First Year Pharm. D : SUMMER - 2019

SUBJECT: REMEDIAL MATHEMATICS

Day : **Saturday**
Date : **20/04/2019**

S-2019-4503

Time: 10.00 A.M. TO 01.00 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 the sections should be written in the **SEPARATE** answer book.

SECTION-I

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

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

ii) Find k, if $\begin{bmatrix} 4 & 3 & 1 \\ 7 & k & 1 \\ 10 & 9 & 1 \end{bmatrix}$ is singular matrix.

iii) Find the distance between the following pairs of lines $2x - 3y + 7 = 0$ and $2x - 3y - 6 = 0$.

iv) Find the equation of circle with centre at $(1, -5)$ and touching the X-axis.

v) Show that $\sqrt{2}\ \text{Sin}\left(\frac{\pi}{4} - A\right) = \text{Cos}A - \text{Sin}A$.

vi) Prove that $\sqrt{\frac{1 - Cosx}{1 + Cosx}} = Co\sec x - Cotx$.

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

i) By using cosine rule, prove that, ac CosB – bc CosA = $a^2 - b^2$.

ii) Find the equation of the tangent to the parabola, $y^2 = 9x$ at the point (4,6).

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

i) 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.

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

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

iv) If the area of triangle ABC is 13/2 sq. units where A(3, −5), B(−2, k), and C(1, 4) then find k.

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

i) For the angles C & D,
Prove that, $\text{Sin } C + \text{Sin } D = 2\ \text{Sin}\left(\frac{C+D}{2}\right).\text{Cos}\left(\frac{C-D}{2}\right)$.

ii) Show that $\frac{CosA + CosB}{SinA + SinB} = Cot\left(\frac{A+B}{2}\right)$.

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

i) In any ΔABC, with usual notations prove that Cosine rule in the form $a^2 = b^2 + c^2 - 2bc\text{Cos}A$

ii) Solve the following equations by Cramer's Rule $x + y - z = 2$, $x - 2y + z = 3$, $2x - y - 3z = 1$.

P.T.O.

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

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

ii) Find the acute angle between the following pairs of lines $x + 3y + 9 = 0$ and $2x + y + 1 = 0$.

iii) If the line $y = 3x + 1$ touches the parabola $y^2 = 4ax$, then find the length of latus rectum.

iv) Find k, if the length of tangent segment from the point (1, −4) to the circle $x^2 + y^2 - 10x + 2y + k = 0$ is 3 units.

SECTION-II

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

i) Evaluate, $\lim_{x \to 0} \dfrac{Sin5x.Sin7x}{3x^2}$

ii) Find dy/dx, if $y = x.\log x$.

iii) Evaluate, $\int_0^{\pi/2} \sin^2 x dx$

iv) Find dy/dx, if $x^2 + xy + y^2 = 0$.

v) Form the differential equation by eliminating arbitrary constants from the following the equation $y = A\cos x + B\sin x$.

vi) Find $L\{e^{-3t}\sin 4t\}$.

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

i) Find $f'(x)$, if $f(x) = x^2$ from the first principle.

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

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

i) If $y = \sqrt{Cosx + \sqrt{\cos x + \sqrt{\cos x + ...\infty}}}$ then show that $\dfrac{dy}{dx} = \dfrac{-\sin x}{2y-1}$

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

$x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = 3$.

iii) Evaluate $\int_0^{\pi/2} \dfrac{Cosx}{Sinx + Cosx} dx$.

iv) Evaluate $\lim_{x \to 0} \dfrac{8^x - 4^x - 2^x + 1}{x^2}$

Q.7 A) Attempt the following: **(07)**

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

ii) Prove that, $\int_a^b f(x)dx = \int_a^b f(t)dt$.

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

i) If u and v are differential functions of x and $y = u - v$ then prove that $\dfrac{dy}{dx} = \dfrac{du}{dx} - \dfrac{dv}{dx}$.

ii) if $L\{f(t)\} = \emptyset(s)$ and a is a real number then prove that $L\{e^{at} f(t)\} = \emptyset(s - a)$.

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

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

ii) Find $L\{t^2 + 2t + 7\}$.

iii) Show that $y = ax^2 + b$ is a general solution of the differential equation $x\dfrac{d^2y}{dx^2} - \dfrac{dy}{dx} = 0$.

iv) Solve the differential equation $\dfrac{dy}{dx} = Sin(x + y) - Sin(x - y)$.

* * * * *