Sem - III Rw KT
Maths
2014-15

QP Code : **13714**

(2 Hours) [Total Marks : 40

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from the **remaining**.
(3) Use of **non-scientific calculator** is **allowed**.
(4) **Figures** to the **right** indicate **marks**.

1. (a) Find the nth derivative of $Y = \cos^2 x + (2x+3)^{-1}$ 4

OR

(a) Find the Extreme values of $f(x,y) = x^3 + y^3 - 63(x+y) - 12xy$ 4

(b) Obtain the reduction formula for $\int_0^{\frac{\pi}{2}} \text{Sin}^n x\, dx$ hence evaluate $\int_0^{\frac{\pi}{2}} \text{Sin}^8 x\, dx$. 4

OR

(b) Find the volume of the solid generated by revolving about x-axis the region bounded by the curve $9x^2-4y^2=36$ in the interval x=2 to x=4. 4

2. (a) Solve the system of equations by Crammer's rule. 4
$4x - 3y + z = 1, \quad x + 4y - 2z = 10, \quad 2x - 2y + 3z = 4$

(b) Find the Eigen values of the Matrix A. 4

$$A = \begin{bmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{bmatrix}$$

3. (a) IF f(1)=10, f(2)=16, f(3)=26, f(4)=40, Estimate value of f(2·5) using Newton's forward difference Interpolation formula. 4

(b) If $U=\log(x^2+y^2)$ prove that $\frac{\partial^2 U}{\partial x \partial y} = \frac{\partial^2 U}{\partial y \partial x}$ 4

4. (a) Verify Rolle's mean value Theorem for $f(x) = e^{-x}(\sin x - \cos x)$ in the interval $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$. 4

(b) Verify Euler's Theorem for $u(x,y) = x/y + y/x$ 4

5. (a) Solve any one differential equation :- 4

(i) $(x^3+y^3)dy = (x^2y)dx$

(ii) $\frac{dy}{dx} = \frac{x-y+3}{2x-2y+5}$

(b) Find the length of loop of the curve $4y^2 = x(x-1)^2$ 4

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6. (a) Solve any **one** differential equation :- 4

(i) $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = \sin 2x$

(ii) $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{3x} + 5$

(b) If an error of 1% is found in measuring the sides of rectangle, find the resultant error in calculating the are of rectangle. 4

7. (a) Evaluate any **one** integral :- 4

(i) $I = \int_0^{\frac{\pi}{2}} \frac{\cos\theta}{\sin\theta + \cos\theta} d\theta$

(ii) $I = \int x \tan^{-1} x \, dx$

(b) Use Simpson's 1/3rd rule to evaluate the Integral $\int_0^6 \frac{1}{1+x} dx$ by taking h=1. 4