Enroll No	

K.E.Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Autonomous Institute, affiliated to SUK)
End Semester Examination (Winter 2019)
F.Y.M.Tech.Civil- Structural Engineering, Sem- I

Q.P.Code
EB 1856

Course Code: CES 1012 **Course Name**: Advanced Structural Analysis

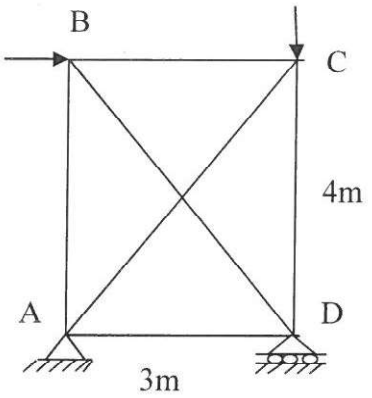
Day & Date: .Saturday 28 /12 / 2019
Time : 2.30pm to 5.30 pm Max Marks: 100

Instructions: 1) All questions are compulsory
2) Figures to the right indicate maximum marks
3) Assume suitable data if not given
4) Use of non-programmable calculator is allowed

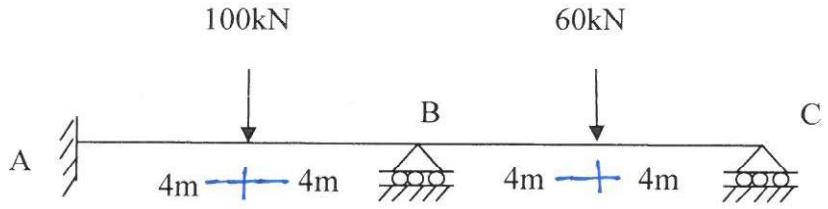
Q.1	(a)	State and prove Mullers Breslau principle.	3	CO1
Q.1	(b)	A two span continuous beam ABC, is fixed at A and simply supported at B and C, such that AB= 6 m, BC= 8 m. Construct ILD for shear force at section D that is 3m from C. Obtain the ordinates of ILD at every quarter point of each span of the beam.	12	CO1
OR				
Q.1	(b)	Construct influence line diagram for horizontal thrust, bending moment, radial shear and normal thrust at a section 6 m from left hand support of the two hinged parabolic arch of span 24 m and central rise 3m.	12	CO1
Q.2		Draw bending moment and twisting moment diagrams for a semicircular beam of radius 'R' is supported at the ends by fixed support. A cross section of beam is circular of radius 'r'. It is loaded with a vertical point load 'W' at the midpoint of semicircle. Take EI/GJ=α	15	CO2
Q3		A beam- column AB simply supported at the ends is subjected to an axial compressive force P at both the ends and clockwise couple M at its left hand end A. Develop the equation for the elastic curve. Estimate slope at end A and B. Also find magnification factor for slopes at both ends. Assume the beam-column is prismatic.	15	CO3
OR				
Q.3		A beam column of circular cross section 350 mm in diameter is 4m long, hinged at both ends. It supports an axial compression of 600 kN, together with a uniformly distributed lateral load of 20 kN/m over entire length. Determine the maximum deflection, bending moment and slope developed in the beam- column. Take E = 28 kN/mm^2	15	CO3
Q.4	(a)	Explain with suitable example the initial and boundary value problems.	5	CO5
Q.4	(b)	Determine the values of y at the pivotal points of the interval (0, 1). If y satisfies the boundary value problem $y^{iv} + 81y = 81x^2,\ y(0) = y(1) = y''(0) = y''(1) = 0$. Take n = 3	10	CO5
OR				
Q.4	(b)	Cantilever beam AB of span L fixed at A and free at B is subjected to uniform distributed load p over entire length. The governing differential equation is $EI\frac{d^4y}{dx^4} - P = 0, and\ B.C.\ are\ y(0) = 0, \frac{dy}{dx}(x = 0) = 0,$ $\frac{d^2y}{dx^2}(x = L) = 0\ and\ \frac{d^3y}{dx^3}(x = L) = 0$ Assume trial solution as $y(x) = C_0 + C_1x + C_2x^2 + C_3x^3 + C_4x^4$ Determine maximum deflection, Use Galerkin method	10	CO5

