CBCS SCHEME

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17MAT31

Third Semester B.E. Degree Examination, July/August 2021
Engineering Mathematics - III

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Obtain the Fourier series for the function
$$f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$
Hence deduce $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots$ **(08 Marks)**

b. Find the Fourier series for the function $f(x) = 2x - x^2$ in $0 < x < 3$. **(06 Marks)**

c. Obtain the constant term and the first sine and cosine terms of the Fourier for y using the following table :

x :	0	1	2	3	4	5
y :	4	8	15	7	6	2

(06 Marks)

2 a. Obtain the Fourier series for the function $f(x) = |\cos x|$, $-\pi < x < \pi$. **(08 Marks)**

b. Find the Half range cosine series for $f(x) = x(\ell - x)$, $0 \le x \le \ell$. **(06 Marks)**

c. Express y as a Fourier series upto first harmonic given :

x :	0	$\pi/3$	$2\pi/3$	π	$4\pi/3$	$5\pi/3$	2π
y :	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

(06 Marks)

3 a. If $f(x) = \begin{cases} 1 - x^2, & |x| < 0 \\ 0, & |x| \ge 1 \end{cases}$

Find the Fourier transform of f(x) and hence find the value of $\int_0^\infty \left(\frac{x\cos x - \sin x}{x^3}\right) dx$ **(08 Marks)**

b. Find the Fourier sine transform of $f(x) = e^{-|x|}$ and hence evaluate $\int_0^\infty \frac{x \sin mx}{1 + x^2} dx \ (m > 0)$ **(06 Marks)**

c. Find $Z_T^{-1}\left[\frac{3z^2 + 2z}{(5z - 1)(5z + 2)}\right]$. **(06 Marks)**

4 a. Find the Fourier transform of
$$f(x) = \begin{cases} 1 - |x|, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$$ and hence evaluate $\int_0^\infty \frac{\sin^2 t}{t^2} dt$. **(08 Marks)**

b. Find the Z – transform of $2n + \sin\left(\frac{n\pi}{4}\right) + 1$. **(06 Marks)**

c. Solve by using Z – transforms $Y_{n+2} - 4\ Y_n = 0$ given that $Y_0 = 0$, $Y_1 = 2$. **(06 Marks)**

5 a. Obtain the lines of regression and hence 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 Second degree parabola in the least Square sense for the following data:

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

(06 Marks)

c. Use the Regula-Falsi method to obtain the real root of the equation $\cos x = 3x - 1$ correct to 3 decimal places in (0, 1). **(06 Marks)**

6 a. Given the equation of the regression lines $x = 19.13 - 0.87y$, $y = 11.64 - 0.5x$. Compute the mean of x's , mean of y's and the coefficient of correlation. **(08 Marks)**

b. Fit a curve of the form, $y = a\,e^{bx}$ for the data:

x :	0	2	4
y :	8.12	10	31.82

(06 Marks)

c. Using Newton-Raphson method to find a real root of $x \log_{10}^{x} = 1.2$ upto 5 decimal places near $x = 2.5$. **(06 Marks)**

7 a. Given $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$, $\sin 60^\circ = 0.8660$, find $\sin 57^\circ$ using an Backward Interpolation formula. **(08 Marks)**

b. Applying Lagrange's Interpolation formula inversely find x when y = 6 given the data

x :	20	30	40
y :	2	4.4	7.9

(06 Marks)

c. Using Simpson's $\frac{1}{3}^{rd}$ rule with Seven ordinates to evaluate $\int_2^8 \frac{dx}{\log_{10} x}$. **(06 Marks)**

8 a. Fit an Interpolating polynomial for the data $u_{10} = 355$, $u_0 = -5$, $u_8 = -21$, $u_1 = -14$, $u_4 = -125$ by using Newton's Divided difference formula and hence find u_2. **(08 Marks)**

b. Use Lagrange's Interpolation formula to fit a polynomial for the data :

x :	0	1	3	4
y :	-12	0	6	12

Hence estimate y at x = 2. **(06 Marks)**

c. Evaluate $\int_4^{5.2} \log_e x\, dx$ taking six equal strips by applying Weddle's rule. **(06 Marks)**

