FIRST YEAR PHARM. D.: SUMMER- 2022
SUBJECT : REMEDIAL MATHEMATICS

Day : Monday
Date : 03-10-2022 S- -2022

Time : 10:00AM TO 1:00PM
Max. Marks : 70

N.B.:

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY**. Out of the remaining questions attempt **ANY TWO** from each section.
2) Answers to both the sections should be written in the **SEPARATE** answer book.
3) Figures to the right indicate **FULL** marks.

SECTION – I

Q.1 A) Attempt **ANY FOUR** of the following: **[08]**

i) Evaluate : $\Delta = \begin{vmatrix} 1 & 3 & -1 \\ -2 & 1 & 2 \\ 4 & 5 & 1 \end{vmatrix}$

ii) Show that $\sqrt{2}\cos\left(\frac{\pi}{4}+\theta\right) = \cos\theta - \sin\theta$

iii) Find the equation of line passing through the points (4, 3) and (3, -5).

iv) If $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 5 \end{bmatrix}$. Find AB.

v) Find the coordinates of the focus of parabola $y^2 = 28x$.

vi) Find the equation of circle with centre (0, 0) and radius 5.

B) Attempt **ANY ONE** of the following: **[03]**

i) If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 1 & 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 0 & 1 & 1 \end{bmatrix}$ verify that $(A+B)^T = A^T + B^T$.

ii) Find the value of $sin\ 495^0$.

Q.2 Attempt **ANY THREE** of the following: **[12]**

i) For any angles A and B show that $tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A.\tan B}$.

ii) Find x, y and z, if $\left\{5\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{bmatrix} - 3\begin{bmatrix} 1 & 2 \\ -2 & 3 \\ 3 & 1 \end{bmatrix}\right\}\begin{bmatrix} 2 \\ 1 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$.

iii) Find the coordinates of focus and length of latus rectum of the parabola $y^2 = 20x$.

iv) If $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 4 & 2 \\ 0 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 6 & 0 \\ 3 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$, verify $|AB| = |A| \cdot |B|$.

P.T.O.

Q.3 **A)** Attempt the following:

i) Show that the points A(a, a), B($-a$, $-a$) and C$\left(-\sqrt{3}a, \sqrt{3}a\right)$ are the vertices of an equilateral triangle. **[03]**

ii) Find the centre and radius of the circle $x^2 + y^2 - 6x + 14y - 42 = 0$. **[04]**

B) Solve by Cramer's rule **[05]**

$5x - 7y + z = 11$, $6x - 8y - z = 15$ and $3x + 2y - 6z = 7$

Q.4 Attempt **ANY THREE** of the following: **[12]**

i) Find Minors and cofactors of each elements of $\Delta = \begin{vmatrix} 1 & 2 & 7 \\ 5 & 0 & 2 \\ 3 & -4 & 6 \end{vmatrix}$.

ii) Find the distance between the following pairs of parallel lines $3x + 2y - 6 = 0$ and $6x + 4y - 9 = 0$.

iii) For any angles C and D, prove that $\sin C - \sin D = 2\cos\left(\frac{C+D}{2}\right).\sin\left(\frac{C-D}{2}\right)$

iv) Show that the line $x + y + 2 = 0$ is tangent to the parabola $y^2 = 8x$. Also find point of contact.

SECTION – II

Q.5 **A)** Attempt **ANY FOUR** of the following: **[08]**

i) Evaluate : $\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$.

ii) If $y = 5e^x - 3\sin x$, then find $\frac{dy}{dx}$.

iii) Evaluate : $\int \sqrt{x}\, dx$.

iv) Evaluate : $\int_2^3 \frac{x}{x^2 + 1}\, dx$.

v) Find order and degree of equation $5\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^2 + 2y = e^x$

vi) Show that, $L\{1\} = \frac{1}{s}$, $s > 0$.

B) Attempt **ANY ONE** of the following: **[03]**

i) If $u = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$, then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \tan u$.

ii) Evaluate : $\lim_{x \to 0} \frac{x}{\tan x}$.

Q.6 Attempt **ANY THREE** of the following: **[12]**

i) Evaluate : $\lim_{x \to 0} \frac{8^x - 4^x - 2^x + 1}{x^2}$

ii) Prove that $\int_0^a f(x)dx = \int_0^a f(a - x)dx$.

iii) Solve the equation $(x - y)\frac{dy}{dx} = x + 3y$.

iv) If $L^{-1}\{F(s)\} = f(t)$, then show that $L^{-1}\{F(s - a)\} = e^{at} f(t)$.

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Q.7 **A)** Attempt the following:

i) Show that $\int \frac{\cos 2x}{\sin^2 x \cos^2 x}\, dx = -(\tan x + \cot x) + c$ **[04]**

ii) Solve, $\frac{dy}{dx} + \frac{\cos x}{\sin x} y = \cos x$ **[03]**

B) If u and v are differentiable functions of x such that $y = u + v$, then prove that $\frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx}$ **[05]**

Q.8 Attempt **ANY THREE** of the following: **[12]**

i) By using first principal, show that $\frac{dy}{dx} = \sec^2 x$, if $y = \tan x$

ii) Evaluate : $\int x \sin 3x\, dx$.

iii) Solve : $\frac{dy}{dx} = x(2\log x + 1)$.

iv) Find Laplace transform of $(1 + e^t)^2$.

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