R.I.T. Rajaramnagar Exam. Centre

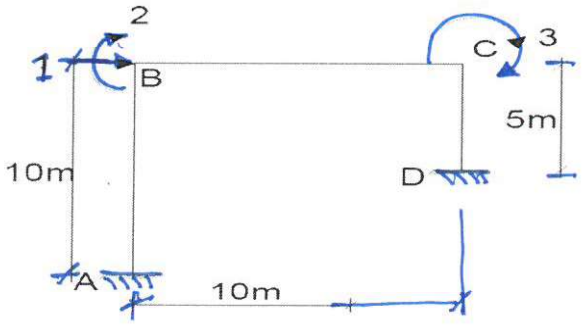
Q.5 (a) Formulate the flexibility matrix for the frame loaded and supported as shown in figure. The axial rigidity for each member is 2.5mm/kN — 4 CO4



Q.5 (b) Analyze the continuous beam ABC shown in figure, if beam undergoes the settlement of support B and C by 300/EI and 200/EI respectively. Use flexibility matrix method. — 16 CO4



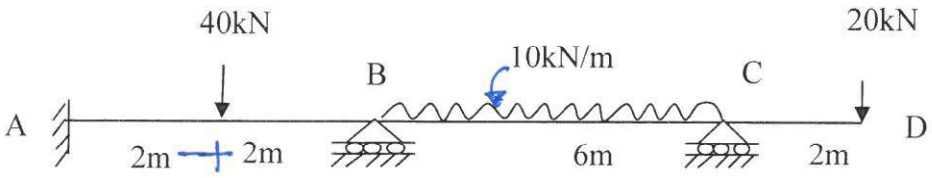
Q.6 (a) Develop the stiffness matrix for portal frame ABCD with reference to coordinates shown in figure. — 4 CO4



Q.6 (b) Analyse a propped cantilever beam AB 3 m in length fixed at A and propped at B with a spring having spring constant EI/2 kN/m. The beam carries uniformly distributed load of intensity 10 kN/m over entire span. Assume EI is constant for the beam. Construct BMD. Use stiffness matrix method. — 16 CO4

OR

Q.6 (b) Analyze the continuous beam loaded and supported as shown in fig, by using stiffness matrix method. — 16 CO4



K. E. Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute affiliated to SUK)

EB 1869

End Semester Examination- 2019

First Year M. Tech Structural Engineering, Semester I

Course Code: CES 1022, Course: Advanced Solid Mechanics

Date & Day: 30-12-2019, Monday

Maximum Marks: 100

Time: 2.30 - 5.30 pm

Instructions:

1. *All questions are compulsory.*
2. *Use of non-programmable calculator is allowed.*
3. *Assume any additional data if required and mention it clearly.*
4. *Figures to the right indicate full marks.*
5. *Draw neat sketches wherever necessary.*

1 a In a 2-D state of stress at a point in a body, σ_x = 120 MPa and τ_{xy} = 60 MPa. Determine the normal and shearing stresses on a plane which is inclined at 30^0 with σ_x direction. **03**

c The stress components at a point are given as follows:

$$\sigma_{ij} = \begin{bmatrix} 3 & -6 & -9 \\ -6 & 6 & 9 \\ -9 & 9 & -3 \end{bmatrix}$$

Compute the stress invariants, principal stresses, maximum shear stress, octahedral shear stress, hydrostatic stress and deviatoric stresses for a state of stress at a point. **12**

2 a The strains are specified as under for a plane strain condition. $\varepsilon_x = 3x^2y$, $\varepsilon_y = 4y^2x$, $\varepsilon_z = y^2$, $\gamma_{xy} = 2(yx + x^3)$. Determine the strain components at a point whose co-ordinates are (2,4,6). **07**

b The strain components at a point in a continuum with respect to *xyz* co-ordinate system are given as follows:

$\varepsilon_x = 0.02$; $\varepsilon_y = 0.03$, $\varepsilon_z = 0$, $\gamma_{xy} = 0.01$, $\gamma_{yz} = -0.04$, $\gamma_{zx} = 0$.

Determine the strain components in a different co-ordinate system *x'y'z'* which was obtained through rotating *xyz* system about *y* axis by an angle of 45^0 **08**

OR

b The strain components at a point are: $\varepsilon_x = 3\times10^{-3}$, $\varepsilon_y = 1\times10^{-3}$, $\varepsilon_z = 2\times10^{-3}$, $\gamma_{xy} = 5\times10^{-3}$, $\gamma_{xz} = 0$, $\gamma_{zx} = 8\times10^{-3}$.

