Roll No.

COER University

END SEMESTER EXAMINATION, EVEN SEM 2022-23

Time : 3 hours

Program Name : B.Tech.(Hons.)-CSE, CSE(AI & ML),

CSE(Cyber Security)

Total Marks : 100 Semester : II

Course Name : Engineering Mathematics-II

places using iteration method.

maximum relative error in evaluating u.

(**d**)

(e)

Discuss rate of convergence of Newton Raphson method.

If u = 5xy2/z3 and errors in x, y, z are 0.001 at x = 1, y = 1, z = 1, calculate the

1 92 Course Code : BTCS201/302

(92)

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CO 3

CO 3

Note: All questions are compulsory. No student is allowed to leave the examination hall before the completion of the time.

Q. No 1	Attempt Any Four Parts, Each Question Carries 5 Marks.	CO	BL
(a)	Are the vectors $(1, 1, -1)$, $(2, -3, 5)$, $(-2, 1, 4)$ linearly independent? Give reasons.	CO 1	2
(b)	Find the Eigen values and corresponding eigen vectors for the matrix	CO 1	3
	$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$		
(c)	In the vector space \mathbb{R}^3 express the vector (1,-2,5) as a linear combination of vectors (1,1,1), (1, 2, 3) and (2,-1,1).	CO 1	3
(d)	Show that the vectors $\alpha_1 = (1, 0, -1), \alpha_2 = (1, 2, 1), \alpha_3 = (0, -3, 2)$ forms a basis for V ₃ (R).Express each of the standard basis vectors as linear combination of α_1, α_2 and α_3 .	CO 1	3
(e)	Show that the mapping T : $V_2(R) \rightarrow V3(R)$ defined as T (a, b) = (a + b, a - b, b) is a linear transformation from $V_2(R)$ into $V_3(R)$. Find the range, rank, null-space and nullity of T.	CO 1	3
		1	
Q. No 2	Attempt Any Four Parts. Each Question Carries 5 Marks.	СО	BL
(a)	If T be a linear operator on R2 defined by $T(x, y) = (2y, 3x - y)$ Find the matrix representation of T relative to the basis $\{(1,3), (2,5)\}$.	CO 2	3
(b)	Produce the matrix P such that $P^{-1}AP$ is a diagonal matrix where $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$	CO 2	2
(c)	Find the matrix for T on V3(R)defined as $T(a,b,c)=(2b+c, a-4b, 3a)$ with respect to the ordered basis B={(1,0,0),(0,1,0),(0,0,1)}	CO 2	3
(d)	Define Matrix Diagonalization.	CO 2	1
(e)	Suppose the mapping $f: \mathbb{R}^2 \to \mathbb{R}^2$ is defined by $f(x, y) = (x + y, x)$. Show that f is linear.	CO 2	3
Q. No 3	Attempt Any Four Parts. Each Question Carries 5 Marks.	CO	BL
(a)	Find the root of the equation $xex = \cos x$ in the interval (0, 1) using Regula-Falsi method correct to four decimal places.	CO 3	2
(b)	Evaluate $\sqrt{12}$ to four decimal places by Newton's iterative method.	CO 3	2
(c)	Find a real root of the equation $\cos x = 3x - 1$ correct to 3 decimal	CO 3	2

Q. No 4	Attempt Any Two Parts, Each Question Carries 10 Marks,	СО	BL
(a)	Estimate the missing term in the following table:	CO 4	3
	X: 0 1 2 3 4		
	y = f(x): 1 3 9 ? 81		
(b)	Find the unique polynomial $P(x)$ of degree 2 such that:	CO 4	3
	P(1) = 1, P(3) = 27, P(4) = 64		
	Use the Lagrange method of interpolation.		
(c)	A train is moving at the speed of 30 m/sec. Suddenly brakes are	CO 4	3
	applied. The speed of the train per second after t seconds is given by		
	Time (t): 0 5 10 15 20 25 30 35 40 45		
	Speed (v): $30 \ 24 \ 19 \ 16 \ 13 \ 11 \ 10 \ 8 \ 7 \ 5$		
	Apply Simpson's three-eighth rule to determine the distance moved by the train in 45		
	seconds.		
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Q. No 5	Attempt Any Two Parts. Each Question Carries 10 Marks.	CO	BL		
(a)	Solve by the method of variation of parameters $\frac{d^2y}{dx^2} + y = \cos ecx$	CO 5	3		
(b)	Solve : $(D2 + 5D + 4) y = 3 - 2x$	CO 5	3		
(c)	Solve $(2x \log x - xy) dy + 2y dx = 0$	CO 5	3		

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