9 a. Using Green's theorem, evaluate $\int_C [(y - \sin x)dx + \cos x\; dy]$, where C is the plane triangle enclosed by the lines $y = 0$, $x = \frac{\pi}{2}$ and $y = \frac{2}{\pi}x$. **(08 Marks)**

b. Using Divergence theorem evaluate $\int_S \vec{F} \cdot ds$, where $\vec{F} = 4x\,i - 2y^2 j + z^2 K$ and S is the surface bounding the region $x^2 + y^2 = 4$, $z = 0$ and $z = 3$. **(06 Marks)**

c. Show that the Geodesics on a plane are straight lines. **(06 Marks)**

10 a. Verify Stoke's theorem for the vector field $\vec{F} = (2x - y)i - yz^2 j - y^2 z \; K$ over the upper half surface of $x^2 + y^2 + z^2 = 1$ bounded by its projection on the xy - plane. **(08 Marks)**

b. Derive Euler's equation in the standard form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left[\frac{\partial f}{\partial y^1}\right] = 0$. **(06 Marks)**

c. Find the Extremals of the functional

$$\int_{x_0}^{x_1} \frac{y^{1^2}}{x^3} dx.$$ **(06 Marks)**

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CBCS SCHEME

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

Third Semester B.E. Degree Examination, July/August 2021

Analog and Digital Electronics

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Explain the construction, working and characteristics of N-channel DE-MOSFET. **(10 Marks)**

b. List out the difference between JFET and MOSFET. **(05 Marks)**

c. Explain CMOS as an inverter. **(05 Marks)**

2 a. Explain the following performance parameters of op-amp :
(i) Bandwidth (ii) Slew rate (iii) CMRR **(06 Marks)**

b. With a neat circuit diagram and waveforms, explain the operation of astable multivibrator using 555 timer. **(08 Marks)**

c. With neat circuit diagram and waveform explain relaxation oscillator. **(06 Marks)**

3 a. What is logic Gate? Realize $Y = \left(\overline{A+B}\right) + \overline{C}$ using Nand gates only. **(05 Marks)**

b. Describe positive and Negative logic. List the equivalence between them. **(05 Marks)**

c. A digital system is to be designed in the months of year which is given input in bit form. The month of January is represented as '0000' and February as '0001' and so on. Output of the system is '1' corresponding to the input of the month containing 31 days, otherwise it is '0'. For this system of 4 variable (a, b, c, d) find the following :

(i) Give the truth table and Boolean expression in $\sum m$ and πM.

(ii) Simplify using K-Map.

(iii) Implement the simplified equation using Nand-Nand gates and NOR – NOR gates. **(10 Marks)**

4 a. Using Quine-McClusky method simplify the following Boolean equation:
$y = f(a, b, c, d) = \sum m(0, 2, 3, 6, 7, 8, 10, 12, 13)$ **(10 Marks)**

b. Define Hazard. Explain different types of Hazard. **(05 Marks)**

c. Explain the structure of verilog HDL. **(05 Marks)**

5 a. What is Multiplexer? Design 16-to-1 Mux using two 8-to-1 Mux and one 2-to-1 Mux. **(06 Marks)**

b. Implement Full adder using following data processing circuits : (i) 8-to-1 Mux (ii) 3-to-8 line decoder and multi-input OR gate. **(08 Marks)**

c. Draw PLA circuit and realize the following equations $x = f(a, b, c) = \sum m(1, 4, 6)$, $y = f(a, b, c) = \sum m(2, 3)$ and $z = f(a, b, c) = \sum m(0, 5, 7)$. **(06 Marks)**

6 a. Realize $y = A'B + B'C' + ABC$ using 8-to-1 Mux. **(05 Marks)**

b. What is Magnitude comparator? Explain 1-bit comparator. Implement 1-bit comparator using 2-to-4 line decoder. **(08 Marks)**

c. With neat logic diagram, truth table and waveform explain positive edge-triggered JK flip-flop. **(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.