Determine strain invariants, principal strains, maximum shear strains and octahedral shear strains. **08**

3 a Distinguish clearly between plane stress and plane strain problem. **04**

b Investigate what problem of plane stress is satisfied by the stress function $\Phi = \frac{3F}{4d}\left[xy - \frac{xy^3}{d^2}\right] + \frac{P}{2}y^2$ applied to the region included in $y = 0$, $y = d$ on the side x positive. **11**

4 a Derive expression for shear stress for equilateral triangular cross section subjected to torque 'T'. Plot the distribution of shear stress on the cross section. Write your observation on stress distribution for triangular section in comparison with circular section. **08**

OR

a Derive expression for torque and angle of twist for thin tube subjected to torsion. **08**

b Explain soap film analogy or membrane analogy? Derive the expression $\frac{T}{\theta} = GI_p$ for circular cross section subjected to torque 'T' by membrane analogy. **07**

5 a Draw stress-strain diagrams and corresponding mechanical models for following materials: i) Perfectly linear elastic material, ii) Rigid-perfectly plastic material, iii) Rigid with strain hardening material and iv) Elastic-perfectly plastic material. **08**

b What are Tresca and von-Mises yield criteria.
The state of stress at a point in a body is given as

$$\sigma_{ij} = \begin{bmatrix} 60 & 0 & 0 \\ 0 & -140 & 0 \\ 0 & 0 & -100 \end{bmatrix}$$

Determine which criterion is more critical to yielding, Tresca or von-Mises. **12**

6 a A cantilever beam of length 'L' carries an end load 'W'. The stress-strain diagram for the beam material is given by $\sigma = \varepsilon^n$, where H and n are material constants. Determine the end deflection. **06**

b A thick cylinder has an internal radius 8mm and the outer radius 15mm, experiences an internal pressure of 200N/mm^2. If the material has yield strength 450N/mm^2, determine
i) the radial and tangential stresses at the initiation of the yielding of the inner surface,
ii) the bursting pressure and
iii) the position of transition layer. **10**

OR

b What are residual stresses in plastic bending of beams?
A simply supported beam of rectangular cross section 100mm wide and 120mm deep is 2.5m long. It carries a concentrated load at the center of span. The yield strength of the beam material is 250N/mm^2. Assume linear stress stress-strain behavior of the material. Determine the magnitude of the concentrated load if,
i) the outermost fibres of the beam just start yielding, ii) the outer shell upto 30mm depth yields, iii) whole of the beam yields.
Also plot the residual stress distribution diagram if the beam is yielded plastically fully before load is removed. **10**

c Determine the shape factor for inverted Tee-section having overall depth 160mm, width of flange 120mm and thickness of flange and web 10mm. **04**

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End Semester Examination (Winter 2019)
F.Y.M.Tech. Civil Str.Sem- I

Q.P.Code
EB 1882

Course Code: CES1032**Course Name**: Structural Dynamics & Earthquake Engg.

Day & Date: ....Wed., 01/01/2020
Time: .....2.30 - 5.30 pm Max Marks: 100

Instructions: 1) All questions are compulsory
2) Figures to the right indicate maximum marks
3) Assume suitable data if not given
4) Use of non-programmable calculator is allowed

Q.1

(a) An automobile whose weight is 200N is mounted on four identical springs as shock absorbers. Due to the weight of automobile, springs get shortened by 0.25m. Each shock absorber has a damping force of 0.5N, at the velocity of 50mm/sec. The car is placed on the rigid platform which moves vertically at resonant speed, having amplitude of 10mm. Calculate the amplitude of vibration of automobile. 09 Marks CO1

(b) A simply supported beam having a span of 4 m is supporting a machine having weight of 80kN at its centre. The motor runs at 250 rpm and the rotor is out of balance to the extent of w (weight of rotor) = 200N at a radious of r (eccentricity) =250mm. Calculate the amplitude of steady state response. Take E= 2.1×10^5 N/mm^2, I= 53×10^6 mm^4 and equivalent damping for the system is 10% of critical damping. 09 marks CO1

Q.2

(a) Compute the natural frequencies and modes of vibration for the two storied frame (2 DOF) system by first principle. Take $m_1 = m$, $m_2 = m$, $K_1 = K_2 = K$, Assume un-damped free vibration. 12 Marks CO1

(b) Derive equation for logarithmic decrement and give its applications. 06

Q.3

(a) For three storied shear building subjected to free undamped vibration, compute the natural frequency and mode shapes by first principle. Neglect axial deformations in all structural elements. Given: 16 Marks CO1
Stiffness of floor- $K_3 = K_2 = 4 \times 10^6$ N/m, $K_1 = 3 \times 10^6$ N/m
Mass of floor- $M_1 = 2000$kg, $M_2 = 15000$kg and $M_3 = 1000$ kg.

