

S. B. Roll. No.....

APPLIED MATHEMATICS-II
2nd Exam/Common/0553/Dec'22
(For 2018 Batch onward)

Duration: 3Hrs.

M.Marks:75

SECTION-A

Q1. Attempt the following.

15x1=15

- a. $\int \log x \, dx$.
- b. Function $f(x)$ is called an _____ Function if $f(-x) = f(x)$.
- c. $\lim_{\theta \rightarrow 0} \frac{1}{\cos \theta \tan 2x}$ is equal to _____
- d. $\lim_{x \rightarrow 0} \frac{\tan 2x}{\tan 3x}$
- e. Find the $\int x \, dx$
- f. find the slope of a tangent to the curve, $y=16-x^2$ at $x=1$
- g. Find the $\frac{d}{dx} a^x$
- h. Find the area bounded by the curve $xy=1$ and $x=1, x=3$
- i. Find $\int x \cdot e^x \, dx$
- j. Evaluate $\int_{-a}^a f(x) \, dx$. if $f(x)$ is odd
- k. The rate of change of displacement is called _____ of a moving point
- l. If $x=3t^2+2t-5$ Find the velocity
- m. Find $\int \frac{1}{x} \, dx$
- n. Find The order of The Differential equation $\frac{d^2y}{dx^2} = \sqrt{1 + \frac{dy}{dx}}$
- o. Find $\frac{d}{dx}(\tan x)$

SECTION-B

Q2. Attempt any six questions.

6x5=30

- i. Prove that $\lim_{\theta \rightarrow 0} \frac{\tan \theta - \sin \theta}{\theta^3}$
- ii. if $y = \sqrt{1+x^2}$, Show that $y \frac{dy}{dx} - x = 0$
- iii. If $x = a(\theta + \sin \theta)$, $y = a(1 + \cos \theta)$ so find $\frac{dy}{dx}$
- iv. If $y = \log(\cos x)$ Find y_2
- v. The side of a square sheet is increasing at the rate of 3 cm per sec. At what rate is the area increasing when the side 10 cm long.
- vi. Find equation of the normal to curve $y=6x^2-5x+3$, at (1,4)
- vii. Find $\int \frac{(\tan^{-1} x)^2}{1+x^2} \, dx$
- viii. Find $\int \frac{dx}{x^2+2x+5}$
- ix. $\int_0^{\pi/2} \sin^8 x \cos^6 x \, dx$

SECTION-C

Q3. Attempt any three questions.

3x10=30

- a. Solve the following linear programming problem graphically: $z = 200x + 500y$ subject to the constraints
 $x + 2y \geq 10$
 $3x + 4y \leq 24$
 $x \geq 0, y \geq 0$

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- b. Differentiate $\tan x^{\log x} + x^x$ w.r.t x
- c. Find maximum and minimum value of the function
 $2x^3 - 15x^2 + 36x + 10$
- d. Apply trapezoidal rule to evaluate $\int_4^8 \frac{1}{x-3} dx$ by taking for equal intervals.
- e. Solve the differential equation $y^2(x^2-1) \frac{dy}{dx} - x^2(y^2-1)=0$
- f. Find $\int \frac{1}{5+4 \sin x} dx$