

APPLIED MATHEMATICS-II
2nd Exam/Common/2354/2251/5422/Nov'17

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. Choose the correct answer.

5x1=5

- i. Which one is a measure of dispersion?
a) Mean b) Median c) Mode d) Range
- ii. Order of differential equation $(y''')^2 + 2y'' + 3y = x$
a) 1 b) 2 c) 3 d) 4
- iii. A square matrix A is singular if $|A|$ is
a) 0 b) 1 c) 2 d) 3
- iv. If $x = \sin 3t$, then acceleration at $\frac{\pi}{2}$ is (x stands for displacement at time t)
a) -9 b) -3 c) 3 d) 9
- v. The equation of the normal to the curve $y = \sin x$ at $(0, 0)$ is
a) $x = 0$ b) $y = 0$ c) $x + y = 0$ d) $x - y = 0$

Q2. State True or False.

5x1=5

- a. $\lim_{\theta \rightarrow 0} \frac{\sin \theta^\circ}{\theta}$ is equal to 1
- b. $\int \sin 4x \, dx = \cos 4x$
- c. If $D \neq 0$, then system has unique solution
- d. If the mean of 4, 3, 7, x , 10 is 6 then $x = 6$
- e. The integral of $\log x$ w.r.t x is $\frac{1}{x}$

Q3. Fill in the blanks.

5x1=5

- i. $\int e^{mx} \, dx$ is equal to -----.
- ii. Area of trapezoid = $\frac{1}{2}$ (sum of parallel side) x -----.
- iii. If AB is defined then $(AB)^t =$ -----.
- iv. Integration is defined as the ----- of differentiation.
- v. The differential co-efficient of a constant is -----.

SECTION-B

Q4. Attempt any six questions.

6x5=30

- (i) If $y = a(t + \frac{1}{t})$, $x = a(t - \frac{1}{t})$ where "a" is constant. Then prove that $\frac{dy}{dx} = \frac{x}{y}$
- (ii) If $kx + y - z = 0$; $x - 2y + z = 3$ and $4x - 3y + z = 5$, and system is inconsistent, then find the value of k .
- (iii) Evaluate $\int_0^{\pi/2} \frac{dx}{1 + \cot x}$
- (iv) If $y = (\sin^{-1} x)^2$, prove that $(1 - x^2)y_2 - xy_1 = 2$
- (v) Evaluate $\int \cos^4 x \, dx$
- (vi) The probability of the horse A winning the race is $\frac{1}{4}$ and the probability of horse B winning the race is $\frac{1}{3}$, find the probability that one of the horse wins the race.

(vii) Calculate the median of the following data:-

Class Interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	12	15	25	40	42	14	8

(viii) Evaluate $\int x \tan^{-1} x \, dx$

(ix) Find the point on the curve $y = 10 + 2x - x^2$ where the curve has slope unity.

SECTION-C

Q5. Attempt any three questions.

3x10=30

(i) Solve the following equations by matrix method

$$x - y + z = 4, \quad x - 2y - 2z = 9, \quad 2x + y + 3z = 1$$

(ii) Using Simpson's Rule, calculate the approximate value of $\int_0^1 \frac{1}{1+x^2} \, dx$ by dividing the interval 0 to 1 into four equal parts. Hence obtain the value of π correct to four places of decimals.

(iii) Solve the differential equation

$$y^2(x^2 - 1) \frac{dy}{dx} - x^2(y^2 - 1) = 0$$

(iv) a) Differentiate $e^{\tan x}$ w.r.t $\sin x$.

b) Determine the point of maxima of $f(x) = \sin x + \cos x$ in $0 \leq x \leq \frac{\pi}{2}$

(v) Find S.D and coefficient of variation of following data

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	5	10	20	40	30	20	10	4