Q.4

(a) Use Stodola's method or any other suitable numerical method to evaluate the fundamental mode of vibration and its natural frequency of the spring – mass system. Take $K_1 = K_2 = K_3 = 100$ KN/m, $M_1=M_2=M_3=5000$kg. 16 Marks CO2

Q.5 Solve any two. 16 Marks CO4

(a) Explain with sketch the structure of earth.

(b) Discuss various earthquake waves with its effects.

(c) Explain various methods of earthquake prediction.

Q.6 Solve any one from a and b and c compulsory. 16Marks CO5

(a) If a building is to be constructed on the slope of holly area, what precautions will have to be exercise during planning of the building to avoid twisting?

(b) Explain the following terms (any two):

i) Strength and stiffness,

ii) Simplicity and symmetry,

iii) Stiff and flexible building.

(c) A 5 storey SMRF building has 4 bays of 5.0m spacing in both directions. The storey height is 3.2m. The DL per unit area of the floor, consisting of the floor slab, finishes etc is 4.0kN/m^2. Weight of partitions on the floor is 3.0 kN/m^2. The intensity of live load on each floor is 3.0kN/m^2. And on roof floor is 1.5kN/m2. The soil below the foundation is hard; the building is located in Koyana area. Calculate lateral forces shears at each floor.

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K. E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
(An Autonomous Institute, Affiliated to SUK)
End Semester Examination (Winter 2019)
F.Y.M.Tech. Civil Str.Sem- I **Course Code**: CES1072
Course Name: P.E.I Advanced Design of Steel Structures

Q. P. Code
EB 1895

Day & Date: FRIDAY & 03-01-2020
Time: .....2.:30 - 5.:30 pm Max Marks: 100

Instructions: 1) All questions are compulsory
2) Figures to the right indicate maximum marks
3) Assume suitable data if not given
4) Use of non-programmable calculator is allowed
5) Use of IS: 800-2007, IS: 801-1975, IS: 811-1987, IS: 11384-1985
IS: 875(Part 3)1987, IS Handbook/Steel table is allowed

Q.1 Solve any one

(a) Design a suitable cross-section for a welded plate girder for a simply supported bridge deck beam with clear span of 20m span subjected to the following: 15 Marks CO1
Dead load including self-weight=20kN/m
Imposed load=10kN/m
Two moving loads=150kN each spaced 2m apart.
Assume that the top compression flange of the plate girder is restrained laterally and prevented from rotating. Use mild steel with fy= 250 Mpa. Design as an unstiffened plate girder with thick webs. Check only for moment carrying capacity and shear capacity.

(b) Determine the flexural design strength of the following welded shapes: the girders are simply supported and have continuous lateral support. Consider that only flanges resist bending moment. 15 Marks CO1
a)Flanges:230 x12mm, web:1100 x 8mm, span:12m
b)Flanges:650 x 50mm, web:2000 x 12mm, span:16m

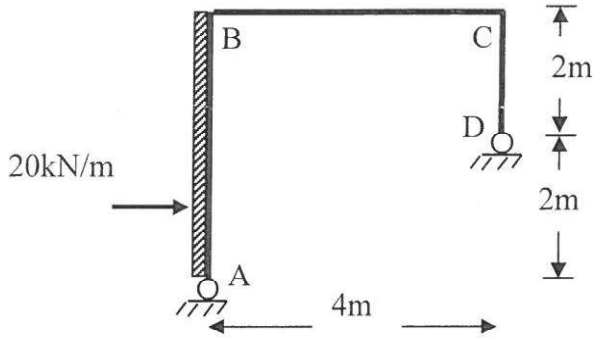
Q.2 Solve any one

(a) A non-sway column of a industrial framed building with flexible joints is subjected to factored load and moment as follows, 15 Marks CO1
P= 500kN
Mz at top=27kN.m
Mz at bottom=45kN.m
Design a suitable beam column assuming fy=250N/mm^2 for effective length 3.2m. Check only for resistance of cross-section to combined effect and Member buckling resistance in compression.

