# First Year Pharm. D (SUPPLEMENTARY) : SUMMER - 2019

## SUBJECT: REMEDIAL MATHEMATICS

Day : Saturday
Date : 06-07-2019

Time: 10.00 A.M. TO 01.00 P.M.
Max. Marks: 70

**S-2019-4532**

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**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.

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## 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 $\begin{bmatrix} k-1 & 2 & 3 \\ 3 & 1 & 2 \\ 1 & -2 & 4 \end{bmatrix}$ is singular matrix

**iii)** Find the focal distance of the point p(4, −8) on the parabola $y^2 = 16x$.

**iv)** Find the distance of the point p(−4, 3) from the line $4x - 3y + 38 = 0$

**v)** Prove that tan x + cot x = sec x . cosec x.

**vi)** Prove that $\tan\left(\frac{\pi}{4}+\theta\right) = \frac{1+\tan\theta}{1-\tan\theta}$.

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

**i)** By using cosine rule, prove that,
(b+c) CosA + (c+a) CosB +(a+b) CosC = a + b + c.

**ii)** Find the equation of the tangent to the parabola, $y^2 = 12x$ at the point (3, −6).

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

**i)** If $A=\begin{bmatrix} 1 & 2 & 4 \\ 3 & 2 & 1 \\ -2 & -3 & 2 \end{bmatrix}$ then show that $A - A^T$ is a skew symmetric matrix.

**ii)** If $A=\begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 3 \\ -1 & 5 \end{bmatrix}$ 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 4 sq. units with vertices at A(k, 3), B(−5, 7), and C(−1, 4) then find k.

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

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

**ii)** Prove that $\frac{Sin8x + Sin2x}{Cos8x + Cos2x} = \tan 5x$ .

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

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

**ii)** Prove that, 1) $\text{Sin}\,3\theta = 3\text{Sin}\,\theta - 4\,\text{Sin}^3\,\theta$.
2) $\tan\theta + \cot\theta = \sec\theta.\text{cosec}\,\theta$

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

**i)** Show that the line $3x - 4y + 20 = 0$ is tangent to the circle $x^2 + y^2 = 16$..

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

**iii)** Find k, if the line $2y = kx + 1$ is tangent to the parabola $y^2 = 4x$.

**iv)** Find the length of tangent segment to the circle $x^2 + y^2 - 10x + 10y + 1 = 0$ from the point (2, 2).

**P.T.O.**

## SECTION-II

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

**i)** Evaluate, $\lim_{x \to 0} \frac{7^x - 1}{\sin x}$

**ii)** Find dy/dx, if y = x.sinx.

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

**iv)** If y = cosx, then show that $\frac{d^2 y}{dx^2} + y = 0$.

**v)** Form the differential equation by eliminating arbitrary constants from the following the equation y =A $e^x$ + B $e^{-x}$.

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

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

**i)** Find f'(x), if f(x) = $x^3$ from the first principle.

**ii)** Solve the differential equation $\frac{dy}{dx} = \frac{xy + y}{xy + x}$.

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

**i)** If $y = \tan^{-1}\left[\frac{6x}{1 + 16x^2}\right]$ then find $\frac{dy}{dx}$.

**ii)** If $u = \log\left(\frac{x^2 + y^2}{x + y}\right)$, then by Euler's theorem prove that,

$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 1$.

**iii)** Evaluate $\int_0^{\pi/2} \frac{\sqrt[3]{\sec x}}{\sqrt[3]{\sec x} + \sqrt[3]{\text{cocex}}} dx$.

**iv)** Evaluate $\lim_{x \to 0} \frac{\sqrt{3 + x} - \sqrt{3}}{x}$.

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

**i)** If a < c < b, then Prove that, $\int_a^b f(x)dx = \int_a^c f(x)dx + \int_c^b f(x)dx$.

**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 $\frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx}$.

**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{Cos h at }.

**ii)** Find L{sin3t −2Cos5t}.

**iii)** Solve the differential equation $\frac{dy}{dx} = 1 + x + y + xy$.

**iv)** Show that ysecx = tanx + c is the general solution of the differential equation

$\frac{dy}{dx} + y\tan x = \sec x$.

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