First Year Pharm-D - SUMMER-2022

SUBJECT: REMEDIAL MATHEMATICS

Day : Wednesday | Time: 2:00PM TO 5:00 PM

Date : 15-05-2022 | Max. Marks: 70

S-21326-2022

N. B.:

1) Q. no. **1** and Q. no. **5** are **COMPULSORY** and out of the remaining attempt any **TWO** questions from each sections.
2) Figures to the right indicate **FULL** marks.
3) Answer to each section must be written in **SEPERATE** answer books.

SECTION-I

Q.1 A) Attempt any four of the following: **(08)**

i) Find x, if $\begin{vmatrix} 2 & 1 & x+1 \\ 1 & 3 & -4 \\ 0 & -5 & 3 \end{vmatrix} = 0$.

ii) Find k, if the matrix $\begin{bmatrix} 7 & 3 \\ -2 & k \end{bmatrix}$ is singular matrix.

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

iv) Find the length of perpendicular of the line $3x+4y-12=0$ from 0(0,0).

v) Find the length of tangent to the circle $x^2+y^2=25$ from the point (3, 4).

vi) The focal distance of point P on the parabola $y^2=8x$ is 4. Find the ordinate of P.

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

i) Examine the consistency of the following equations:
$x+y=2,\ 2x+3y=5,\ 3x-2y=1$.

ii) Find the co-ordinates of focus, and length of latus rectum of the parabola $y^2=20x$.

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

i) Solve the following equations by Cramer's rule
$2x-y+3z=9,\ x+y+z=6,\ x-y+z=2$.

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

iv) Find k, if the line $2x+ky+3=0$ touches the parabola $y^2=6x$.

P.T.O.

Q.3 A) Attempt the following: **(07)**

i) Find the Cartesian co-ordinates of the point on the parabola $y^2 = 8x$ whose parameter is -2. **(03)**

ii) If m_1 and m_2 are slopes of two lines such that $m_1 m_1 \neq -1$. Then prove that measures of acute angle 'θ' between the line is given by $\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1 . m_2}\right|$ **(04)**

B) To find the condition that the line $y = mx + c$ may be tangent to the circle $x^2 + y^2 = a^2$. Also find the co-ordinates of point of contact and equation of tangent in terms of its slope. **(05)**

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

i) Find the centre and radius of the circle $x^2 + y^2 - 6x + 14y - 42 = 0$

ii) Find the acute angle between the following pairs of lines $3x + 2y = 5$ and $2x - y + 7 = 0$

iii) Prove that, by using cosine rule

$$1 + \cos A = \frac{(b + c + a)(b + c - a)}{2bc}$$

iv) If $A = \begin{bmatrix} 7 & 3 & 0 \\ 0 & 4 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -2 & 3 \\ 2 & 1 & -4 \end{bmatrix}$ show that $(A - B)^T = A^T - B^T$

SECTION-II

Q.5 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 $y = \cos 2x$

iii) If $y = \sin x$, then show that $\frac{d^2 y}{dx^2} + y = 0$

iv) Prove that $\int_a^b f(x)\,dx = -\int_b^a f(x)\,dx$

v) From the differential equation by eliminating arbitrary constant from the equation

$y = A\cos 3x + B\sin 3x$

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

B) If $u = Sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$ then show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial x} = \tan u$ **(03)**

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

i) Evaluate $\int_0^{\pi/2} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + \sqrt{\cot x}} dx$

ii) Evaluate $\lim_{x\to 0}\dfrac{14^x-7^x-2^x+1}{x^2}$.

iii) Find the particular solution of the differential equation $\dfrac{1}{x+2}dx+\dfrac{1}{y+2}dy=0 \text{ when } x=1, y=2$.

iv) Find $L\{\cosh at\}$.

Q.7 **A)** Attempt the following: **(03)**

i) If $y=\left(\tan^{1}x)^2\right)$ *then prove that*

$$\left(1+x^2\right)^2\frac{d^2y}{dx^2}+2x\left(1+x^2\right)\frac{dy}{dx}-2=0$$

ii) If $Z=\sec^{-1}\left(\dfrac{x^3+y^3}{x+y}\right)$ then show that by Euler's theorem $x\dfrac{\partial Z}{\partial x}+y\dfrac{\partial Z}{\partial y}=2\cot Z$.

B) If u & v are differentiable 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 $f'(x), if\ f(x)=x^3$ from first principle.

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

iii) If $L\{f(t)\}=\phi(s)$ *then prove that* $L\{e^{at}f(t)\}=\phi(s-a)$ where a is real constant.

iv) Evaluate $\lim_{x\to 1}\left(\dfrac{3}{x^2+x-2}-\dfrac{4}{x^2+2x-3}\right)$.

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