

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.



Question Paper Code: 2004

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020

First Semester

Computer Science and Engineering

U19MA101 – CALCULUS

(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering, Information Technology & Biotechnology)

(Regulation 2019)

Time : Three Hours

Maximum : 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. If $f(y) = y^3 - 8y + 10$, find the value of $f'(2)$.
2. Identify the minimum value of $f(x, y) = x^2 + y^2$, if it exists.
3. If $u = \frac{y}{z} + \frac{z}{x}$, Find $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$.
4. If $u = x^2, v = y^2$, find $\frac{\partial(u,v)}{\partial(x,y)}$.
5. Evaluate $\int \sec^2(2 - x) dx$.
6. Find the value of $\int x e^x dx$.
7. Calculate $\int_1^a \int_1^b \frac{dx dy}{xy}$.
8. Compute $\int_0^1 \int_1^2 \int_2^3 (x + y + z) dx dy dz$.
9. Convert the variable coefficient ordinary differential equation $(x^2 D^2 - x D + 1)y = \log x$ into a constant coefficient differential equation.
10. If $(D^2 + 4D + 8)y = 2^x$ then find the particular integral.

PART – B

(5 x 16 = 80 Marks)

11. a) i. Find the local maximum and local minimum of the function $2x^3 + 5x^2 - 4x$. (8)
 ii. Verify Mean value theorem for the function $f(x) = \frac{1}{x}$, $-1 \leq x \leq 1$. (8)
 (OR)
- b) i. Find the Taylor's series expansion of $f(x) = \sin x$ about $x = \frac{\pi}{2}$. (8)
 ii. Verify Rolle's theorem for the function $f(x) = x^3 + 5x^2 - 6x$ on $(0,1)$ (8)
12. a) Find the volume of the greatest rectangular parallelepiped that can be inscribed in the ellipsoid $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$. (8)
 (OR)
- b) A rectangular box, open at the top, is to have a volume of 32cc. Find the dimensions of the box, that requires the least material for its construction
13. a) Evaluate $\int x^2 e^{3x} dx$ by using integration by parts method. (8)
 (OR)
- b) Evaluate: $\int \frac{x}{(x-1)(x-2)(x-3)} dx$
14. a) Change the order of integration of the integral $\int_0^1 \int_{x^2}^{2-x} xy dy dx$ and hence evaluate it. (8)
 (OR)
- b) Find the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ by double integration.
15. a) i. Solve $(D^2 - 4D + 4)y = e^{2x} + \cos 4x + x^2$ (8)
 ii. Solve $(x^2 D^2 - 2xD - 4)y = x^2 + 2 \log x$ (8)
 (OR)
- b) i. Evaluate $\frac{d^2 y}{dx^2} + 4y = 4 \tan 2x$ using method of variation of parameters. (8)
 ii. Solve: $(D^2 - 2D + 2)y = e^x x^2 + 5 + e^{-2x}$. (8)