

FACULTY OF ENGINEERING
M.E.(Civil-SE) II Semester (AICTE) (Main) Examination, October 2021

Subject: FEM in Structural Engineering

Time: 2 Hours

Max. Marks: 70

- Note: i) First Question is compulsory. Answer any three questions from the remaining six questions.**
ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
iii) Missing data, if any, may suitably be assumed.

1 Answer any four questions from the following. (4 x 4 = 16 Marks)

- (a) What is a plane stress problem? Give an example and write the material matrix D.
- (b) State the principle of minimum potential energy.
- (c) Derive the strain-displacement matrix B for a one dimensional 2-node bar element.
- (d) What are the sub-parametric elements?
- (e) Evaluate $I = \int_{-1}^1 \left[x^3 + 2x + e^x - \frac{1}{x+3} \right] dx$ using the two-point Gauss quadrature.
- (f) Write the convergence criterion for a displacement model.
- (g) Draw the master cube for hexahedral element and write the generalized shape function N_i .

2 (a) Derive the equilibrium equations for a 2-D continuum subjected to body forces.

- (b) A two hinged column of uniform flexural rigidity EI is subjected a compressive load of P at the two ends. Find the critical load, using the finite difference method, by discretizing the span l into five parts.

3 (a) Derive the element body force vector f_e and element traction force vector T_e for a 1-D 2-node bar element.

- (b) Use the Rayleigh-Ritz method to find the displacement $u(x)$ and Stress $\sigma(x)$ of the rod shown in Fig. 1. It is subjected to a self-weight density $\rho g = 1 \text{ N/mm}^3$ in addition to a point load P of 1 kN at mid-span. Assume the displacement as $u(x) = a_0 + a_1x + a_2x^2$. Take $E = 210 \text{ GPa}$, $A = 100 \text{ mm}^2$ and $L = 2\text{m}$.

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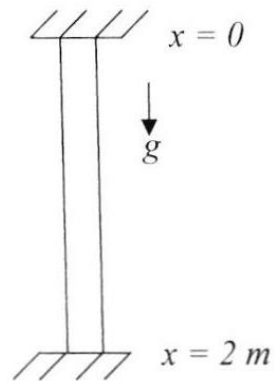


Fig. 1

- 4 (a) Derive the strain-displacement matrix B for a 1-D higher order 3-node bar element.
(b) Derive the strain-displacement matrix B for a 2-D 3-node CST element.
- 5 (a) Derive the shape functions N for a 2-D higher order 4-node quadrilateral element.
(b) Derive the strain-displacement matrix B for a 2-D 4-node quadrilateral element.
- 6 (a) Write notes on Galerkin's method of weighted residuals.
(b) An axi-symmetric body with a linearly distributed load on the conical surface is shown in Fig.2.
Determine the equivalent point loads at nodes 1 and 2.

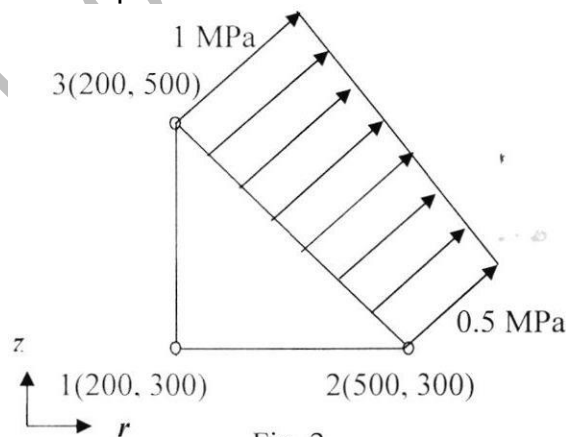


Fig. 2

- 7 (a) Write notes on material non-linearity and geometric non-linearity.
- (b) The (x, y, z) coordinates of nodes of a 3-D 4-node tetrahedral element shown in Fig.3 in cm are: 1 (0,1,1), 2(0,0,1), 3(1,0,1) and 4(0,0,0). If the displacement of vertex 1 is (0,0.01, -0.03, 0.02) mm, determine the displacement of the centroid of the face 1-2-3, if the face 2-3-4 is fixed to a steel stanchion. Also, find the material property matrix **D** assuming the element to be steel with **E**= 200 GPa and Poisson's ratio, $\nu = 0.3$.