7 a. With a neat logic diagram and truth table, explain the working of JK Master Slave flip-flop along with its implementation using Nand gates. **(10 Marks)**

b. Explain various representations of SR, D, JK flip-flop. **(10 Marks)**

8 a. Using negative edge triggered JK flip-flop draw logic diagram of 4-bit Serial In Serial Out (SISO) shift register. Explain how to shift binary number 1001 using state table and necessary waveform. **(10 Marks)**

b. Explain with neat logic diagram and state table a switched tail counter initialized with 0000 also explain how to decode the counter. **(08 Marks)**

c. How long will it take to shift an 8-bit number into serial? In parallel out shift register, if clock used is of 10 MHz. **(02 Marks)**

9 a. What is ripple counter? Explain 3-bit ripple counter with logic diagram truth table and waveforms. What is the clock frequency if the period of the waveform at Q_C is 24 μs. **(10 Marks)**

b. Design self correcting Mod-5 synchronous down counter for Q_C, Q_B, Q_A, using JK flip-flop. Assume all unused state leads to 100. **(10 Marks)**

10 a. What is Binary Ladder? Explain binary ladder with digital input of 1000. What is full-scale output voltage of 5-bit ladder if input levels are 0 = 0 V and 1 = +10V **(08 Marks)**

b. Explain 2-bit simultaneous A to D converter. **(08 Marks)**

c. Explain : (i) Steady state accuracy test. (ii) Monotonicity test. **(04 Marks)**

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CBCS SCHEME

USN | | | | | | | | | | | **17CS/IS33**

Third Semester B.E. Degree Examination, July/August 2021
Data Structures and Applications

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

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.

1 a. Define Data structure, classify them briefly. **(05 Marks)**

b. What is structure, how it is different from an array, how are they defined and initialized. **(05 Marks)**

c. Explain with examples about dynamic memory allocation functions. **(10 Marks)**

2 a. With example explain about self referential structures. **(05 Marks)**

b. What is pointer variable? How pointers are declared and initialized in C? Can we have multiple pointers to a variable? **(05 Marks)**

c. Write a C program to
i) Compare two strings
ii) To concatenate two strings. **(10 Marks)**

3 a. Define stack, list the application of stack. Write a C function to insert on element in stack and delete a element from stack. **(06 Marks)**

b. With suitable example explain infix postfix and prefix expression. **(06 Marks)**

c. Explain the evaluation of postfix expression 456 *+. Mention the rule for evaluation of postfix expression. **(08 Marks)**

4 a. Define Queue, explain the implementation of queue. **(06 Marks)**

b. State clearly problem of Tower of Hanoi. Write a program to solve this problem for 3 disks using the technique of recursion. **(08 Marks)**

c. Explain the following:
i) Dequeue ii) Priority Queue. **(06 Marks)**

5 a. Define list. Explain the representation of linked list in memory. **(05 Marks)**

b. Explain circular linked list and doubly linked list with example. **(10 Marks)**

c. List out operations performed on list explain any two of them. **(05 Marks)**

6 a. Define polynomial, explain the representation of polynomial. Write a C program to add two polynomial. **(10 Marks)**

b. What is sparse matrix? Write the tripelet form and linked list representation of sparse matrix given in below Fig. Q.6(b) and write the program. **(10 Marks)**

$$\begin{bmatrix} 0 & 0 & 3 & 0 & 4 \\ 0 & 0 & 5 & 7 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 6 & 0 & 0 \end{bmatrix}$$

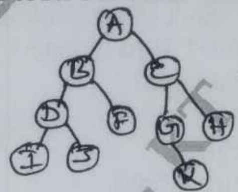
Fig.Q.6(b) Sparse Matrix.

7 a. Define the following with example:
 i) Binary tree
 ii) Complete binary tree
 iii) Binary search tree
 iv) Threaded binary tree. **(10 Marks)**

 b. Write C routine for In order Pre order and Post order traversal with example for each. **(10 Marks)**

8 a. Explain how to
 i) Insert a node into binary search tree
 ii) Searching a binary search tree. **(10 Marks)**

 b. For the tree given below write the In order Pre order and Post order traversal. **(06 Marks)**



 c. Construct a tree for post order traversal
 4, 12, 10, 18, 24, 22, 15, 31, 44, 35, 66, 90, 70, 50, 25 **(04 Marks)**

