Roll no._____ **ID: 180012**

Semester: 1st year
Branch: Common
Subject: Applied Mathematics

Time Allowed: 3Hrs. **M.M. : 60**

Section-A

Note: Multiple Choice questions. All questions are compulsory. 6x1=6

Q.1 If $f(x) = 2 + x - x^3$, then $f(0) =$ ____ (CO10)

(a) 0 (b) 2
(c) -1 (d) None of these

Q.2 $\frac{d}{dx}(\sin x) =$ ____ (CO10)

(a) $\cos x$ (b) $cos^2 x$
(c) $sec^2 x$ (d) None of these

Q.3 $\int \frac{1}{x}\, dx =$ ____ (CO12)

(a) $\frac{x^{-2}}{-2} + c$ (b) $\log|x| + c$
(c) $\frac{2}{x} + c$ (d) None of these

Q.4 $\int_0^1 1\, dx =$ ____ (CO14)

(a) e (b) π
(c) $\sin 1 - \sin 0$ (d) 1

Q.5 Which of the following is a linear Ordinary Differential Equation? (CO17)

(a) $\left(\frac{dy}{dx}\right)^2 - y = e^y$ (b) $e^{-y}\frac{dy}{dx} - y.\cos y = x$
(c) $\frac{dy}{dx} + y = \sin x$ (d) $\frac{dy}{dx} = e^{y'}y^{1/2}$

Q.6 What is the Mode of the data $1, 3, 4, 4, 5, 5, 5, 10, 10, 12$? (CO18)

(a) 12 (b) 10
(c) 5 (d) 4

Section-B

Note: Objective/Completion type questions. All questions are compulsory. 6x1=6

Q.7 Fill in the blank (CO10)

$$\lim_{x \to 0} \frac{\tan x}{x} = \_\_\_\_$$

Q.8 Is $\frac{d}{dx}(x) = 1$? (TRUE/FALSE) (CO10)

Q.9 Fill in the blank: $\int 2^x\, dx =$ _____ . (CO12)

Q.10 What is the value of $\int_0^2 e^x dx$? (CO14)

Q.11 Write the order of the following Differential Equation: (CO17)

$$\frac{d^2y}{dx^2} - \frac{dy}{dx} + y = x$$

Q.12 The Median of the data $2, 3, 5, 7, 11$ is _____. (CO18)

Section-C

Note: Short answer type Questions. Attempt any eight questions out of ten questions. 8x4= 32

Q.13 Write the value of (CO10)

$$\lim_{x \to 0} \frac{a^x - 1}{x}$$

and hence evaluate the following limits

$$\lim_{x \to 0} \frac{4^x - 3^x}{x}$$

Q.14 Differentiate $y = \frac{\tan x}{x}$ with respect to x. (CO10)

Q.15 If $y = e^x \sin x$, find $\frac{d^2y}{d\,x^2}$. (CO10)

Q.16 Find the rate of change of area of a circle with respect to its radius r when $r = 5\ m$. (CO10)

Q.17 Use integration by parts to evaluate the following (CO12)

$$\int x \sin x \, dx$$

Q.18 Evaluate the following (CO14)

$$\int_0^{\pi/2} sin^7 x \, dx$$

Q.19 Find the area under the curve $y = x^2 + x + 1$, between the x-axis and $0 \leq x \leq 3$. (CO15)

Q.20 Apply Variable Separable method to solve the following differential equation: (CO17)

$$y \frac{d\,y}{d\,x} = (x + 1)$$

Q.21 Write the formula of Mean for discrete frequency distribution and hence find the Mean for the following frequency distribution: (CO18)

x_i	1	2	3	4
f_i	2	3	4	1

Here f_i 's represent frequencies of x_i 's.

Q.22 Find the rank correlation coefficient from the data given below: (CO18)
An examination of 10 applicants for an accountant post was taken by a company. The marks obtained by the applicants in the reasoning and aptitude tests are given by:

Applicants	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
Reasoning Test	20	50	28	24	68	90	75	44	30	19
Aptitude Test	30	40	60	50	75	85	95	34	22	44

Section-D

Note: Long answer questions. Attempt any two questions out of three questions. 2x8=16

Q.23 Find the point of maxima or minima and their corresponding maximum or minimum value of the function $f(x) = -5x^2 + 7x + 3$. (CO11)

Q.24 Apply Trapezoidal rule to evaluate (CO16)

$$\int_2^8 (x + 3) \, dx$$

by taking 6 equal subintervals of $2 \leq x \leq 8$.

Q.25 Find the mean deviation about mean for the following distribution: (CO18)

$5, 7, 2, 3, 4, 6, 2, 8, 9, 4$