



OEMT211

Reg. No.

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II Semester B.Sc. Degree Examination, October - 2022

Mathematics - II

(NEP Scheme Open Elective 2021-22 and Onwards)

Paper : II

Time : 2½ Hours

Maximum Marks : 60

Instructions to Candidates:

Answer all the questions.

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(5×3=15)

I. Answer any Five questions.

1. State factor theorem.

2. If $1, w, w^2$ are cube roots of unity, then show that $(1+w)^3 - (1+w^2)^3 = 0$.3. If the sum of the squares of the roots of the equation $x^2 + px - 3 = 0$ is 10, then find P.4. If $u = x^3 - 3xy^2$, find $u_{xx} + u_{yy}$.5. If $x = u(1+v)$, $y = v(1+u)$, Prove that $\frac{\partial(x,y)}{\partial(u,v)} = 1+u+v$.6. Find $\frac{dz}{dt}$, if $z = x^2 + y^2$ where $x = a \cos t$, $y = b \sin t$ by using partial differentiation.7. Evaluate $\int_C (3x+y)dx + (2y-x)dy$ along $y = x$ from $(0,0)$ to $(10,10)$ 8. Evaluate $\int_0^{\pi/2} \int_0^{a \cos \theta} dr d\theta$

[P.T.O.]



(2)

OEMT211

9. Evaluate $\int_0^1 \int_0^2 \int_1^2 x^2 yz \, dx \, dy \, dz$

II. Answer any **Three** questions

(3×5=15)

10. Solve the equation $x^4 - 2x^3 - 10x^2 + 6x + 45 = 0$ given that $-2 + i$ is a root.

11. Solve the equation $x^3 - 7x^2 + 14x - 8 = 0$, the roots being in G.P.

12. If α, β, γ are the roots of $x^3 - 10x^2 + 6x - 8 = 0$, then find

i) $\sum \alpha^2$

ii) $\sum \frac{1}{\alpha\beta}$

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13. Solve the reciprocal equation $2x^4 + x^3 - 6x^2 + x + 2 = 0$.

14. Solve $3x^4 + 16x^3 + 24x^2 - 16 = 0$, given that the equation has multiple roots.

III. Answer any **Three** questions

(3×5=15)

15. State and prove Euler's theorem.

16. If $u = x + 3y^2 - z^3$, $v = 2x^2 - yz$, $w = 2z^2 - xy$, evaluate $\frac{\partial(u, v, w)}{\partial(x, y, z)}$ at $(1, -1, 0)$.

17. Expand $e^x \sin y$ about $\left(1, \frac{\pi}{4}\right)$ upto second degree terms using Taylor's expansion.

18. Expand e^{xy} upto third degree terms in powers of x and y using Maclaurin's expansion.

19. Find extreme values of the function $f(x, y) = x^3 + 3xy^2 - 3x^2 - 3y^2 + 4$.

IV. Answer any **Three** questions

(3×5=15)

20. Evaluate $\int_C (2x + y) dx + (3y + x) dy$ along the line joining $(0, 1)$ and $(2, 5)$.

21. Evaluate $\int_0^a \int_0^{\sqrt{a^2 - y^2}} \sqrt{a^2 - x^2 - y^2} \, dx \, dy$

22. Find area of circle $x^2 + y^2 = a^2$ by using double integration.



(3)

OEMT211

23. Evaluate $\int_{-1}^1 \int_{x-z}^{x+z} \int_0^z (x+y+z) dy dx dz$

24. Find volume bounded by the surface $z = a^2 - x^2$ and the planes $x=0, y=0, z=0, y=b$.

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