B. Pharm / Sem - III / Maths / 23/12/15

QP Code : 21762

Duration: 3 Hrs

Maximum marks: 70

Note: All Questions are compulsory
Use of simple calculator is allowed
Figure at right indicate maximum marks

Q1. (a) Attempt any 7 [2 marks each]: **[14]**

(i) If A = $\begin{bmatrix} -1 & 2 \\ -3 & 7 \end{bmatrix}$ B = $\begin{bmatrix} 3 & 6 \\ -4 & -13 \end{bmatrix}$ then $2A + B^T$ is :

(a) $\begin{bmatrix} 4 & 7 \\ -19 & 10 \end{bmatrix}$ (b) $\begin{bmatrix} -6 & -9 \\ -3 & 20 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 10 \\ -10 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

(ii) If $\begin{vmatrix} 2 & x \\ 1 & 4 \end{vmatrix} = \begin{vmatrix} x & 6 \\ 2 & 4 \end{vmatrix}$ then the value of x is:

(a) 1 (b) -2 (c) 4 (d) 2

(iii) The N^{th} derivative of $f(x) = Sin^2x$ is :

(a) $-2^{n-1} \cos(2x+n\pi/2)$ (b) 2 sinx cosx (c) $2^{n-1} Cos(2x+n\pi/2)$ (d) $2^{n-1} Sin(2x+n\pi/2)$

(iv) With respect to Rolle's theorem the value of 'c' corresponding to $f(x) = x^2-4x + 3$ is:

(a) 1 (b) 2 (c) 3 (d) 4

(v) If $y = 2x^2$, then Δy by taking h = 1 is:

(a) 2x+1 (b) 4 x + 2 (c) $2x^2 - 2x$ (d) $2x^2 - 1$

(vi) The N^{th} derivative of f(x) = log (2x+1) is:

(a) $Y_n = \frac{1}{2(2x+1)}$ (b) $Y_n = \frac{(-1)^{n-1}(n-1)!2^n}{(2x+1)^n}$ (c) $Y_n = \frac{(-1)^n (n)!2^n}{(2x+1)^n}$

(d) $Y_n = \frac{(-1)^n (n-1)!2^n}{(2x+1)^n}$

(vii) General solution for the differential equation $(D^2 -5D +6)y = 0$ is:

(a) $c_1e^{-3x} + c_2e^{2x}$ (b) $c_1e^{2x} + c_2e^{3x}$ (c) $c_1e^{-3x} + c_2e^{-2x}$ (d) $c_1e^{-x} + c_2e^{-2x}$

(viii) The value of $\int_{-2}^{2} x^3\,dx$ is: (a) 16/3 (b) 8/3 (c) 0 (d) 3/16

(ix) The partial derivative of $Z = 3x^2 +2xy + xy^2$ with respect to x is:

(a) $6x + 2y + 2xy$ (b) $6x + 2y + y^2$ (c) $3x + 2y + y^2$ (d) $2x + xy + xy^2$

(b) Attempt any 1: **[1]**

(x) If A = $\begin{bmatrix} 3 & 1 & 2 \\ 1 & 2 & 3 \\ t & 2 & 4 \end{bmatrix}$ is a singular matrix , then the value of t is:

(a) 1 (b) 2 (c) 4 (d) 6

(xi) The N^{th} derivative of f(x) = log (2x+1) is:

(a) $Y_n = \frac{1}{2(2x+1)}$ (b) $Y_n = \frac{(-1)^{n-1}(n-1)!2^n}{(2x+1)^n}$ (c) $Y_n = \frac{(-1)^n (n)!2^n}{(2x+1)^n}$

(d) $Y_n = \frac{(-1)^n (n-1)!2^n}{(2x+1)^n}$

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Q2. (a) Attempt any two (4 marks each) [8]

(i) If $y = \sin^{-1}x$, prove that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - n^2 y_n = 0$

(ii) Using Maclaurin's series, give the expansion of $f(x) = e^{\sin x}$

(iii) Examine the function $f(x, y) = x^3 + y^3 - 15xy$ for maxima or minima.

(b) Attempt any one (3 marks) [3]

(i) State Lagrange's Mean Value Theorem. Use it to verify for $f(x) = x^2 - 5x + 6$ in $[2, 4]$

(ii) Find the N^{th} derivative of $y = e^x.\cos x.\sin 3x$

Q3. (a) Attempt any two (4 marks each) [8]

(i) Obtain the reduction formula for $\int_0^{\frac{\pi}{2}} Sin^n\, x\, dx$, hence evaluate $\int_0^{\frac{\pi}{2}} Sin^9\, x\, dx$

(ii) Find out the area common to two parabolas $y^2 = 4ax$ and $x^2 = 4ay$

(iii) Evaluate $\int Sin^{-1}x\, dx$

(b) Attempt any one (3 marks) [3]

(i) Find the length of the curve $x = 3\,at^2$, $y = a(t-3t^2)$ at $t=0$ to $t = 1$.

(ii) By using the properties of Definite Integral Evaluate $I = \int_0^{\frac{\pi}{2}} \frac{1}{1+tan^3\theta}\, d\theta$

Q4. (a) Attempt any two (4 marks each) [8]

(i) By using the Adjoint method, find the inverse of the matrix $A = \begin{bmatrix} 2 & -1 & 3 \\ 1 & 1 & 1 \\ 1 & -1 & 1 \end{bmatrix}$

(ii) Find the Eigen values of the matrix $A = \begin{bmatrix} 4 & 1 & -1 \\ 6 & 3 & -4 \\ 6 & 2 & -3 \end{bmatrix}$

(iii) Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

(b) Attempt any one (3 marks) [3]

(i) Solve $\begin{vmatrix} 1 & -6 & -x \\ 2 & -3 & x-3 \\ -3 & 2 & x+2 \end{vmatrix} = 0$

[TURN OVER

Q4.

(ii) Find the Rank of the matrix A = $\begin{bmatrix} 1 & 2 & 3 & 4 \\ -1 & -3 & 2 & -4 \\ 1 & 2 & -3 & 4 \\ -2 & -1 & -4 & -3 \end{bmatrix}$

Q5. (a) **Attempt any two (4 marks each)** [8]

(i) Solve the differential equation $(x^2 - y^2)\frac{dy}{dx} = 2xy$, given that y =1 when x = 1.

(ii) Form the Differential Equation of $y = A\cos(x^2) + B\sin(x^2)$.

(iii) Solve $(D^2 + 2D + 1)y = 2x + x^2$.

(b) **Attempt any one (3 marks)** [3]

(i) Form the Differential Equation of $y = A e^x + B e^{-x}$.

(ii) Solve the differential equation: $x\,dy - y\,dx = 0$

Q6. (a) **Attempt any two (4 marks each)** [8]

(i) By using Newton's Forward Interpolation formula estimate f(3) from

X:	2	4	6	8
F(x) :	13	21	29	37

(ii) By using Simpsons 1/3 rule, calculate the approximate value of $\int_0^6 \frac{1}{1+x^2}\,dx$, by taking 7 equidistant ordinates.

(iii) Estimate the missing term by using E and Δ from the following:

x:	0	1	2	3	4
y:	1	3	9	--	81

(b) **Attempt any one (3 marks)** [3]

(i) Evaluate $\left(\frac{\Delta^2}{E}\right)\sin x$.

(ii) Evaluate $\left(\frac{\Delta^2}{E}\right)e^x$, take h=1.
