Q.P. Code :09452

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

Please check whether you have got the right question paper.

N.B:
1. **All** questions are **compulsory**.
2. **Use** of **simple calculator** is **allowed**.
3. **Figures** to the **right** indicate **full marks**.

Q.1 (A) Attempt any 7 [2 marks each] **14**

1) If A=$\begin{bmatrix}3 & 4\\5 & 7\end{bmatrix}$ then the inverse of the A is:
   a) $\begin{bmatrix}7 & -4\\-5 & 3\end{bmatrix}$
   b) $\begin{bmatrix}3 & 5\\4 & 7\end{bmatrix}$
   c) $\begin{bmatrix}-4 & 7\\-5 & 3\end{bmatrix}$
   d) $\begin{bmatrix}7 & -5\\-4 & 3\end{bmatrix}$
2) 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
3) The value of $\int logx\ dx$ is:
   a) 1/x
   b) xlogx+x+c
   c) xlogx-x+c
   d) xlogx-x
4) If y=2x, then Δy by taking h=1 is:
   a) 4
   b) 2
   c) 3
   d) 1
5) If A=$\begin{bmatrix}3 & 1 & 2\\1 & 2 & 3\\x & 2 & 4\end{bmatrix}$ is a singular matrix, then the value of x is:
   a) 1
   b) 2
   c) 4
   d) 6

[P.T.O]

6) 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) $y_n = \frac{(1)^n(n-1)!2^n}{(2x+1)^n}$
7) General solution for the differential equation $(D^3-6D^2+9D)y=0$ is:
   a) $(c_1x+c_2)e^{3x}+c_3$
   b) $c_1e^{3x}+c_2e^{3x}+c_3e^{0x}$
   c) $(c_1x+c_2x)e^{3x}+c_3$
   d) $(c_1x+c_2)e^{3}+c_3e^{3x}$
8) The partial derivative of $Z=3x^2+2xy+xy^2$ with respect to x is:
   a) $6x+2y+2xy$
   b) $6x+2y+2y^2$
   c) $3x+2y+ y^2$
   d) $2x+xy+xy^2$
9) 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

(B) Attempt any one (3 marks) **1**

10) Which of the following is not a homogeneous differential equation?
   a) f(x,y)=2x-9y
   b) $f(x,y)=3x^2-7y^3$
   c) $f(x,y)=x^2+3y^2-3xy$
   d) a and c
11) The value of $\int_{-2}^{2} x^5 \ dx$ is:
   a) 16/3
   b) 8/3
   c) 0
   d) 3/16

Q.2 (A) Attempt any two (4 marks each) **8**

1) Find the N^{th} derivative of $y = \frac{x}{(x+2)(x-2)}$
2) Using Maclaurin's series, give the expansion of f(x)=sin x.
3) Examine the function $f(x,y)=x^3+3xy^2-15x^2-15y^2+72x$ for maxima and minima.

(B) Attempt any one (3 marks) **3**

1) Verify Rolle's theorem for the function f(x)=x^2-3x+2 in[1,2]
2) If y=x^3logx, find : y_4 using Leibnitz's theorem.

Q.3 (A) Attempt any two (4 marks each) **8**

1) Obtain the reduction formula for $\int_0^{\frac{\pi}{2}} sin^n x\, dx$, hence evaluate $\int_0^{\frac{\pi}{2}} sin^8 x\, dx$.
2) Find the length of the curve x=asinθ , y=acosθ from θ=0 to θ= $\pi/4$
3) Evaluate: $\int e^x cosx\, dx$

(B) Attempt any one (3 marks) **3**

1) Find the area bounded by the parabola x^2=4y, X-axis and the lines x=1 and x=3
2) By using the properties of Definite Integral, Evaluate |=$\int_0^2 \left(\frac{x^2-4}{x^2+4}\right) dx$

Q.4 (A) Attempt any two (4 marks each) **8**

1) By using the Adjoint method, find the inverse of the matrix A = $\begin{bmatrix}1 & 2 & 3\\4 & 5 & 6\\7 & 8 & 9\end{bmatrix}$
2) Prove that $\begin{vmatrix}1 & x & x^2\\1 & y & y^2\\1 & z & z^2\end{vmatrix}$ = (x-y)(y-z)(z-x)
3) Verify Cayley Hamilton theorem for the matrix: A= $\begin{bmatrix}1 & 0 & 1\\0 & 1 & 0\\0 & 0 & 1\end{bmatrix}$

(B) Attempt any one (3 marks) **3**

1) Find the rank of the matrix A= $\begin{bmatrix}2 & 3 & 4\\4 & 3 & 1\\1 & 2 & 4\end{bmatrix}$
2) Solve by Cramer's rule :
   x+y+x=6; 2x+y-2z=-2; x+y-3z=-6

Q.5 (A) Attempt any two (4 marks each) **8**

1) Find the particular solution of: (D^2+D-2)y=0, when x=0, y=1 and $\frac{dy}{dx} = 0$
2) From the differential equation for y = A cos(logx)+ B sin(logx)
3) Solve (x^3+y^3)dy=x^2y dx

(B) Attempt any one (3 marks) **3**

1) Solve (1-x)dy-(1+y)dx = 0. Also find the particular solution, if y = 2 when x = 1
2) Form the differential equation for x^2+y^2-2ax = 10

Q.6 (A) Attempt any two (4 marks each) **8**

1) Use Lagrange's Interpolation formula estimate y when x=4

x	0	2	5	6
Y	7	11	17	19

2) Evaluate $\int_0^2 x^2 dx$ by using Trapezoidal rule (with h=0.2)

3) Estimate the missing value by using E and Δ from the following:

x	1	2	3	4	5
Y	2	4	8	-	32

(B) Attempt any one (3 marks) **3**

1) Given :

x	1	3	4
f(x)	1	5	7

Assuming $\Delta^3 f(x) = 0$, find f(2), take h=1

2) Evaluate : $\left(\frac{\Delta^2}{E}\right) Sinx$