passed by the Supreme Court in respect of Preamble of the Constitution
   a) Beru Bari　　b) Keshavananda Bharathi
   c) Menaka Gandhi　　d) Sonia Gandhi

8. Who is the Neutral person in the affairs of the party politics?
   a) C.M.　　b) Home Minister
   c)Finance Minister　　d) Speaker

9. Indian Constitution guarantees reservation of seats to SC and ST in
   a) Loksabha and Assembly only　　b) Loksabha only
   c) Loksabha and Rajyasabha　　d) Rajyasabha

10. India is referred to as _____ under the Indian Constitution
    a) Country　　b) Hindustan
    c) India　　d) Bharat

11. Who will preside over the joint session of both the houses of the parliament
    a) President　　b) Prime Minister
    c) Speaker　　d) Law Minster

12. What is the minimum age for becoming M.P. in Rajyasabha and Loksabha
    a) 18 & 25 years　　b) 25 & 18 years
    c) 35 & 25 years　　d) 30 & 25 years

13. The citizens can enforce their Fundamental Rights before SC under Article
    a) Art 31　　b) Art 32
    c) Art 33　　d) Art 34

14. Who quoted "Child of Today is Citizen of Tomorrow"?
    a) L. Tilak　　b) Jawaharlal Nehru
    c) B.R. Ambedkar　　d) Gandhiji

15. Who quoted "Freedom is my birth right"
    a) L. Tilak　　b) Jawaharlal Nehru
    c) Sardar Patel　　d) Gandhiji

16. No person shall be punished for same offence more than once
    a)Jeopardy　　b) Double Jeopardy
    c) Ex-post facto law　　d) Testimonial compulsion

17. When the Office of The President falls vacant the same must be filled up within
    a)4 months　　b) 6 months
    c) 12 months　　d) 18 months

18. Which important Human Rights is protected under Article 21
    a) Right to Equality　　b) Right to Life and Personal Liberty
    c)Right to Freedom of Speech　　d) Right to Religion

19. The Rajya Sabha is
a)Is a Permanent House
b) Has a life of 6 years
c) Has a life of 5 years
d) Has a life of 7 years

20. The Quorum or minimum number of members required to hold the meetings of either houses of the Parliament is
a)One-tenth
b) One-fifth
c)One-third
d) One-fourth

21. Article 19 provides
a)6 freedoms
b) 7 freedoms
c) 8 freedoms
d) 5 freedoms

22. One of the salient features of our Constitution is
a) It is fully rigid
b) It is fully flexible
c) It is partly rigid and partly flexible
d) None of these

23. Who is the present Speaker of Loksabha
a) Sumithra Mahajan
b) K.S.Hegde
c) Om Birla
d) Venkiah Naidu

24. The Chief Election Commission holds office for a period of
a) 3 yrs
b) 6 yrs
c) 5 yrs
d) 6 yrs or till he attains the age of 65 years

25. The procedure for amending the Constitution is detailed under
a)Art 360
b) Art 368
c)Art 352
d) Art 301

26. Writ of Mandamus can be issued on the ground of
a) Non-performance of public duties
b) Unlawful Detention
c)Unlawful occupation of public offence
d) None of these

27. Engineering Ethics is
a)A macro ethics
b) Business Ethics
c)A preventive ethics
d) A code of scientific rules based on ethics

28. The use of Intellectual Property of others without permission is referred as
a) Cooking
b) Stealing
c) Plagiarism
d) Trimming

29. Who appoints the Lieutenant General to Delhi
a) Prime Minister
b) Home Minister
c)President
d) Vice-President

30. The final interpreter to the Indian Constitution is
a)Speaker of Loksabha
b) Parliament
c) President
d) SC

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CBCS SCHEME

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17MATDIP31

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Additional Mathematics - I

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Find the modulus and amplitude of $\frac{(1+i)^2}{3+i}$. **(06 Marks)**

b. If $x + \frac{1}{x} = 2\cos\alpha$, then prove that $x^n + \frac{1}{x^n} = 2\cos n\alpha$. **(07 Marks)**

c. Find the fourth roots of $1 - i\sqrt{3}$ and represent them on an argand plane. **(07 Marks)**

