

APPLIED MATHEMATICS – II
2nd Exam /Common/2354/2251/5422/Nov' 2016

Duration : 3 Hrs.

M. Marks : 75

SECTION – A

1. Choose the correct answer :

5x1=5

- (i) If $f(x) = \frac{3x+1}{1-x}$ then $\frac{f(2)}{f(3)}$ is
 (a) $\frac{5}{7}$ (b) $\frac{7}{5}$ (c) $\frac{2}{5}$ (d) $\frac{5}{2}$
- (ii) $\lim_{x \rightarrow 0} \frac{\sin x - x}{x} =$
 (a) 1 (b) -1 (c) 0 (d) ∞
- (iii) $\frac{d}{dx}(\cot^{-1} x) =$
 (a) $\frac{1}{1+x^2}$ (b) $-\frac{1}{1+x^2}$ (c) $\frac{1}{x}$ (d) $\tan^{-1} x$
- (iv) $\frac{d}{dx}(\log x) =$
 (a) e^x (b) x (c) $\frac{1}{x}$ (d) $\frac{x^2}{2}$
- (v) If $\begin{vmatrix} x & 3 \\ 6 & 2 \end{vmatrix} = 0$, the x is
 (a) 9 (b) -9 (c) 18 (d) -18

2. State true or false.

5x1=5

- (i) Standard deviation is square of variance
- (ii) Degree of $\left(\frac{d^2 y}{dx^2}\right)^2 + x^2 \left(\frac{dy}{dx}\right)^3 = 0$ is 2
- (iii) For tangent parallel to x -axis, $\frac{dy}{dx} = \infty$
- (iv) The determinant of a singular matrix is zero
- (v) If $y = \log(\sin x)$, then $\frac{dy}{dx} = \cot x$

3. Fill in the blanks:-

5x1=5

- (i) $\lim_{x \rightarrow 0} \frac{a^x - 1}{x} = \dots\dots\dots$
- (ii) Mirror of 2 in $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$ is $\dots\dots\dots$
- (iii) In any distribution, 3 median - 2 Mean = $\dots\dots\dots$
- (iv) The probability of an impossible event is $\dots\dots\dots$
- (v) $\int \sec x \, dx = \dots\dots\dots$

SECTION – B

4. Attempt any six questions:

6x5=30

- Use Cramer's rule to find x and y $6x - 4y = -24$, $5x - 11y = -43$
- Calculate by Simpson's rule an approximate value of $\int_{-3}^3 x^4 dx$, by taking seven equidistant and quadiantes.
- Evaluate $\int \sin^4 x dx$
- Solve the differential equation $3e^x \tan y dx + (1 - e^x) \sec^2 y dy = 0$
- Evaluate : $\int_0^a \frac{x^4}{\sqrt{a^2 - x^2}} dx$
- $y = \sin \left(2 \tan^{-1} \sqrt{\frac{1-x}{1+x}} \right)$, prove that $\frac{dy}{dx} = -\frac{x}{\sqrt{1-x^2}}$
- Evaluate $\int \frac{e^x(1+x)}{(2+x)^2} dx$
- Find derivative of $y = \log(x + \sqrt{x^2 - a^2})$
- Find equation of the tangent to the curve $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at $(1, 3)$

SECTION – C

Attempt any three Questions.

3x10=30

- Calculate Standard deviation and mean from following data

C, I.	30-34	35-39	40-44	45-49	50-54	55-59	60-64
fi	2	2	7	10	6	2	1

- Solve the system of equations, using matrix method (By finding inverse)

$$\begin{aligned} x + y + z &= 3 \\ x + 2y + 3z &= 4 \\ x + 4y + 9z &= 6 \end{aligned}$$
- Differentiate the following function $y = (x)^{\frac{1}{x}} + (\sin x)^{\cos x}$
- (a) If $x = at^2$, $y = 2at$, find $\frac{d^2y}{dx^2}$
 (b) Find maximum and minimum value at the function $y = 2x - 15x^2 + 36x + 10$
- Evaluate $\int_0^{1/2} \frac{\cos^{3/2} x}{\sin^{3/2} x + \cos^{3/2} x} dx$