D-M-201915 Seat No. _____

D. Pharm. (First Year) Examination

May – 2022

1. Remedial Mathematics

2. 1.6 : Remedial Biology

Time : **3** Hours] [Total Marks : **70**

1. Remedial Mathematics

Q1. Answer the following: **(2 * 10 = 20 *marks*)**

a. Solve the equation $\begin{vmatrix} x+3 & 4 \\ x-2 & 5 \end{vmatrix} = 13$ to find x.

b. If $A = \begin{pmatrix} -1 & 2 & 17 \\ 2 & 3 & 1 \\ 6 & -4 & 2 \end{pmatrix}$ Then find the cofactors of the entries A_{12}, A_{31}, A_{13} and A_{21}.

c. Define: i) Row Matrix ii) Rational function with each of examples.

d. Solve $f'(3)$, $g'(3)$, if $f(x) = -\frac{1}{x} + \frac{1}{2}$ and $g(x) = \sin(7)$.

e. What is the order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{dy}{dx}\right)^4 - siny = 0$.

f. Find the Domain and Range of the function $f(x) = \frac{1}{x(x-1)}$.

g. Solve: $\int \frac{(1)}{(16-25x^2)}\, dx$ and $\int \frac{2}{(x^2+9)}\, dx$.

h. For what values of x the function $y = x^2 + 5x$ will have maximum or minimum value.

i. Find the value of $\int te^{2t}\, dt$ and $\int_1^2 (x+1)(x+5)\, dx$.

j. Find the stationary values of $f(x) = x^2 + 7x - 6 = 0$.

Q2. Answer any two of the following: **(10 * 2 = 20 *marks*)**

a. i) Form the differential equation from the equation $xy = ae^x + be^{-x}$.
ii) Find the maximum or minimum values of $f(x) = x^3 - x^2 - x$

b. If $A = \begin{bmatrix} 6 & 2 & 3 \\ 7 & 4 & 1 \\ 14 & 2 & 9 \end{bmatrix}$ then using Cayley Hamilton theorem find A^{-1}= _____.

c. i) Find $\frac{dy}{dx}$: 1) If $y = \log(\sec\theta + \tan\theta)$ *and* $x = sec\theta$
2) $x^2 + y^2 + 2gx + 2fy + d = 0$.
ii) If matrices $A = \begin{bmatrix} 2 & -1 & 0 \\ 3 & 2 & -4 \\ 5 & 1 & 9 \end{bmatrix}$ *and* $B = \begin{bmatrix} 17 & -1 & 3 \\ -24 & -1 & -16 \\ -7 & 1 & 1 \end{bmatrix}$, then find the matrix C from the equation $4A + 3C = B$.

d. i) The distance 's' travelled by a particle in 't' seconds is given by $s = 4t^3 - 5t + 6$ then find the velocity and acceleration at the end of 10 seconds
ii) Evaluate: $\int \frac{x+3}{(x-1)(x-2(x-3))}\, dx$.

Q3. **Answer any six of the following:** **$(6 * 5 = 30\ marks)$**

a. If $y = x^2 \cdot cosx$ then show that $(1 - x^2)\, y_2 - 4xxy_1 + (x^2 + 6)\, y = 0$.

b. i) If $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$, then prove that $A^2 - 4A - 5I = 0$.

ii)Solve $\int \frac{(x^4+x^2+1)}{(x^2+1)}\, dx$.

c. i) If $A = \begin{pmatrix} 3 & 4 \\ 1 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & -2 \\ 2 & 1 \end{pmatrix}$ then prove that $(A+B)^T = B^T + A^T$.

ii) If $y = \log(\sec(2x^2 + 3x + 4))$ then find $\frac{dy}{dx}$.

d. If $A = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$ then prove that $(AB)^{-1} = (B)^{-1}(A)^{-1}$.

e. Solve the equations using matrix method $2x + 3y = 2xy$ *and* $8x + 3y = 5xy$.

f. Solve the system using Cramer's Rule:

$$3x + y + 2z = 3$$
$$2x - 3y - z = -3$$
$$z + x + 2y = 4$$

g. If $f(x) = 2x^2 + 3$ *and* $g(t) = \frac{1}{2t^3}$ then find the following:

$$(f + g)(x),\ (fg)(x),\ (fog)(x),\ (gof)(x) and\ (f)^{-1}(x).$$

h. Evaluate: i) $\int \frac{2+3sinx}{\cos^2 x}\, dx$ and ii) $\int_0^1 \frac{e^x}{e^x+1}\, dx$.

i. Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$.

j. If $A_t = \begin{bmatrix} cost & sint \\ -sint & cost \end{bmatrix}$ *then prove that* $A_x \cdot A_y = A_{x+y}$.

2. 1.6 : Remedial Biology

Instruction : Figure to the right indicate full marks for the respective questions.

Q. 1. Answer the following Questions: **[10*2=20]**

1. Define animal cell.
2. What is biology.
3. Mention biological name of frog.
4. Enlist different types of connective tissue.
5. What are reptiles.
6. Enlist characteristic of mammal's animal.
7. Mention four poisonous animals.
8. Define: Zoology
9. What is stem.
10. Define flower.

Q.2. Answer the following Questions: (Any Two) **[2*10=20]**

1. Define inflorescences. Write in detail about different types of inflorescences.
2. Write in detail about Modification of stem.
3. Discuss various types of animal tissue.

Q.3. Answer the following Questions: (Any Six) **[6*5=30]**

1. Define root. Draw well labelled diagram of region of root.
2. Define stem. Differentiate stem from root.
3. Write in detail about bud.
4. Draw well labelled diagram of different types of stomata.
5. Differentiate simple leaf & compound leaf.
6. Discuss digestive system of frog.
7. Write a note on poisonous animals.
8. Discuss reproductive system of frog