

S.B. Roll No.....

APPLIED MATHEMATICS-II
2nd Exam/Common/2354/June 2015

Duration 3 hrs

M. Marks: 75

Section A

Q 1

15x1=15

A. Choose the correct one:

- I. If $x = \sin 3t$ then acceleration at $t = \frac{\pi}{2}$
 - a. -9
 - b. -3
 - c. 3
 - d. 9
- II. Equation of normal to the circle $y = 2x^2 - 3x - 1$ at point (1,-2) is
 - a. $x + y + 1 = 0$
 - b. $x - 1 = 0$
 - c. $y - 1 = 0$
 - d. $x + y - 1 = 0$
- III. $\int_1^2 \log x dx =$
 - a. $\log(2/e)$
 - b. $\log 4$
 - c. $\log(4/e)$
 - d. $\log 2$
- IV. Arithmetic mean of 7, 9, 5, 2, 4, 8, x is given to be 7. Then x is
 - a. 12
 - b. 14
 - c. 11
 - d. 10
- V. Order of differential equation $(y''')^2 + 2y'' + 3y = x$ is
 - a. 1
 - b. 2
 - c. 3
 - d. 4

B. State whether the following statements are true or false:

- I. Function is said to be odd if $f(-x) = -f(x)$.
- II. $\lim_{\theta \rightarrow 0} \frac{\sin 2\theta}{\theta}$ is equal to zero.
- III. If $xy = a^2$ then $\frac{dy}{dx} = -\frac{x}{y}$
- IV. A matrix may be rectangular or square shape.
- V. Integral of zero is constant.

C. Fill in the blanks:

- I. If $\begin{vmatrix} 1 & 2 & 3 \\ k & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} = 0$ then $k =$ -----.
- II. Inverse of matrix A is equal to -----.
- III. $\frac{d}{dx} (\cot x) =$ -----.
- IV. $\int e^{mx} dx$ is equal to -----.
- V. Probability of ----- is zero.

Section B

Q2. Attempt any six questions

5x6=30

- a. Evaluate $\lim_{x \rightarrow 1} \frac{\sqrt{3+x} - \sqrt{5-x}}{x^2 - 1}$
- b. Prove that $\begin{vmatrix} x+a & x & x \\ x & x+a & x \\ x & x & x+a \end{vmatrix} = a^2(3x+a)$
- c. Find equation of tangent to the curve $y = 9x^2 - 12x + 7$ at $(\frac{2}{3}, 3)$
- d. If $x = a(\theta + \sin \theta)$ and $y = a(1 - \cos \theta)$. Find $\frac{dy}{dx}$
- e. Evaluate $\int \frac{dx}{1 + \sin x}$
- f. Integrate $x^2 \cot^{-1} x$

S.B. Roll No.....

- g. Find area bounded by the curve $y = \log x$ between x-axis and the ordinates $x = 2$ and $x = 3$
- h. Calculate the median of the data

Class interval	0-7	7-14	14-21	21-28	28-35	35-42
frequency	8	7	14	16	9	6

- i. The odds against A solving a certain problem are 8 to 6 and the odds in favour of B solving the same problem are 14 to 10. What is probability that if both of them try, the problem would be solved?

Section C

10x3=30

3. Solve the equations by matrix method:

$$\begin{aligned} 2x - y + 4z &= 18 \\ -3x + 0y + z &= -2 \\ -x + y + 0z &= 0 \end{aligned}$$

OR

Prove that $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx = \frac{\pi}{8} \log 2$

4. Differentiate w.r.t. $x \log[\log(\tan x)]$

OR

If $y = e^{m \sin^{-1} x}$ Prove that $(1 - x^2)y_2 - xy_1 = m^2y$

5. Calculate mean and standard deviation for the following data:

x	25	35	45	55	65	75	85
y	3	61	132	153	140	51	2

OR

Find maximum and minimum value of the function $x^4 + 2x^3 - 3x^2 - 4x + 4$