Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrollment No......................................

Faculty of Pharmacy
End Sem Examination Dec 2024
PY3RC02 Remedial Mathematics

Programme: B. Pharm. Branch/Specialisation: Pharmacy

Duration: 3 Hrs. **Maximum Marks: 35**

Note: All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	What is the value of $lim_{x\to 0}\frac{sinx}{x}$?	**1**	1	1	1	
	ii.	If A = $\begin{bmatrix} 3 & 5 \\ -4 & 2 \end{bmatrix}$ then write the minor of M_{22} .	**1**	1	1	1	
	iii.	Differentiation of x^n with respect to x is ____.	**1**	1	1	1	
	iv.	Find the slope of line joining the points (2, -5) and (4,1).	**1**	2	1	2	
	v.	Degree of differential equation $\frac{dy}{dx} + 2y = x$ is-	**1**	1	1	1	
Q.2	i.	Resolve into partial fraction- $$\frac{2x+3}{(x+1)(x-3)}$$	**6**	3	1	3	
OR	ii.	(a) Prove that $\log 72 = 2\log 3 + 3\log 2$. (b) If f(x) = x^3+ 14x^2 -2x + 4 then find the value of f(3).	**6**	3	1	3	
Q.3	i.	If A= $\begin{pmatrix} 3 & 2 & 1 \\ 0 & -5 & 6 \end{pmatrix}$ and B = $\begin{pmatrix} 4 & 5 & -2 \\ 3 & 1 & 8 \end{pmatrix}$ then show that $(A+B)^T = A^T + B^T$, where T ⟶ Transpose.	**6**	3	1	3	
OR	ii.	Evaluate the following- (a) $\begin{vmatrix} -1 & 2 & 3 \\ 2 & -3 & 1 \\ 3 & -1 & 1 \end{vmatrix}$ (b) $\begin{vmatrix} 5 & 4 \\ -2 & 3 \end{vmatrix}$	**6**	3	1	3	

			Marks	BL	PO	CO
Q.4	i.	Find $\frac{dy}{dx}$ if- (a) y = $e^{4x}.\sin x$ (b) y = $x^3 + \tan x$	**6**	3	1	4
OR	ii.	If $y = ae^{mx} + be^{-mx}$ then show that $\frac{d^2y}{dx^2} = m^2y.$	**6**	3	1	3
Q.5	i.	Write distance formula and find the distance between the points $(10{,}15)$ and $(7, 10)$.	**6**	3	1	3
OR	ii.	Find the following- (a) $\int x\sin x\, dx$ (b) $\int_{-1}^{2} x^3\, dx$	**6**	3	1	3
Q.6	i.	Solve the equation- $$\frac{dy}{dx} - y = e^{2x}$$	**6**	3	1	3
OR	ii.	Find the Laplace transform of- F(t) = 1+ sin 2t + e^t	**6**	3	1	3

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Medi-Caps University
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Solution of: PY3RC02 Remedial Mathematics

Q1. 1) $\lim_{x \to 0} \frac{\sin x}{x} = 1$ +1

2) if $A = \begin{bmatrix} 3 & 5 \\ -4 & 2 \end{bmatrix}$ then minor $M_{22} = 2$ +1

3) $\frac{d x^n}{dx} = n x^{n-1}$ +1

4) Slope of line joining $(2,-5)$ & $(4,1)$ is 3 +1

5) Degree of differential equation $\frac{dy}{dx} + 2y = x$ is $\underline{1}$ +1

Q2 1) Resolve into partial fraction $\frac{2x+3}{(x+1)(x-3)}$

$$\frac{2x+3}{(x+1)(x-3)} = \frac{A}{(x+1)} + \frac{B}{(x-3)} \rightarrow (1)$$ +1

$2x+3 = A(x-3) + B(x+1)$ +2

$2x+3 = Ax + Bx - 3A + B$

$2x = (A+B)x$ $-3A+B = 3$

$A+B = 2$

$$\begin{array}{r} A + \cancel{B} = 2 \\ -3A + \cancel{B} = 3 \\ + \quad - \quad - \\ \hline 4A = -1 \end{array}$$

$A = -1/4$, $B = 9/4$ +2

put in equation (1)

$$\frac{2x+3}{(x+1)(x-3)} = \frac{-1/4}{(x+1)} + \frac{9/4}{(x-3)} \quad +1$$

$$= \frac{9}{4(x-3)} - \frac{1}{4(x+1)} \quad \text{Ans}$$

or

ii) Prove that $\log 72 = 2\log 3 + 3\log 2$

a) $\Rightarrow \log(2\times2\times2\times3\times3)$ +1

$\Rightarrow \log(2^3 \times 3^2)$ +1

formula $\log(m.n) = \log m + \log n$

$\Rightarrow \log 2^3 + \log 3^2$

formula $\log a^b = b \log a$ +1

$\Rightarrow 3\log 2 + 2\log 3 = 2\log 3 + 3\log 2$ +1 Ans

b) if $f(x) = x^3 + 14x^2 - 2x + 4$ then $f(3) = ?$

$f(3) = (3)^3 + 14(3)^2 - 2(3) + 4$ +1

$= 27 + 122 - 6 + 4$

$= 147$ Ans +1

Q3

i) $A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & -5 & 6 \end{bmatrix}$ $B = \begin{bmatrix} 4 & 5 & -2 \\ 3 & 1 & 8 \end{bmatrix}$

