

9	1	9	A	C	S	4	2	8
---	---	---	---	---	---	---	---	---

## I/IV B.Tech (Regular / Supplementary) DEGREE EXAMINATION

November, 2020

Second Semester

Time: Three Hours

Common to All Branches

Numerical Methods And Advanced Calculus

Maximum: 50 Marks

Answer ALL Questions from PART-A.

(1X10 = 10 Marks)

Answer ANY FOUR questions from PART-B.

(4X10=40 Marks)

PART-A

1. a) What is the order of convergence of Bisection method? CO1
- b) State diagonal dominance property. CO1
- c) Write Newton's backward interpolation formula. CO1
- d) State Trapezoidal rule of integration. CO2
- e) Write the Euler's iterative formula for  $y' = f(x, y)$ ,  $y(x_0) = y_0$ . CO2
- f) Evaluate the double integral  $\int_0^1 \int_1^2 xy dy dx$  CO3
- g) What is formula to find the area enclosed by the plane curves? CO3
- h) Find the value of grad f for  $f(x, y, z) = xyz$ . CO4
- i) Is the vector function  $\vec{F} = 2x\mathbf{i} + 3y\mathbf{j} + 4z\mathbf{k}$  irrotational CO4
- j) State Stoke's theorem. CO4

PART-B

2. a) Using Newton – Raphson method find a root of the equation  $x^3 - 2x - 5 = 0$ . CO1 5M
- b) Solve the system of equation  $x + 4y - z = -5$ ;  $x + y - 6z = -12$ ;  $3x - y - z = 4$  using Gauss Elimination method. CO1 5M
3. a) Find a root of the equation  $xe^x - 2 = 0$  using the method of false position. CO1 5M
- b) Solve the system of equations  $5x + 2y + z = 12$ ;  $x + 4y + 2z = 15$ ;  $x + 2y + 5z = 20$  using Gauss- Seidel iteration method. Do five iterations. CO1 5M
4. a) Find the cubic polynomial which takes the following values (0,1), (1,2), (2,1) and (3,10) using Newton's forward interpolation formula. CO2 5M
- b) Estimate the value of  $f(9)$  using Lagrange's interpolation formula from the following data: CO2

x	5	7	11	13
f(x)	15	39	14	23

5M

5. a) Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using Simpson's one third rule of integration. Take  $n = 6$ . CO2 5M
- b) Apply Runge – Kutta method of 4<sup>th</sup> order find an approximate value of y for  $x = 0.2$  if  $dy/dx = x + y^2$ ,  $y(0) = 1$ . Take  $h = 1$ . CO2 5M

P.T.O.

6. a) Evaluate by changing the order of integration  $\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} dy dx$  CO3 5M

- b) Show that the area between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$  is  $16a^2/3$ . CO3 5M

7. a) Evaluate the triple integral  $\int_{-1}^1 \int_0^{x+z} \int_{x-z}^{x+z} (x+y+z) dy dx dz$  CO3 5M

- b) Find the volume of the solid bounded by the planes  $x = 0$ ,  $y = 0$ ,  $x + y + z = 1$  and  $z = 0$ . CO3 5M

8. a) Find the directional derivative of  $f(x,y,z) = xy^2 + yz^3$  at the point  $(2,-1,1)$  in the direction of the vector  $I + 2J + 2K$ . In what direction the directional derivative is maximum? CO4 5M

- b) If  $\vec{F} = 3xyI - y^2J$  evaluate  $\int_C \vec{F} \cdot d\vec{R}$ , where  $C$  is the curve in the  $xy$ -plane  $y = 2x^2$  from  $(0,0)$  to  $(1,2)$ . CO4 5M

9. a) Find the area of a circle of radius  $a$  using Green's theorem. CO4 5M

- b) Evaluate  $\iint (x dy dz + y dz dx + z dx dy)$  over the surface of a sphere of radius  $a$ . CO4 5M