



K21U 3469

Reg. No. :

Name :

II Semester B.Sc. Degree (CBCSS – OBE – Reg./Sup./Imp.)
Examination, April 2021
(2019 Admission Onwards)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
2C02 MAT – PH : Mathematics for Physics – II

Time : 3 Hours

Max. Marks : 40

UNIT – I

Short answer type (Answer **any 4** questions).

1. Find $\frac{\partial Z}{\partial x}$ if $Z = \sin(xy) + 3x^2y^2$.
2. If z is a homogeneous function of degree 2. then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$
3. Evaluate $\int_0^{\frac{\pi}{2}} \cos^5 x \, dx$.
4. Find the area bounded by $y = 2x^2$, x axis and the line $x = 1$.
5. State : Cayley – Hamilton theorem.

(4×1=4)

UNIT – II

Short essay type (Answer **any 7** questions).

6. Evaluate $\lim_{x, y \rightarrow 0} \frac{xy}{x^2 + y^2}$.
7. Evaluate $\int \sin^2 x \, dx$.
8. If $u = x^4y^2$, $x = 2t^2$, $y = t$, find $\frac{du}{dt}$.
9. Evaluate $\int_0^1 \frac{x+3}{\sqrt{1+x^2}} \, dx$.
10. Evaluate $\int \cos^3 x \sin^2 x \, dx$.
11. Write the reduction formula for $\int \tan^n x \, dx$.
12. Find the area between $y = \sqrt{x}$ and $x = \sqrt{y}$.

P.T.O.

K21U 3469



13. Find the volume of the solid generated by revolving $y = 2\sqrt{x}$, $0 \leq x \leq 9$ about X axis.
14. Find the eigen values of $\begin{bmatrix} 2 & 3 \\ 3 & 1 \end{bmatrix}$.
15. Reduce the matrix $A = \begin{bmatrix} -2 & 7 \\ 0 & 6 \end{bmatrix}$ to the diagonal form.
16. Reduce the quadratic form $3xy + 4yz + 2zx$ into canonical form. (7×2=14)

UNIT – III

Essay type (Answer **any 4** questions).

17. If $u = \frac{x}{y+z} + \frac{y}{z+x} + \frac{z}{x+y}$, find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$.
18. Find the value of $\frac{du}{dt}$ given that $u = y^3 - 2ax + 2$, $x = at^2$, $y = 2at$
19. Evaluate $\int \sec^2 x \, dx$.
20. Find the area of surface generated by revolving $y = 2x^2$, $0 \leq x \leq 3$ about X axis.
21. Find the length of the cardioid $r = 1 - 2\cos\theta$.
22. Find the eigen vector of $A = \begin{bmatrix} 6 & 3 \\ 5 & 4 \end{bmatrix}$.
23. Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 5 & -2 \\ -4 & 5 \end{bmatrix}$. (4×3=12)

UNIT – IV

Long essay type (Answer **any 2** questions).

24. If $u = \cos^{-1} \left(\frac{x^2 + y^2}{x+y} \right)$, find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$.
25. If $I_n = \int_0^{\pi/3} \tan^n x \, dx$ show that $(n-1)(I_n + I_{n-2}) = (\sqrt{3})^{n-1}$.
26. Find the area of the region in the plane enclosed by the cardioid $r = (1 + 2\cos\theta)$.
27. Reduce the quadratic form $2x^2 + 3y^2 + 4z^2 - 2yz + 6zx - 3xy$ to the canonical form and specify the matrix of transformation. (2×5=10)