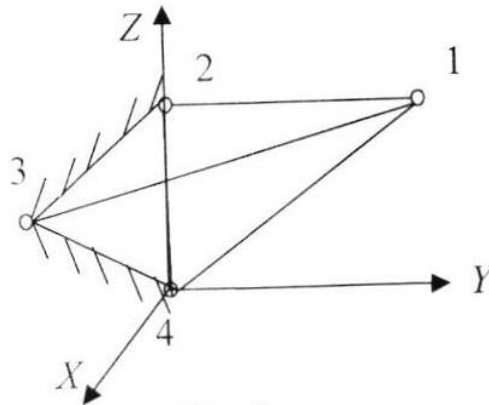


Fig. 3

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M.E. (Civil-SE) II -Semester (AICTE) (Main & Re - Registered Students)

Examination, October 2021

Subject : Advanced Structural Analysis

Time: 2 Hours

Max. Marks: 70

Note: i) First Question is compulsory and answer any Three questions from the remaining six questions.

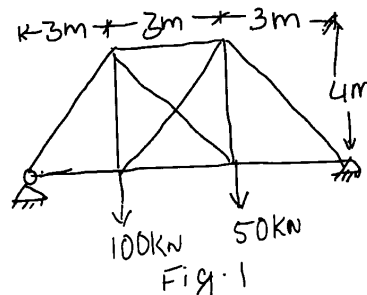
- ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.**
- iii) Missing data, if any, may suitably be assumed.**

1. Answer any Four Questions from the following (4 X 4 = 16Marks)

- a) Derive the flexibility matrix for a cantilever beam considering two displacements at free end.
- b) Write the matrix form of the load – displacement equation for a truss member
- c) List the advantages of stiffness matrix
- d) State the advantages of direct element method
- e) What are the boundary conditions used for obtaining constants in the governing equation of an infinitely long beam, supported on an elastic foundation carrying point load?
- f) Explain the concept of column buckling
- g) Define beam column.

2. Analyse the pin jointed plane frame shown in Fig.1 using flexibility method approach, axial rigidity for all members of the truss is same

18



3. Analyse the portal frame shown in Fig.2 by flexibility method . EI is constant

18

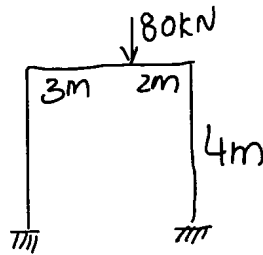


Fig.2

4. Analyse the continuous beam shown in Fig.3 by direct element method and draw

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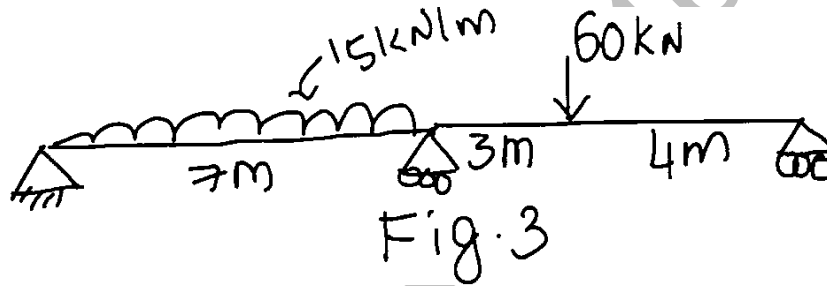


Fig.3

SFD and BMD

5. a) Derive the expression for transformation of stiffness matrix from local to global coordinates
- b) Determine force in all members of the truss shown in Fig.4 using stiffness method. Take $E = 2000 \times 10^6 \text{ kN/mm}^2$ and $A = 1.5 \times 10^{-4} \text{ m}^2$.

