

Reg. No. :

Name :

II Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/
Improvement) Examination, April 2022
(2019 Admission Onwards)

COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
2C02 MAT-PH : Mathematics for Physics – II

Max. Marks : 40

Time : 3 Hours

UNIT – I

Short answer type. Answer any 4 questions.

1. Find $\frac{\partial z}{\partial x}$ if $z = \cos(x^3y) + 2x^2y^2$.
2. Find the characteristic polynomial of $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$.
3. Evaluate $\int_0^{\frac{\pi}{2}} \sin x \cos x \, dx$.
4. Find the area bounded by $y = 2x^3$, x axis and the line $x = 3$.
5. State Cayley – Hamilton theorem.

(4×1=4)

UNIT – II

Short essay type. Answer any 7 questions.

6. Evaluate $\lim_{(x,y) \rightarrow (0,0)} \frac{x^2 - y^2}{x + y}$.
7. Evaluate $\int \cos^3 x \, dx$.
8. If $u = x^3y^4$, $x = t^3$, $y = 2t$, find $\frac{du}{dt}$.
9. Evaluate $\int_0^1 \frac{2x-4}{\sqrt{1+x^2}} \, dx$.

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10. Evaluate $\int \cos^4 x \sin^3 x \, dx$.11. Write the reduction formula for $\int \tan^n x \, dx$.12. Find the area between $y = 4x$ and $y = x^2$.13. Find the volume of the solid generated by revolving $y = x^{\frac{1}{2}}$, $0 \leq x \leq 4$ about X axis.14. Find the eigen value of $\begin{bmatrix} 3 & 3 \\ 4 & 1 \end{bmatrix}$.15. Reduce the matrix $A = \begin{bmatrix} 2 & 5 \\ 0 & 6 \end{bmatrix}$ to the diagonal form.16. Reduce the quadratic form $5xy + 2yz + zx$ into canonical form.

(7×2=14)

UNIT – III

Essay type. Answer any 4 questions.

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

(4×3=12)



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UNIT – IV

Long essay type. Answer any 2 questions.

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

(2×5=10)