

DIPLOMA
Piping Technology
Subject: Applied Mathematics
Subject Code: MTH-501
Semester: First
July 2021
Theory (External): 70 Marks
Time: 03 Hours

5. Find the value of

- $\int e^x \cos x \, dx$;
- $\int \frac{5x+1}{(x-3)(x+1)(x+2)} \, dx$.

6. In a group it was found that 21 people liked cricket, 26 liked football and 29 liked hockey. If 14 people liked cricket and football, 12 people liked cricket and hockey, 14 people liked football and hockey and 8 liked all the three games. Find how many liked hockey only?

7. (i) Find the values of x, y, z and w , if $3 \begin{bmatrix} x & y \\ z & w \end{bmatrix} = \begin{bmatrix} x & 6 \\ -1 & 2w \end{bmatrix} + \begin{bmatrix} 4 & x+y \\ z+w & 3 \end{bmatrix}$.

(ii) Find the determinant of the matrix: $\begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$

8. Find $\frac{dy}{dx}$, if $xy + y^2 - y = \tan x$.

==END OF PAPER==

Instructions to the Students

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of objective type in nature. All questions are compulsory. Each question carries 2 marks.
3. Section B comprises 8 essay type questions out of which students need to do any 5. Each question carries 10 marks.
4. Read the questions carefully and write the answers in the answer sheets provided.
5. Do not write anything on the question paper.
6. Wherever necessary, the diagram drawn should be neat and properly labelled

Roll Number

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SECTION -A (SHORT/OBJECTIVE TYPE QUESTIONS)
(10x2=20 Marks)

- A. Choose the correct formula
- $\cos 2A = 2 \cos A \sin A$
 - $\cos 2A = \cos^2 A + \sin^2 A$
 - $\cos 2A = 2\cos^2 A - 1$
 - $\cos 2A = 2 \sin^2 A - 1$
- B. If $f(x) = x \cos x$ then $f'(0) = ?$
- 1
 - 0
 - 1
 - ∞
- C. If $U = \{1,2,3, \dots, 10\}$, $A = \{1,3,5,10\}$ and $B = \{3,8,10\}$. Then calculate $(A \cup B)'$.
- D. Evaluate $\operatorname{cosec} 210^\circ$.
- E. What is the order of a column matrix having 4 elements?
- F. Calculate $\frac{d}{dx} \log \cos x$.
- G. If $y = \sec(x+2)$ then $\frac{dy}{dx}$ is
- $\sec^2(x+2)$
 - $\sec(x+2) \tan(x+2)$
 - $2 \sec(x+2)$
 - $\tan^2(x+2)$
- H. $\int \cos 2\theta \, d\theta$
- $\frac{1}{2} \sin 2\theta + c$
 - $\frac{1}{2} \sin \theta + c$
 - $\sin 2\theta + c$
 - $-\sin 2\theta + c$

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1. $\frac{d}{dx} \cos \sqrt{x} = ?$
- $\sqrt{x} \sin \sqrt{x}$
 - $-\frac{\sin \sqrt{x}}{2\sqrt{x}}$
 - $\frac{1}{\sqrt{x}} \sin \sqrt{x}$
 - $\frac{1}{2\sqrt{x}} \sin \sqrt{x}$

- J. Which of the following correctly evaluates the definite integral $\int_{-2}^1 x^3 + 3x - 2 \, dx$
- $\frac{114}{4}$
 - $-\frac{57}{4}$
 - 0
 - $78/4$

SECTION -B (ESSAY TYPE QUESTIONS)
(5x10=50 Marks)

- (i) In how many ways can the letters of the word ASSASSINATION be arranged so that all the S's are together?

(ii) Find the coefficient of $a^5 b^7$ in the expansion $(a+2b)^{12}$.
- Prove that:
 $\sin 2x + 2 \sin 4x + \sin 6x = 4 \cos^2 x \sin 4x$
- Solve the following equations by crammer's rule
 $x + 3y - 2z = 6$
 $-3x - 5z = 3$
 $2x + 5y = 8$
- Differentiate the following with respect to x :
 - $y = \sqrt{\sec(x^3 + 1)}$
 - $y = x \cos x^2 + \sin^2 x$.