6

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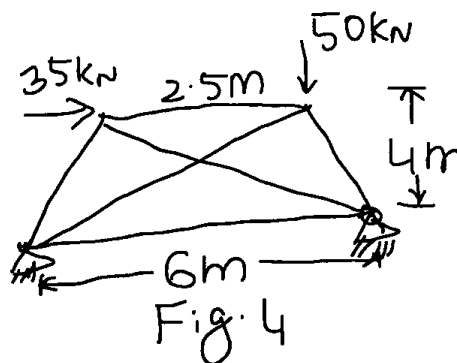
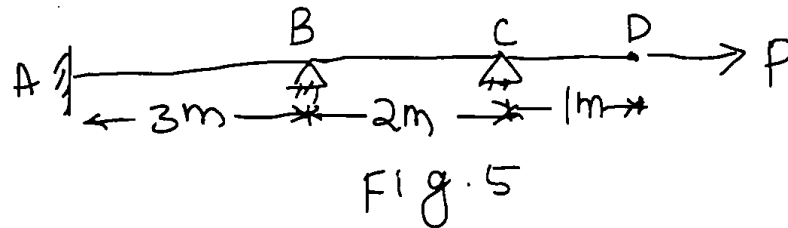


Fig.4

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6. a) What is non linearity? Define geometrical, material and loading non linearity 6
- b) Calculate the critical buckling load (P_{cr}) in the continuous beam ABC as shown in Fig.5 using the slope - deflection method and also draw the mode shape. Assume constant $EI = 8000 \text{ kNm}^2$ 12



7. a) Derive the differential equation for a beam on elastic foundation 6
- b) A rail road uses steel rails ($E=200 \text{ GPa}$) with a depth of 184mm the distance from the top of the rail to its centroid is 99.1mm, and the moment of inertia of the rail is $36.9 \times 10^6 \text{ mm}^4$. The rail is supported by ties, ballast and a road bed that together are assumed to act as an elastic foundation with spring constant $k=140 \text{ N/mm}^2$. Determine the maximum bending deflection and maximum bending moment for a single wheel load of 190 kN. 12

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**M.E. (Civil-TE II-Semester (AICTE) (Main & Re - Registered Students)
Examination, October 2021**

Subject: Pavement Systems Engineering

Time : 2 Hours

Max. Marks : 70

- Note :**
- i) First Question is compulsory and answer any three questions from the remaining six questions.
 - ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.
 - iii) Missing data, if any, may suitably be assumed.

1. Answer any Four Questions from the following (4 X 4 = 16Marks)

- a) Distinguish the composite and rigid pavements?
 - b) Classify the axle types of rigid chassis and articulated commercial vehicles?
 - c) Describe vehicle-Pavement design concept?
 - d) Describe the pavement design concept?
 - e) What is the design philosophy of PCA method of pavement design?
 - f) What are the different types of pavement evaluations?
 - g) What is the effect of transient moving loads?
2. a) Distinguish growth factor and truck factor? Explain how these factors change and useful for pavement design purpose? 9
 - b) Explain the concepts of EAL and ESWL with neat sketches? 9
3. a) Derive an expression for determination of vertical stress under a uniformly loaded circular area with a neat sketch? 9
 - b) Define how the assumptions made in a multi-layered flexible pavement system are unrealistic in practice or in service conditions of pavement. 9
4. a) Explain the fatigue cracking and rutting models of flexible pavements? 9
 - b) What is the need and describe how verification of Rigid pavement Mechanistic design procedure is carried out? 9
- 5 a) Determine (i) distance from face of the joint to the point of maximum moment occurs and (ii) Maximum value of bending moment on dowel at the face of concrete when : Diameter of dowel bar = 2.5 cm; Load transferred = 1450 kg; width of joint = 1.1 cm; Elastic modulus of dowel bar = 20×10^5 kg/cm² and Modulus of dowel bar support = 41550 kg/cm²/cm. 9
 - b) Draw a flow chart and explain the procedure of design of Dowel bars and tie bars as per IRC:58? 9