9 a. Define Graph. Explain the matrix and adjacency list representation of a graph with example. **(05 Marks)**

 b. Explain the following traversal methods:
 i) Breadth first search
 ii) Depth first search. **(10 Marks)**

 c. Explain Radix sort. **(05 Marks)**

10 Write a note on:
 a. File Attributes
 b. File Organization and Indexing
 c. Hashing
 d. Elementary graph operation. **(20 Marks)**

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CBCS SCHEME

USN

17CS36

Third Semester B.E. Degree Examination, July/August 2021
Discrete Mathematical Structures

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Write all the logical connectives with truth table. **(06 Marks)**

b. Prove that for any proposition p, q, r the compound proposition
$[(p \vee q) \rightarrow r] \Leftrightarrow [\neg r \rightarrow \neg(p \vee q)]$ is logically equivalent. **(08 Marks)**

c. Prove that for any proposition p, q, r the compound proposition
$\{p \rightarrow (q \rightarrow r)\} \rightarrow \{(p \rightarrow q) \rightarrow (p \rightarrow r)\}$ is tautology. **(06 Marks)**

2 a. Prove the logical equivalences using laws of logic
i) $[(p \vee q) \wedge (p \vee \neg q)] \vee q \Leftrightarrow p \vee q$
ii) $(p \rightarrow q) \wedge [\neg q \wedge (r \vee \neg q)] \Leftrightarrow \neg(q \vee p)$ **(08 Marks)**

b. Test the validity of the following argument
If I study, I will not fail in the examination
If I don't watch TV in the evening, I will study
I failed in the examination
___
$\therefore$ I must have watched TV in the evenings **(06 Marks)**

c. Establish the validity of the following argument
$\forall x, \{p(x) \vee q(x)\}$
$\forall x, \{\{\neg p(x) \wedge q(x)\} \rightarrow r(x)\}$
___
$\therefore \forall x, \{\neg r(x) \rightarrow p(x)\}$ **(06 Marks)**

3 a. Prove that mathematical induction that
$$1^2 + 3^2 + 5^2 + \ldots\ldots\ldots\ldots + (2n-1)^2 = \frac{1}{3} n(2n-1)(2n+1)$$ **(06 Marks)**

b. For the Fibonacci sequence $F_0, F_1, F_2 \ldots\ldots\ldots$ Prove that
$$F_n = \frac{1}{\sqrt{5}}\left[\left(\frac{1+\sqrt{5}}{2}\right)^n - \left(\frac{1-\sqrt{5}}{2}\right)^n\right].$$ **(08 Marks)**

c. Find the coefficients of
i) $x^9 y^3$ in the expansion of $(2x - 3y)^{12}$
ii) x^{12} in the expansion of $x^3 (1 - 2x)^{10}$. **(06 Marks)**

4 a. In how many ways can 10 identical pencils be distributed among 5 children in the following cases?
i) There are no restrictions
ii) Each child gets atleast one pencil
iii) The youngest child gets atleast two pencils. **(06 Marks)**

b. Prove the following identities :
i) $C(n, r-1) + C(n, r) \equiv C(n+1, r)$
ii) $C(m, 2) + C(n, 2) \equiv C(m+n, 2) - mn$ **(08 Marks)**

c. In how many ways one can distribute eight identical balls into four distinct containers so that
   i) No container is left empty
   ii) The fourth container gets an odd number of balls. **(06 Marks)**

5 a. Consider the function f and g defined by $f(x) = x^3$ and $g(x) = x^2 + 1$, $\forall x \in R$. Find gof, fog, f^2 and g^2. **(06 Marks)**

b. Let A = {1, 2, 3, 4, 6, 12}. On A define the relation R by aRb if and only if a divides b. Prove R is partial order on A. Draw the Hasse diagram for this relation. **(07 Marks)**

c. Let A = {1 2 3 4} and f and g be functions from A to A given by f = {(1, 4) (2, 1), (3, 2), (4, 3)}, g = {(1, 2), (2, 3), (3, 4), (4, 1)}.Prove that f and g are inverse of each other. **(07 Marks)**