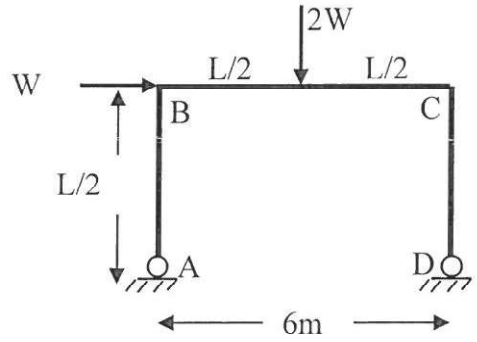
(b) Design a column of length 6.3m to carry a load of 700kN at an eccentricity of 100mm from the centroidal axis of the column across the web. The ends of the column are pinned. Check only for resistance of cross-section to combined effect and Member buckling resistance in compression. 15 Marks CO1

Q.3 **Solve any one**

(a) A portal frame ABCD with the bases A and D as hinged as shown in figure 1. The frame is subjected to a service load of 20kN/m on column AB. Column CD is treated as laterally unsupported and subjected to bending moment M=Mp=91.67kNm at C and axial force P= 37.08kN (compressive) The reactions at hinges are Ax=74.17kN (left), Ay=37.08kN (upward), Dx=45.83kN (left), Dy=37.08kN (upward) and Mp=68.91kN.m.Design the section for member CD. 15 Marks CO1

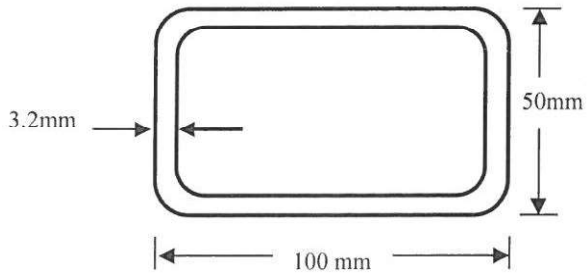


(a) Determine the value of W at collapse load for the portal frame as shown in figure. All the members have the same plastic moment of resistance. 15 Marks CO1



Q.4

(a) Determine the column section properties and allowable load for the column section as shown in figure if effective length of column is 5m consider fy=235N/mm^2. 15 Marks CO1



Q.5 **Solve any one**

(a) Design a simply supported composite beam to support the slab of a building 18m x 35m with beams spaced at 6m center to center. The thickness of the concrete slab is 150mm. Consider a floor finish load of 0.5kN/m^2 and a live load of 3.5kN/m^2.Grade of concrete is M20 and the yield strength of the material of the steel beam is 250MPa. Assume that propped method of construction will be used. 20 Marks CO1

(b) Design a wide flange beam (WB) to resist an ultimate bending moment of 1200kNm. The effective width of the concrete slab is 2.0m and its thickness is 0.15m.Use M30 grade steel. Assume that shear connection is provided between the steel beam and concrete slab. 20 Marks CO1

Q.6 **Solve any one**

(a) An ISLB 300@369.8N/m transmits an end reaction of 385kN, under factored loads, to the web of ISMB 450@710.2N/m. Design a bolted framed connection. Steel is of grade Fe410 and bolts are of grade 4.6. 20 Marks CO2

(b) Design a stiffened welded seat connection to join ISMB 350@514N/m with a column section ISHB300@576.8N/m. The beam transmits an end reaction of 320kN due to factored loads. Use steel of grade Fe 410. 20 Marks CO2

Enroll No		Q.P.Code
		EB 1894

K.E.Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute, affiliated to SUK)

End Semester Examination (Winter 2019)

F.Y.M.Tech. Civil Str. Sem- I

Course Code: CES1092 **Course Name**: P.E.I Advanced Concrete Technology

Day & Date: Fri, 03/01/2020

Time : 2:30 - 5:30 pm Max Marks: 100

Instructions: 1) All questions are compulsory

2) Figures to the right indicate maximum marks

3) Assume suitable data if not given and mention it.

