

Code No. 50021N

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 14. a) Find the radius of curvature $y^2 = 4ax$ at $(at^2, 2at)$. 5

 b) Find local maxima and minima of $f(x) = 3x^4 - 2x^3 - 6x^2 + 6x + 1$. 5

 15. a) Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ using Green's theorem. 5

 b) If $\mathbf{A}$ is a constant vector and $\mathbf{r} = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$ show that

$$\nabla \times (\mathbf{A} \cdot \mathbf{r}) = \mathbf{A} \times \nabla$$
 5

 16. a) Reduce the matrix to normal form and find rank. 5

$$\begin{vmatrix} -3 & -6 & 1 & 2 \\ 1 & 2 & -3 & 3 \\ 1 & 2 & 1 & 1 \end{vmatrix}$$

 b) Discuss the convergence of the series $\sum_{n=1}^{\infty} \frac{(n+1)3^n}{n^{n+1}} x$, $x > 0$. 5

 17. a) If $v = (x^2 + y^2 + z^2)^{-1/2}$ 5

find $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} + \frac{\partial^2 v}{\partial z^2}$

 b) Evaluate $\oint_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = 6xz\mathbf{i} + 4xy\mathbf{j} + yk$ where S is the portion of the plane $2x + 3y + 6z = 12$. 5