

[Dec-23]

GITAM (Deemed to be University)

[MATH1001]

B.Tech. Degree Examination

I Semester

SINGLE VARIABLE CALCULUS

(Effective from the admitted batch 2021–22)

Time: 2 Hours

Max.Marks: 30

Instructions: All parts of the unit must be answered in one place only.

Section-A

1. Answer all the questions. (5×1=5)

- a) Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 7x + 10}{x - 2}$
- b) Calculate the value of $F'(-1)$ if $F(x) = (x - 1)^2 + 1$.
- c) If the function f has a continuous derivative on $[0, C]$, find $\int_0^C f'(x) dx$.
- d) Obtain the value of $\int x e^x dx$
- e) Write the suitable substitution for finding the integral $\int \frac{dx}{\sqrt{9-x^2}}$

Section-B

Answer the following: (5×5=25)

UNIT-I

2. Evaluate $\lim_{\theta \rightarrow 0} \frac{(1 - \cos \theta)}{\theta \sin \theta}$.

OR

3. Find the values of a and b for which the function

$$f(x) = \begin{cases} ax + 2b, & x \leq 0 \\ x^2 + 3a - b, & 0 < x \leq 2 \\ 3x - 5, & x > 2 \end{cases}$$

is continuous at every x .

UNIT-II

4. Determine all critical points for $f(x) = \frac{x^2}{x-2}$.

OR

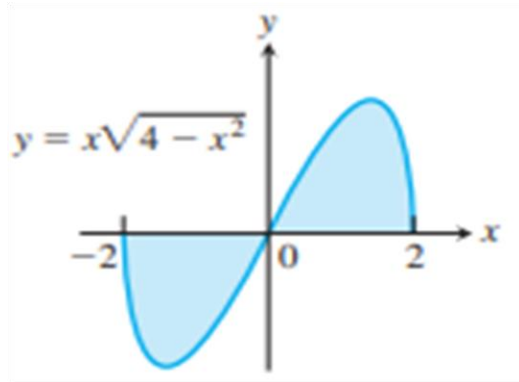
5. Find the absolute maximum and absolute minimum values of $y = -\sqrt{5-x^2}$, $-\sqrt{5} \leq x \leq 0$.

UNIT-III

6. Evaluate $\left\{ \int \left(\frac{\cos(\sqrt{\theta})}{\sqrt{\theta} \sin^2(\sqrt{\theta})} \right) d\theta \right\}^2$.

OR

7. Find the total areas of the shaded region in the below figure



UNIT-IV

8. Evaluate $\int_{-1}^1 (4x^3 - 5x^2 + 6x + 9) dx$.

OR

9. Integrate $\frac{2x}{(x^2+1)(x^2+2)}$ with respect to x.

UNIT-V

10. Evaluate $\int \frac{(1+\log x)^2}{x} dx$.

OR

11. Find the area of the region enclosed by the parabola $y = 2 - x^2$ and the line $y = -x$.