4) Use of non-programmable calculator is allowed

5) Use of IS: 10262-2009 is allowed

Q.1

(a)	Explain different types of chemical and mineral admixtures and their effect on concrete properties.	**10**	CO1
(b)	Illustrate basic properties of concrete.	**5**	CO1

Q.2

(a)	Design concrete mix according to following data : Characteristic cube strength M-25, Type of cement – Portland Pozzolana, Fine Aggregate – Natural River Sand confirming to grading zone II of Table 4, of IS:383-1970, Coarse Aggregate of 20mm maximum size conforming to IS:383 code requirements, Specific gravity of Cement – 3.15, Specific gravity of Fine Aggregate – 2.65, Specific gravity of Coarse Aggregate – 2.63, Type of exposure – mild, Degree of quality control – good, Degree of workability – 0.8, Type of concrete – RCC.	**9**	CO2
(b)	Compare between ACI and British code method of concrete mix design.	**6**	CO2

Q.3

(a)	Describe importance of polymer modified, polymer impregnated and partially impregnated and surface coated polymer concrete.	**9**	CO3
(b)	Compare between pervious concrete and high strength concrete.	**6**	CO3
	OR		
	Compare between properties of foamed concrete and light weight concrete.		

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Q.4

(a)	Explain tremie, prepacked concrete and bucket placing method of underwater concreting.	**9**	CO4
	OR		
	Explain required properties of liquid retaining structure concrete and grouted concrete.		
(b)	Describe advantages and disadvantages of sprayed concrete construction.	**6**	CO4
	OR		
	Describe advantages and disadvantages of slip form construction.		

Q.5

(a)	Describe different tests and techniques to measure hardness of concrete.	**10**	CO5
(b)	Explain in detail about strength of concrete cores.	**5**	CO5
(c)	Write short note on partially destructive testing.	**5**	CO5

Q.6

(a)	Describe methods of controlling sulphate attack on concrete.	**10**	CO6
(b)	Explain interaction between permeability, volume change and cracking.	**10**	CO6
	OR		
	Explain factors affecting on durability of concrete in detail.		

Enroll No.	

K. E. Society's

Rajarambapu Institute of Technology, Rajaramnagar

(An Autonomous Institute, Affiliated to Shivaji University, Kolhapur)

Q.P. Code
EB 1847

End Semester Examination December 2019

First Year M.Tech. (Civil Structural Engineering) Semester – I

Course Name: Numerical Methods for Structural Engineering **Course Code:** SHP 517

Day and Date: Thu., 26/12/2019 **Time:** 2.30 - 5.30pm **Max. Marks – 100**

Instructions: *i) All questions are compulsory.*
ii) Figures to the right indicate full marks.
iii) Use of non-programmable calculator is allowed.

1. Attempt the following.

a) Use the series $\log_e\left(\frac{1+x}{1-x}\right)=2\left(x+\frac{x^3}{3}+\frac{x^5}{5}+\ldots\right)$ to compute the value of log(1.2) correct to seven decimal places and find the number of terms retained. CO1 5

b) An approximate value of π is 3.1428571, and its true value is 3.1415926. Determine absolute and relative errors. CO1 5

c) Derive the error formula for product of n numbers $x_1, x_2, \cdots, x_n$. CO1 5

OR

c) Compute the relative error in the function $y = ax_1^{m_1}x_2^{m_2}\ldots x_n^{m_n}$. CO1 5

2. Attempt the following.

a) Prove that $E = e^{hD}$ where E is shift operator and D is differential operator. CO2 5

b) Apply Newton's divided difference formula to compute the value of $f(x)$ as a polynomial in powers of $(x-5)$ from the following table. CO2 5

x	0	2	3	4	7	9
$f(x)$	4	26	58	112	466	922

c) Prove that $x^{(-n)} = \frac{1}{(x+n)^{(n)}}$, if interval of differencing h is unity. CO2 5

OR

c) Use Lagrange's interpolation formula to express the function CO2 5

$$\frac{x^2+6x-1}{(x-1)\times(x+1)\times(x-4)\times(x-6)}$$

as a sum of partial fractions.

