

SECTION - D

Answer any two questions from 21 to 24. These questions carry 8 marks each.

21. Find

(i) $\int \tan x \, dx$

(ii) $\int (\ln x)^n \, dx$

22. Prove that $B(u, v) = \frac{\Gamma(u) \Gamma(v)}{\Gamma(u+v)}$, $u, v > 0$.

23. Find the area of the surface generated by revolving the curve $y = x^2$, $0 \leq x \leq \frac{1}{2}$ about x-axis.

24. Find the volume of the region D enclosed by the surface $z = x^2 + 3y^2$ and $z = 8 - x^2 - y^2$.



Reg. No. :

Name :

II Semester B.Sc. Degree (CBCSS – Supplementary)

Examination, April 2020

CORE COURSE IN MATHEMATICS

2B02 MAT : Integral Calculus

(2014-2016 Admissions)

Time : 3 Hours

Max. Marks : 48

SECTION – A

All the first 4 questions are **compulsory**. They carry 1 mark each.

- Find the derivative of $y = \tan^{-1} \sqrt{1+t^2}$.
- Find the value of $\Gamma(1)$.
- Write the formula for the length of a smooth curve $x = g(y)$, $c \leq y \leq d$.
- Evaluate $\int_0^1 \int_0^1 \int_0^2 dx \, dy \, dz$.

SECTION – B

Answer **any 8** questions from among the questions 5 to 14. These questions carry 2 marks each.

- Express $\lim_{\|P\| \rightarrow 0} \sum_{k=1}^n (C_k^2 - 3C_k) \Delta x_k$, where P is a partition of $[-7, 5]$, as a definite integral.
- If f is continuous on $[a, b]$ $a \neq b$ and if $\int_a^b f(x) \, dx = 0$ then show that $f(x) = 0$ at least once in $[a, b]$.
- Evaluate $\int \frac{2 \, dx}{\sqrt{3+4x^2}}$.
- Show that $\int_1^\infty \frac{dx}{x^2}$ converges to 1.
- Express the integral $\int_0^1 x^4(1-x)^3 \, dx$ as a β -function and hence find its value.

P.T.O.

10. Write the equation of the hyperboloid of one sheet and its section by $z = 0$, $x = 0$, $y = 0$.
11. Find the volume of the solid generated by revolving the region between the y-axis and the curve $x = \frac{2}{y}$, $1 \leq y \leq 4$ about y-axis.
12. Using the parametrization $x = \cos t$, $y = 1 + \sin t$ $0 \leq t \leq 2\pi$, of the circle of radius 1 centered at the point (0, 1), find the area of the surface swept out by revolving the circle about x-axis.

13. Evaluate $\int_1^2 \int_y^{y^2} dx dy$.

14. Evaluate $\int_0^1 \int_0^{3-3x} \int_0^{3-3x-y} dz dy dx$.

SECTION - C

Answer **any 4** questions from among the questions **15 to 20**. These questions carry **4** marks **each**.

15. Find $\int x \sin^{-1} x dx$.

16. Evaluate $\int_0^{\infty} x^6 \cdot e^{-2x} dx$.

17. Find the surface area of the solid generated by revolution of the curve $y = 2\sqrt{x}$, $1 \leq x \leq 2$ about the x-axis.

18. Find the area of the region in the plane enclosed by the cardioid $r = 2(1 + \cos \theta)$.

19. Evaluate $\iint_R e^{x^2+y^2} dy dx$ where R is the semicircular region bounded by the x-axis and the curve $y = \sqrt{1-x^2}$.

20. Evaluate $\int_0^{1-x} \int_0^x \sqrt{x+y} (y-2x)^2 dy dx$.

SECTION - D

Answer **any two** questions from **21 to 24**. These questions carry **6** marks **each**.

21. Find

i) $\int \tan^5 x dx$

ii) $\int (\ln x)^n dx$.

22. Prove that $B(u, v) = \frac{\Gamma(u) \cdot \Gamma(v)}{\Gamma(u+v)}$, $u, v > 0$.

23. Find the area of the surface generated by revolving the curve $y = x^3$, $0 \leq x \leq \frac{1}{2}$ about x-axis.

24. Find the volume of the region D enclosed by the surface $Z = x^2 + 3y^2$ and $Z = 8 - x^2 - y^2$.