6 a. Define an equivalence relation with example. **(08 Marks)**

b. Draw the Hasse diagram representing the positive divisors of 36. **(06 Marks)**

c. Let $f : R \rightarrow R$ be defined by

$$f(x) = \begin{cases} 3x - 5 & \text{for } x > 0 \\ -3x + 1 & \text{for } x \leq 0 \end{cases}$$

   i) Determine : $f(0)$, $f(-1)$, $f(5/3)$, $f(-5/3)$
   ii) Find $f^{-1}(0)$, $f^{-1}(1)$, $f^{-1}(3)$, $f^{-1}(6)$. **(06 Marks)**

7 a. Out of 30 students in hostel, 15 study History, 8 study Economics and 6 study Geography. It is known that 3 students study all these subjects. Show that 7 or more students study none of these subjects. **(07 Marks)**

b. Find the rook polynomial for the 3×3 board using expansion formula. **(07 Marks)**

c. Solve the recurrence relation $a_n + a_{n-1} - 6a_{n-2} = 0 \quad n \geq 2$ given $a_0 = -1$ $a_1 = 8$. **(06 Marks)**

8 a. An apple, a banana, a mango and an orange are to be distributed among 4 boys B_1, B_2, B_3, B_4. The boys B_1 and B_2 do not wish to have an apple. The boy B_3 does not want banana or mango, B_4 refuses orange. In how many ways the distribution can be made so that no boy is displeased. **(08 Marks)**

b. How many permutations of 1 2 3 4 5 6 7 8 are not derangements? **(05 Marks)**

c. The number of virus affected files in a system is 1000 (to start with) and this increases 250%, every two hours. Use recurrence relation to determine the number of virus affected files in the system after one day. **(07 Marks)**

9 a. Define : i) Graph ii) Simple graph iii) Complete graph iv) Order of graph v) Size of graph vi) Bipertite graph vii) General graph. **(07 Marks)**

b. Show that the following two graphs are isomorphic (Fig Q9(b))

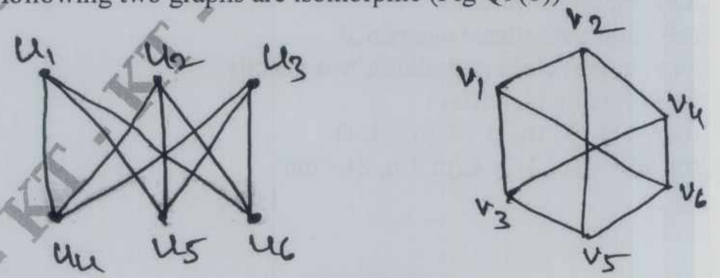

Fig Q9(b) **(06 Marks)**

c. Find the prefix codes for the letters B, E, I, K, L, T, P, S, if the coding scheme is as shown in Fig Q9(c).

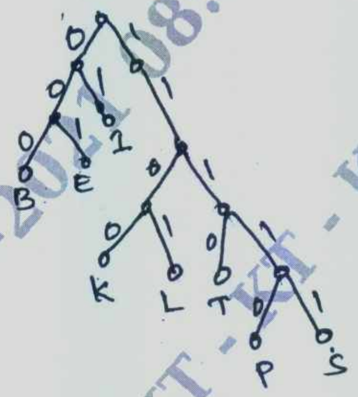

Fig Q9(c)

1) Find the codes for the words PIPE and BEST
2) Decode the string i) 000011100001 ii) 11111111101101011110 **(07 Marks)**

10 a. Obtain an optimal prefix code for the message LETTER RECEIVED. Indicate the code. **(08 Marks)**

b. Apply the merge sort to following list of elements.
{-1, 0, 2, -2, 3, 6, -3, 5, 1, 4}. **(06 Marks)**

c. Let $T_1 = (V_1\ E_1)$ and $T_2 = (V_2\ E_2)$ be two trees. If $|E_1| = 19$ and $|V_2| = 3|V_1|$ determine $|V_1|$, $|V_2|$ & $|E^2|$. **(06 Marks)**

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CBCS SCHEME

USN

17MATDIP31

Third Semester B.E. Degree Examination, July/August 2021
Additional Mathematics – I

