PAPER ID-420257

Subject Code: KOE065

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM VI) THEORY EXAMINATION 2021-22
COMPUTER BASED NUMERICAL TECHNIQUES

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2*10 = 20

Q.no	Questions	Marks	CO
(a)	Define Rate of convergence of Bisection method	2	1
(b)	Add and Subtract the following floating point numbers: 0.78596E-2 and 0.78633E1	2	1
(c)	Evaluate $\Delta^n(e^{3x+5})$	2	2
(d)	Write the relation between Divided differences and ordinary differences.	2	2
(e)	Write the formula of generalized Simpson's 1/3 Rule.	2	3
(f)	Find differentiation of Newton's forward difference formula	2	3
(g)	Define Predictor Corrector method.	2	4
(h)	Define Stability of solution.	2	4
(i)	Classify $u_{xx} + 3u_{xy} + u_{yy} = 0$	2	5
(j)	Define eigen vector of a matrix.	2	5

SECTION B

2. Attempt any *three* of the following: 10*3 = 30

Q.no	Questions	Marks	CO
(a)	Using Regula Falsi Method find the real root of the equation $x^3 - 4x - 9 = 0$ upto 3 iteration.	10	1
(b)	Using Lagrange interpolation formula, calculate f(3) from the following table: x: 0 1 2 4 5 6 f(x): 1 14 15 56 30 19	10	2
(c)	The velocity of a car which start initially from rest at interval of 2 minutes are given below Time (minutes): 2 4 6 8 10 12 Velocity (Km/hr): 22 30 27 18 7 0 Apply Simpson's 3/8th rule to find the distance covered by car	10	3
(d)	Find the value of y(1.1) using Runge-Kutta method of fourth order for the differential equation : $\frac{dy}{dx} = y^2 + xy, y(1) = 1.0$. Take h=0.05	10	4
(e)	Explain finite difference method to the solution of Boundary value problem of second order.	10	5

SECTION C

3. Attempt any *one* part of the following: 10*1 = 10

Q.no	Questions	Marks	CO
(a)	If $u = \frac{4x^2y^3}{z^4}$ and errors in x, y, z be 0.001, compute the relative maximum error in u when $x = y = z = 1$	10	1
(b)	Calculate $\sqrt{12}$ approximately using Newton-Raphson method.	10	1

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4. Attempt any *one* part of the following: 10 *1 = 10

Q.no	Questions	Marks	CO
(a)	Prove that $\Delta \log f(x) = \log\left[1+\frac{\Delta f(x)}{f(x)}\right]$	10	2
(b)	Construct Newton forward interpolation polynomial for the data x: 4 6 8 10 y: 1 3 8 16 Hence evaluated y for x=5.	10	2

5. Attempt any *one* part of the following: 10*1 = 10

Q.no	Questions	Marks	CO
(a)	Compute f′(x) at x=16 from the given data x: 15 17 19 21 f(x)= $\sqrt{x}$: 3.87 4.12 4.35 4.58	10	3
(b)	Find the value of the integral using trapezoidal rule, taking h=0.25 $\int_0^1 \frac{dx}{1+x^2}$	10	3

6. Attempt any *one* part of the following: 10*1 = 10

Q.no	Questions	Marks	CO
(a)	Use Picard's method; obtain the solution of the equation $\frac{dy}{dx} = x(1+x^3y), y(0)=3.$ Compute the value of $y(.1) and y(.2)$	10	4
(b)	Write the algorithm of Euler's method to the solution of ordinary differential equation.	10	4

7. Attempt any *one* part of the following: 10*1 = 10

Q.no	Questions	Marks	CO
(a)	Explain Explicit method to solve parabolic one dimensional Heat equation	10	5
(b)	Using Power method, find Eigen values and Eigen vector of A $A = \begin{bmatrix} 4 & 1 \\ -1 & 6 \end{bmatrix}$	10	5