$A^T = \begin{bmatrix} 3 & 0 \\ 2 & -5 \\ 1 & 6 \end{bmatrix}$ $B^T = \begin{bmatrix} 4 & 3 \\ 5 & 1 \\ -2 & 8 \end{bmatrix}$ +1

$A^T + B^T = \begin{bmatrix} 7 & 3 \\ 7 & -4 \\ -1 & 14 \end{bmatrix}$ +2

$A+B = \begin{bmatrix} 3 & 2 & 1 \\ 0 & -5 & 6 \end{bmatrix} + \begin{bmatrix} 4 & 5 & -2 \\ 3 & 1 & 8 \end{bmatrix} = \begin{bmatrix} 7 & 7 & -1 \\ 3 & -4 & 14 \end{bmatrix}$ +1

$(A+B)^T = \begin{bmatrix} 7 & 3 \\ 7 & -4 \\ -1 & 14 \end{bmatrix}$ +2

Hence

$A^T + B^T = (A+B)^T$

or

ii) a) $\begin{vmatrix} -1 & 2 & 3 \\ 2 & -3 & 1 \\ 3 & -1 & 1 \end{vmatrix} = -1(-3+1) - 2(2-3) + 3(-2+9)$ +1

$= -1(-2) - 2(-1) + 3(7)$ +1

$= 2 + 2 + 21$ +1

$= 25$ Ans +1

b) $\begin{vmatrix} 5 & 4 \\ -2 & 3 \end{vmatrix} = 15 - (-8) = 15 + 8 = 23$ Ans +2

Q4 i) find $\frac{dy}{dx}$.

a) $y = e^{4x} \cdot \sin x$.

formula: $u \cdot v = uv' + vu'$ +1

$\frac{dy}{dx} = e^{4x}(\cos x) + \sin x(4e^{4x})$ +1

$= \cos x\, e^{4x} + 4\sin x\, e^{4x}$

+1

$= e^{4x}(\cos x + 4\sin x)$ Ans

b) $y = x^3 + \tan x$.

$\frac{dy}{dx} = \frac{d}{dx}(x^3) + \frac{d}{dx}(\tan x)$ +1

$= 3x^2 + \sec^2 x$. Ans +2

or.

ii) $y = ae^{mx} + be^{-mx}$. then

$\frac{dy}{dx} = ame^{mx} - bme^{-mx}$. +1

$\frac{d^2y}{dx^2} = am^2e^{mx} + bm^2e^{-mx}$. +2

$\frac{d^2y}{dx^2} = m^2(ae^{mx} + be^{-mx})$ +2

$\frac{d^2y}{dx^2} = m^2y$. Ans +1

Q5 i) distance formula = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$. +2

distance b/w points (10,15) and (7,10)

$= \sqrt{(10-7)^2+(15-10)^2}$ +2

$= \sqrt{9+25}$ +1

$= \sqrt{34}$ Ans +1

or

ii) a) $\int x \sin x \, dx$.

formula of integration by parts

$\int u.v = u\int v - \int [u' \int v]$. +1

$u = x \qquad v = \sin x$

$\int x \sin x \, dx = x(-\cos x) - \int \left[\frac{dx}{dx} \int \sin x\right] dx$ +1

$= -x\cos x - \int (-\cos x)\, dx$.

$= -x\cos x + \int \cos x \, dx$.

$= -x\cos x + \sin x + c$ Ans +1

b) $\int_{-1}^{2} x^3 \, dx = \left[\frac{x^{3+1}}{3+1}\right]_{-1}^{2}$ +1

$= \left[\frac{x^4}{4}\right]_{-1}^{2}$

$$= \frac{1}{4}\left(x^4\right)_{-1}^{2}$$

$$= \frac{1}{4}\left(2^4 - (-1)^4\right)$$ +1

$$= \frac{1}{4}\left(16 - 1\right) = \frac{15}{4} \quad \underline{\text{Ans}}$$ +1

Q6 i) $$\frac{dy}{dx} - y = e^{2x}$$

$$\frac{dy}{dx} + Py = Q$$ +1

$P = -1 \qquad Q = e^{2x}$

$$IF = e^{\int P dx} = e^{-\int dx} = e^{-x}$$ +1

$$y \cdot IF = \int Q \cdot IF \, dx$$ +1

$$y \cdot e^{-x} = \int e^{2x} \cdot e^{-x} dx.$$ +1

$$y \cdot e^{-x} = \int e^{x} dx.$$ +1

$$y \cdot e^{-x} = e^{x} + c \quad \underline{\text{Ans}}$$ +1

Or

ii) $$F(t) = 1 + \sin 2t + e^{t}$$

$$L\{F(t)\} = L\{1\} + L\{\sin 2t\} + L\{e^{t}\}.$$ +3

$$= \frac{1}{s} + \frac{2}{s^2+4} + \frac{1}{s-1}$$ +3