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BBT-M-201915 Seat No. _____

First Year D. Pharm. Examination

August – 2021

Remedial Mathematics

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

1. Answer the following: $2 * 10 = 20$

a. If $A=\begin{pmatrix}1 & 0 & 1\\ 5 & 2 & -1\\ 6 & 8 & 3\end{pmatrix}$ Then cofactor of 6 =_____ and cofactor of -1 =_____.

b. Define: i) Column Matrix ii) Square Matrix with each of examples.

c. $\int_1^2 (3/x + 2^x)\,dx.$

d. Solve $f'(1)$, $g'(3)$, if $f(x) = \frac{3}{x^2} + \frac{2}{x} - \frac{1}{2}$ and $g(x) = -\frac{7^3}{x} + 2x^4$.

e. Find the first derivative of x with respect to t if $x = (t^3 + 3t)\, sint\, e^t$.

f. If $\begin{bmatrix}1 & 0\\ -1 & 4\end{bmatrix} = \begin{bmatrix}x-y & 0\\ -1 & x^2-y^2\end{bmatrix}$ then x=_____ and y=_____.

g. Solve i) $\int \frac{dx}{\sqrt{25+16x^2}}$ & ii) $\int (x-2)(x+1)(x+2)\,dx$

h. If $y = \log(\tan(2x+3))$ then find $\frac{dy}{dx}$.

i. $\int \left(\frac{(1-3x)^2}{x^3}\right) dx$

j. The value of the $\begin{vmatrix}-1 & \log_{12} 4\\ 1 & \log_{12} 3\end{vmatrix}$ = _____.

2. Answer any two of the following: $10 * 2 = 20$

a. i) Verify that $AB \neq BA$ for $A=\begin{pmatrix}1 & 2 & 3\\ 4 & 5 & 6\end{pmatrix}$ and $B=\begin{pmatrix}1 & 2\\ 2 & 1\\ 1 & 2\end{pmatrix}$.

ii) If matrices $A=\begin{pmatrix}1 & 2 & 0\\ -3 & 0 & 4\end{pmatrix}$, $B=\begin{pmatrix}0 & -1 & -3\\ 3 & 2 & 4\end{pmatrix}$ then find the solution of the matrix of equation $2(X+A)+3B=0$.

b. i) Find the maximum or minimum values of $f(x) = (x-1)^2(x-2)$.
ii) If $x^3 + y^3 = 3axy$ then find $\frac{dy}{dx}$.

c. Find the unique solution of $3x+y=3-2z$, $2x-3y+3=z$, $x+z+2y=4$ using the matrix method.

d. Evaluate: i) $\int_0^1 x \cdot e^{x^2} dx$ and ii) $\int \frac{(x^2+4x-1)}{(x^3-x)}\,dx$.

3. Answer any six of the following: $6 * 5 = 30$

a. Find $\frac{dy}{dx}$ if $y = \cos(2x + y)$ *and* $\frac{d^2y}{dx^2}$ if $y = x^x$.

b. If $A = \begin{pmatrix} 2 & 5 \\ 8 & -3 \end{pmatrix}$ then verify Cayley Hamilton theorem and hence obtain A^{-1} using Cayley Hamilton Theorem.

c. If $y = a\cos(\log x) + b\sin(\log x)$ then show that $x^2 y_2 + xy_1 + y = 0$.

d. Solve the system using Cramer's Rule:

$$x + y + z = 3$$
$$3z + 2y + x = 4$$
$$x + 4y + 9z = 6$$

e. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & 1 & -1 \end{bmatrix}$ then $A^{-1} =$ _____.

f. Evaluate: i) $\int \frac{5+3\cos x}{\sin^2 x} dx$ and ii) $\int_0^2 \frac{x^2}{x^3+1} dx$.

g. If $A = \begin{pmatrix} 2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & 2 & 2 \end{pmatrix}$, then find $A^2 - 2A - I$.

h. Evaluate: i) $\int (x \cdot e^x)\, dx$ and ii) $\int_3^4 \frac{x+3}{(x-1)(7+x)}\, dx$

i. Find $\frac{dy}{dx}$ i) For $x = \sqrt{(\sin 2t)}$ and $y = \sqrt{(\cos 2t)}$.

ii) For $y = \log(\sec^2 x)$

j. If $A = \begin{pmatrix} 2 & -2 \\ 3 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 5 \\ 4 & -3 \end{pmatrix}$ then prove that $(AB)^T = B^T A^T$.