FIRST YEAR PHARM. D (SUPPLEMENTARY) : SUMMER - 2018
SUBJECT : REMEDIAL MATHEMATICS

Day : **Saturday**
Date : **07/07/2018**

Time : **10.00 AM to 01.00 PM**
Max. Marks : 70

S-2018-4053

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) Answers to each section must be written in **SEPARATE** answer books.

SECTION - I

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

i) Show that the following equations are consistent.
$x + 2y - 3 = 0,\ 7x + 4y - 11 = 0,\ 2x + 3y + 1 = 0.$

ii) Find a, b, c if, $\begin{bmatrix} 1 & 3/5 & a \\ b & -5 & -7 \\ -4 & c & 0 \end{bmatrix}$ is a symmetric matrix.

iii) Find the slope, X-intercept and Y-intercept of the line
$4x - 3y - 12 = 0.$

iv) Find the equation of tangent to the circle
$x^2 + y^2 - 3x - y + 2 = 0 \ at\ (1, 1).$

v) Express the following as a product
$a)\ \cos 4\theta + \cos 2\theta \qquad b)\ \sin 60 + \sin 40$

vi) Find the Cartesian co-ordinates of the points on the parabola $3y^2 = 16x$ whose parameter is 2.

b) Find the values of the remaining trigonometric ratios if **(03)**
$\cos\theta = \frac{4}{5}$, if $0 < \theta < \frac{\pi}{2}$.

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

i) Find the value of x, if $\begin{vmatrix} x & 2 & 1 \\ 3 & x & -2 \\ 1 & 3 & 1 \end{vmatrix} = 5$

ii) Solve the following equations by Cramer's rule:
$x - y + z = 4,\ 2x + y - 3z = 0,\ x + y + z = 2.$

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

iv) If $A = \begin{bmatrix} 4 & -6 & 3 \\ 2 & 1 & 5 \end{bmatrix}, B = \begin{bmatrix} 2 & 3 \\ 1 & 4 \\ 0 & 2 \end{bmatrix}$, show that BA is singular matrix.

Q. 3 a) Answer the following:

i) Find the co-ordinates of the focus, equation of directrix length of latus rectum for the parabola $y^2 = 24x$. **(03)**

ii) Obtain the equation of parabola in standard form $y^2 = 4ax$. **(04)**

b) Find the length of intercepts made by the circle $x^2 + y^2 - 7x + 2y + 12 = 0$ on the co-ordinate axes. **(05)**

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

i) If θ is the acute angle between the lines with slopes m_1 and m_2 then prove that $\tan\theta = \left|\dfrac{m_1 - m_2}{1 + m_1.m_2}\right|$ provided $m_1.m_2 \neq -1$.

ii) Examine the whether the lines given by the following equations are concurrent:
$2x + 3y + 4 = 0,\ x + 2y + 3 = 0,\ 3x + 4y + 5 = 0.$

iii) Find the distance of the point (3, 4) from the line $3x + 2y - 5 = 0$.

iv) Prove that :

a) $\tan x + \cot x = \sec x \operatorname{cosec} x$

b) $\sec^2 x + \operatorname{cosec}^2 x = \sec^2 x \cdot \operatorname{cosec}^2 x$

SECTION - II

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

i) Evaluate, $\lim\limits_{x \to 2} \dfrac{x - 2}{x^2 + x - 6}$.

ii) If $\int_0^a 4x^3\,dx = 16$ then find a.

iii) If $f(x) = x^2$ find $f'(x)$ from first principle.

iv) Find $L\{t^3 - t^2 + 4t\}$

v) Find order and degree of the following differential equation: $\dfrac{d^3y}{dx^3} + 3\left(\dfrac{dy}{dx}\right)^4 - y = 0.$

vi) Differentiate the following w.r.t.x
$x.\log x$

b) Prove that $\int_0^a f(x)\,dx = \int_0^a f(a-x)\,dx$ **(03)**

Q. 6 Answer **ANY THREE** of the following; **(12)**

i) Evaluate $\lim\limits_{x\to 0} \dfrac{\sqrt{x+2}-\sqrt{2}}{x}$

ii) Find $\dfrac{dy}{dx}, if\ y = x^x$

iii) If $y = \tan^{-1} x$ then show that, $\left(1+x^2\right)\dfrac{d^2y}{dx^2} + 2x\dfrac{dy}{dx} = 0.$

iv) If $u = \log\left(\dfrac{x^2+y^2}{x+y}\right)$ then prove that, $\dfrac{du}{dx} + y\dfrac{du}{dy} = 1.$

Q.7 a) Answer the following; **(03)**

i) If $z = \sec^{-1}\left(\dfrac{x^2+y^2}{x+y}\right)$, then show that, $x.\dfrac{dz}{dx} + y.\dfrac{dz}{dy} = 2.\cot z$.

ii) If $u = \log\left(\dfrac{x^4+y^4}{x+y}\right)$ then show by Euler's theorem that $x\dfrac{du}{dx} + y\dfrac{du}{dy} = 3$. **(04)**

b) If u and v are differential functions of x such that y = u + v, then prove that $\dfrac{dy}{dx} = \dfrac{du}{dx} + \dfrac{dv}{dx}$ **(05)**

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

i) Find L $\{\sinh at\}$

ii) Evaluate the following integral using Laplace transform $\int_0^\infty e^{-1} \sin^2 t \, dt$.

iii) Show that $y = ae^x + be^{-2x}$ where a, b $\in$ R is a solution of the differential equation $\dfrac{d^2y}{dx^2} + \dfrac{dy}{dx} = 2y$.

iv) Form the differential equation of family of lines having x-intercept a and y – intercept b.

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