OR

2 a. If the vectors $2\hat{i} + \lambda\hat{j} + \hat{k}$ and $4\hat{i} - 2\hat{j} - 2\hat{k}$ are perpendicular to each other than find the value of λ. **(06 Marks)**

b. Find the sine of the angle between the vectors $\vec{a} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} + 2\hat{k}$. **(07 Marks)**

c. Find λ such that the vectors $2\hat{i} - \hat{j} + \hat{k}$, $\hat{i} + 2\hat{j} - 3\hat{k}$ and $3\hat{i} + \lambda\hat{j} + 5\hat{k}$ are coplanar. **(07 Marks)**

Module-2

3 a. Find the n^{th} derivative of cosx cos2x cos3x. **(06 Marks)**

b. With usual notations prove that $\tan\phi = r\frac{d\theta}{dr}$. **(07 Marks)**

c. Prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{24} + \ldots\ldots$ By using Maclaurin's expansion. **(07 Marks)**

OR

4 a. If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$. **(06 Marks)**

b. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$. **(07 Marks)**

c. If $u = e^x\cos y$, $v = e^x\sin y$, find $J = \frac{\partial(u,v)}{\partial(x,y)}$. **(07 Marks)**

Module-3

5 a. Evaluate $\int_0^{\pi} x\cos^6 x\,dx$. **(06 Marks)**

b. Evaluate $\int_0^1\int_0^1 \frac{dx\,dy}{\sqrt{(1-x^2)(1-y^2)}}$. **(07 Marks)**

c. Evaluate $\int_0^1\int_0^2\int_1^2 x^2 y z\,dx\,dy\,dz$. **(07 Marks)**

OR

6 a. Evaluate $\int \sin^6 x \, dx$. **(06 Marks)**

b. Evaluate $\iint_R (x^2 + y^2)\, dx\, dy$, where R is the triangle bounded by the lines y = 0 , y = x and x = 1. **(07 Marks)**

c. Evaluate $\int_0^1 \int_0^1 \int_0^1 e^{x+y+z}\, dx\, dy\, dz$. **(07 Marks)**

Module-4

7 a. A particle moves along a curve whose position vector is given by $\vec{r} = \left(t - \frac{t^3}{3}\right)\hat{i} + t^2\hat{j} + \left(t + \frac{t^3}{3}\right)\hat{k}$. Find the velocity and acceleration at t = 3. **(06 Marks)**

b. Find the unit normal vector to the surface xy + x + zx = 3 at (1, 1, 1). **(07 Marks)**

c. Find div $\vec{F}$ and curl $\vec{F}$, where $\vec{F} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. **(07 Marks)**

OR

8 a. A particle moves so that its position vector is given by $\vec{r} = \cos wt\ \hat{i} + \sin wt\ \hat{j}$, where w is a constant. Show that the velocity $\vec{V}$ is perpendicular to $\vec{r}$. **(06 Marks)**

b. If $\vec{F} = (x + y + 1)\ \hat{i} + \hat{j} - (x + y)\ \hat{k}$, show that $\vec{F}$ curl $\vec{F} = 0$. **(07 Marks)**

c. Show that $\vec{f} = (\sin y + z)\ \hat{i} + (x \cos y - z)\ \hat{j} + (x-y)\ \hat{k}$ is irrotational. Also find ϕ such that $\vec{f} = \nabla\phi$. **(07 Marks)**

Module-5

9 a. Solve $\frac{dy}{dx} = 1 + \frac{y}{x} + \left(\frac{y}{x}\right)^2$. **(06 Marks)**

b. Solve $\frac{dy}{dx} + y \cot x = \sin x$. **(07 Marks)**

c. Solve $(x^2 + y)dx + (y^3 + x)\, dy = 0$. **(07 Marks)**

OR

10 a. Solve $\frac{dy}{dx} + \frac{y}{x} = y^2 x$. **(06 Marks)**

b. Solve (y cos x + sin y + y) dx + (sin x + x cos y + x) dy = 0. **(07 Marks)**

c. Solve $y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$. **(07 Marks)**

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