3. Attempt the following.

a) Derive the normal equations of the curve $y = ax + bx^2$ to be fitted to n-pair of values $(x_1, y_1), (x_2, y_2), \ldots (x_n, y_n)$ by the principle of least squares. CO3 5

b) Find the relation of the form $y = ab^x$ for the following data by the method of least squares: CO3 5

x	2	3	4	5	6
y	8.3	15.4	33.1	65.2	126.4

c) The pressure of the gas correspond to various volumes V is measured, given by the following data, fit the data to the curve $PV^{\gamma} = C$. CO3 5

$V(cm^3)$	50	60	70	90	100
$P(kg\ cm^{-2})$	64.7	51.3	40.5	25.9	78

OR

c) Determine the gravitational constant g using the data given below and the relation $h = \frac{1}{2}gt^2$, where h is the distance in metres and t the time in seconds. CO3 5

t	0.200	0.400	0.600	0.800	1.000
h	0.1960	0.7850	1.7665	3.1405	4.9075

4. Attempt the following.

a) Estimate numerically the positive root of the equation $x^3 + x^2 + x - 100 = 0$ by Horner's method. CO4 8

b) Estimate numerically the complex roots of an algebraic equation CO4 7

$$x^4 - 5x^3 + 20x^2 - 40x + 60 = 0.$$

OR

b) Assume x_{n-2}, x_{n-1}, x_n as the roots of $f(x) = 0$. Approximate the polynomial $f(x)$ by second degree parabola passing through three points $(x_{n-2}, y_{n-2}), (x_{n-1}, y_{n-1})$ and (x_n, y_n). CO4 7

5. Attempt the following.

a) Solve the following system of equations by LU-decomposition CO5 7

$$x_1 + x_2 - x_3 = 2$$
$$2x_1 + 3x_2 + 5x_3 = -3$$
$$3x_1 + 2x_2 - 3x_3 = 6.$$

b) Using Gauss Elimination method solve the system of linear equations given below CO5 7

$$2x_1 + x_2 + 2x_3 + x_4 = 6$$
$$6x_1 - 6x_2 + 6x_3 + 12x_4 = 36$$
$$4x_1 + 3x_2 + 3x_3 - 3x_4 = -1$$
$$2x_1 + 2x_2 - x_3 + x_4 = 10.$$

c) The natural period, T, of vibrations of a building is given by $T = \frac{2\pi}{\sqrt{-\lambda}}$ where λ is the eigen value of the given matrix A. Determine the periods of $A = \begin{pmatrix} -15 & 5 \\ 10 & -10 \end{pmatrix}$. CO5 6

OR

c) Illustrate how to reduce an engineering problem in general to eigen value problem and give the physical meaning of eigen values and eigen vector in mathematical sense and vibrations of cantilever beam. CO5 6

6. **Attempt the following.**

a) Let $A=\{a_1,a_2,a_3,a_4\}$ and $B=\{b_1,b_2,b_3\}=\{0,0.1,2\}$. Let the fuzzy relations CO6 6

$P(A,B)=$

	b_1	b_2	b_3
a_1	0.6	0.6	0.0
a_2	0.8	0.7	0.0
a_3	0.9	0.8	0.4
a_4	1.0	0.9	0.5

and $Q(A,B)=$

	b_1	b_2	b_3
a_1	0.2	0.2	0.5
a_2	0.1	0.1	1.0
a_3	0.0	0.0	0.5
a_4	0.0	0.0	03

Determine (i) ${}^{0.9}P$, ${}^{0.8}Q$ (ii) $(P\cup Q)^c$ (ii) $(P\cap Q)^c$.

b) Given a fuzzy logic implication statement CO6 7

"IF a_1 is A_1 AND a_2 is not A_2 OR a_3 is not A_3 THENb is B",

how can you write it as set of equivalent general fuzzy IF-THEN rules in the unified form?

c) Let $A=B=\{1,2,3,4\}$ where A is defined by CO6 7

$$A(a)=\begin{cases}1.0 & \text{if } a=1\\ 0.7 & \text{if } a=2\\ 0.3 & \text{if } a=3\\ 0.0 & \text{if } a=4\end{cases}$$

Let R be the fuzzy relation between the two members in A defined by

$R=$

	1	2	3	4
1	1.0	0.5	0.0	0.0
2	0.5	1.0	0.5	0.0
3	00	0.5	1.0	0.5
4	0.0	0.0	0.5	1.0

Suppose that one wants to perform the following fuzzy logic inference

Premise : a is small

Implication: a and b are approximately equal

Conclusion : b is somewhat small

Determine the membership function for the conclusion (fuzzy modus ponens).

OR

c) By aggregating certain inference the following membership values for the consequent variable Y is obtained: CO6 7

$x\in[0,3]:0.75, x\in[3,4]:\frac{6-x}{4}, x\in[4,8]:0.5, x\in[8,9]:\frac{10-x}{4}, x\in[9,10]:0.25$. Calculate the defuzzified value of Y, using Centroid method.