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Find the modulus and amplitude of $\dfrac{4+2i}{2-3i}$. **(06 Marks)**

b. Find a unit vector normal to both the vectors $4i-j+3k$ and $-2i+j-2k$. Find also sine of the angle between them. **(07 Marks)**

c. Show that $\left[\vec{a}+\vec{b}, \vec{b}+\vec{c}, \vec{c}+\vec{a}\right] = 2\left[\vec{a}, \vec{b}, \vec{c}\right]$. **(07 Marks)**

2 a. Express $(2+3i)+\dfrac{1}{1-i}$ in $x+iy$ form. **(06 Marks)**

b. Find the modulus and amplitude of $1+\cos\theta+i\sin\theta$. **(07 Marks)**

c. Find λ so that $\vec{a}=2\hat{i}-3\hat{j}+\hat{k}$, $\vec{b}=\hat{i}+2\hat{j}-3\hat{k}$ and $\vec{c}=\hat{j}+\lambda\hat{k}$ are coplanar. **(07 Marks)**

3 a. Find the n^{th} derivative of $e^{ax}\cos(bx+c)$. **(06 Marks)**

b. Find the angle of intersection of the curves $r=\sin\theta+\cos\theta$ and $r=2\sin\theta$. **(07 Marks)**

c. If, $z=f(x,y)$ where $x=e^{u}+e^{-v}$, $y=e^{-u}-e^{v}$. Prove that $x\dfrac{\partial z}{\partial x}-y\dfrac{\partial z}{\partial y}=\dfrac{\partial z}{\partial u}-\dfrac{\partial z}{\partial v}$. **(07 Marks)**

4 a. If $y=\tan^{-1}x$, then show that $(1+x^2)y_{n+2}+2(n+1)xy_{n+1}+n(n+1)y_n=0$. **(06 Marks)**

b. Find the pedal equation for the curve $\dfrac{2a}{r}=1+\cos\theta$. **(07 Marks)**

c. If, $u=x^2+y^2+z^2$, $v=xy+yz+zx$, $w=x+y+z$, then find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$. **(07 Marks)**

5 a. Obtain the reduction formula for $\int \cos^n x\,dx$. **(06 Marks)**

b. Using reduction formula, find the value of $\int_0^1 x^2(1-x^2)^{\frac{3}{2}}dx$. **(07 Marks)**

c. Evaluate $\int_{-1}^{1}\int_{0}^{2}\int_{x-z}^{x+z}(x+y+z)\,dx\,dy\,dz$. **(07 Marks)**

6 a. Evaluate $\int_0^{\pi} x\sin^8 x\,dx$. (06 Marks)

b. Evaluate $\int_0^1\int_0^{\sqrt{1-y^2}} x^3 y\,dx\,dy$. (07 Marks)

c. Evaluate $\int_0^{\pi} x\sin^2 x\cos^4 x\,dx$. (07 Marks)

7 a. A particle moves along the curve $\vec{r} = 3t^2\hat{i} + (t^3 - 4t)\hat{j} + (3t+4)\hat{k}$. Find the component of velocity and acceleration at $t = 2$ in the direction of $\hat{i} - 2\hat{j} + 2\hat{k}$. (06 Marks)

b. Find the angle between the tangents to the surface $x^2y^2 = z^4$ at (1, 1, 1) and (3, 3, −3). (07 Marks)

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

8 a. Find the angle between the tangents and to the curve $\vec{r} = \left(t - \frac{t^3}{3}\right)\hat{i} + t^2\hat{j} + \left(t + \frac{t^3}{3}\right)\hat{k}$ at $t = \pm 3$. (06 Marks)

b. Find the directional derivative of $f = x^2yz + 4xz^2$ at $(1,-2,-1)$ along $2\hat{i} - \hat{j} - 2\hat{k}$. (07 Marks)

c. Prove that $\operatorname{div}(\operatorname{curl}\vec{F}) = 0$. (07 Marks)

9 a. Solve $\frac{dy}{dx} = e^{3x-2y} + x^2e^{-2y}$. (06 Marks)

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

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

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

b. Solve $(5x^4 + 3x^2y^2 - 2xy^3)dx + (2x^3y - 3x^2y^2 - 5y^4)dy = 0$. (07 Marks)

c. Solve $\frac{dy}{dx} - \frac{y}{x+1} = e^{3x}(x+1)$. (07 Marks)

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