FIRST YEAR PHARM. D: Winter- 2021
SUBJECT: REMEDIAL MATHEMATICS

Day: Saturday
Date: 11-12-2021

Time: 10:00 AM-TO 1:00 P.M.
Max. Marks: 70

N.B.:

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

SECTION – I

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

i) Evaluate : $\begin{vmatrix} 3 & 2 & 1 \\ 1 & 2 & 3 \\ 2 & 3 & 1 \end{vmatrix}$.

ii) Find P+Q, if $P = \begin{vmatrix} 1 & 2 & -3 \\ 3 & -1 & 2 \\ -2 & 1 & 3 \end{vmatrix}$, $Q = \begin{vmatrix} 2 & 3 & 1 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{vmatrix}$.

iii) Show that $\frac{\sin 2\theta}{\sin\theta} - \frac{\cos 2\theta}{\cos\theta} = \sec\theta$.

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

v) Find the equation of circle having centre $(1,-5)$ and touching X-axis.

vi) Find the equation of the parabola with vertex at origin, axis along x-axis and passing through the point $(1,-4)$.

B) Attempt **ANY ONE** of the following: **(03)**

i) Show that, $\sqrt{2}\cos\left(\frac{\pi}{4}+A\right) = \cos A - \sin A$.

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

Q.2 Attempt **ANY THREE** of the following: **(12)**

i) Examine the consistency of the equations $5x+6y=17$, $2x+3y=8$, $x+y=3$.

ii) If $A = \begin{bmatrix} 1 & 3 & 3 \\ 3 & 1 & 3 \\ 3 & 3 & 1 \end{bmatrix}$ then show that A^2-5A is a Scalar matrix.

iii) Find the equation of tangent to the circle $x^2+y^2=9$ having slope 7.

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

Q.3 A) If m_1 and m_2 are slopes of two lines such that, $m_1.m_2 \neq -1$, then prove that measure of the acute 'θ' between the lines is given by $\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1.m_2}\right|$. **(07)**

Also find the condition for parallel lines.

P.T.O.

B) Attempt **ANY ONE** of the following: **(05)**

i) Prove that the equation of tangent to the circle $x^2 + y^2 = a^2$ at the point P (x_1, y_1) is $xx_1 + yy_1 = a^2$.

ii) Obtain the equation of parabola in the standard form $y^2 = 4ax$.

Q.4 Attempt **ANY THREE** of the following: **(12)**

i) Solve the following equation by Cramer's rule $x + y - z = 2$, $x - 2y + z = 3$, $2x - y - 3z = -1$.

ii) If A= $\begin{vmatrix} 3 & 1 \\ 2 & 4 \end{vmatrix}$, B = $\begin{vmatrix} 0 & 3 \\ -1 & 5 \end{vmatrix}$ show that $|AB| = |A||B|$.

iii) For any ΔABC , with usual notations, prove that cosine rule in the form of $b^2 = c^2 + a^2 - 2ca\cos B$. where a = l (BC), b = l (AC), c = l (AB) .

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

SECTION – II

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

i) Evaluate, $\lim_{x \to 0} \frac{3^x - 5^x}{x}$.

ii) Find $\frac{dy}{dx}$, if $y = x^3.\sec x$.

iii) Evaluate , $\int \left(\sin 2x + \cos(2x+3) + e^{2x+3}\right) dx$.

iv) Evaluate $\int_0^{\frac{\pi}{2}} \cos x \, dx$.

v) Find the order and degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1 + \frac{dy}{dx}}$.

vi) Find $L\left\{\frac{1 - \cos 4t}{2}\right\}$.

B) Attempt **ANY ONE** of the following: **(03)**

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

ii) Find $L\{\sinh at\}$.

Q.6 Attempt **ANY THREE** of the following: **(12)**

i) Find $\frac{dy}{dx}$, if $y = \tan^{-1}\left(\frac{8x}{1 - 16x^2}\right)$.

ii) Find $L\{e^{-5t} \sin 7t\}$.

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

iv) Form the differential equation by eliminating arbitrary constants of the equation $y = Ae^{3x} + Be^{-3x}$.

Q.7 A) If u and v are differentiable functions of x such that y = u–v, then prove that $\frac{dy}{dx} = \frac{du}{dx} - \frac{dv}{dx}$. hence find $\frac{dy}{dx}$, if $y = 2\cos x - 5\sin x - 4\sec x$. **(07)**

B) Attempt **ANY ONE** of the following: **(05)**

i) Define Laplace transformation and prove that if $L\{f(t)\}=\phi(s)$, then $L\{e^{at} f(t)\}=\phi(s-a)$.

ii) If $u=\log\left(\frac{x^4+y^4}{x+y}\right)$, then by Euler's theorem show that, $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=3$.

Q.8 Attempt **ANY THREE** of the following: **(12)**

i) Evaluate $\int_4^7 \frac{(11-x)^2}{(11-x)^2+x^2}\,dx$.

ii) If $y=\tan^{-1}x$ then show that $(1+x^2)\frac{d^2y}{dx^2}+2x\frac{dy}{dx}=0$.

iii) Find the particular solution of the differential equation $xdy+2ydx=0$ when x=2 and y=1.

iv) Find, $L(2t^3-t^2+3\cosh 4t)$.

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