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- 6 a) Compare IRC:37 and IRC : SP:72 designs of flexible pavement? 9
b) Write an overview on pre-stressed and continuously Reinforced Cement Concrete Pavement Design? 9
- 7 a) Describe the working principle of Falling Weight Deflectometers (FWD) and explain types of evaluation of rigid and flexible pavements? 9
b) Define Serviceability concept? Explain how this concept is applicable for pavement evaluation and maintenance purpose? 9

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FACULTY OF ENGINEERING
M.E. (CIVIL – CEM) II Semester (AICTE) Examination, October 2021

Subject: Construction Planning and Scheduling

Time: 2 Hours

Max. Marks: 70

- Note:** i) **First Question is compulsory. Answer any four questions from the remaining six questions.**
 ii) **Answer to each question must be written at one place only and in the same order as they occur in the question paper.**
 iii) **Missing data, if any, may suitably be assumed.**

1 Answer any four questions from the following. (4x4 =16M)

- (a) Explain in brief the role of management in project execution.
- (b) Define about bar chart and milestone chart.
- (c) Discuss the forward and backward planning.
- (d) What do you understand by work breakdown structures?
- (e) Differentiate between crash time and actual time.
- (f) What is the importance of cost control?
- (g) Explain how dummy activity is eliminated in A-O-N network.

2 (a) A project consists of 8 activities and with their times of completion as follows: (10)

Activity	A	B	C	D	E	F	G	H
Time (weeks)	2	4	2	4	6	4	5	4

The precedence relationships are as follows:

A and B can be performed in parallel, C and D can not start until A is complete, E can not start until half the work of activity C is complete. F can start only activity D is complete and G succeeds C. H is the last activity, which should succeed E. Draw the bar chart? Estimate total time of completion of the project.

(b) Discuss about three different activity times in precedence networks. (6)

3 (a) A construction company has an opportunity to submit a bid for the construction of a new apartment building. From the specification provided by the developer, the PERT network along with the three time estimates in weeks for each activity are given in the table. (18)

Event	1-2	1-3	2-3	2-4	2-5	3-4	3-8	4-5	4-6	5-7	6-7
Time Estimates (days)	1-3-5	3-6-15	2-5-14	5-7-9	6-9-18	2-4-12	3-12-15	1-2-3	4-6-8	1-2.5-7	0-0-0

6-8	7-9	8-10	8-11	9-10	9-11	10-11
3-4-5	1-8-9	0-0-0	1-9-11	1-3-5	4-9-20	3-4.5-9

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Draw the network and determine the critical path and its standard deviation, find out the probability of completing the work in 38 weeks. Compute time duration for which the company should bid to provide 95% probability of completing the project in time. The values of Probability factor(Z+) are:

(Z+) values	%Probability	(Z+) values	% Probability
0.8	78.81	1.3	90.32
0.9	81.59	1.4	91.92
1.0	84.13	1.5	93.32
1.1	86.43	1.6	94.52
1.2	88.49	1.7	95.54

- 4 (a) Explain why planning is necessary. Describe various steps for planning a project. (8)
- (b) Explain how do you determine the probability of meeting the scheduled date of completion of a project. Also explain the need of computer application to network diagrams. (10)
- 5 (a) Discuss the terms Direct cost, indirect cost and outage loss. (8)
- (b) The normal time, normal cost, crash time and crash cost are given below in table. (10)

Activity	Normal		Crash	
	Duration (days)	Cost (Rs.)	Duration (days)	Cost (Rs.)
1-2	3	800	2	600
2-3	6	1440	4	2250
2-4	8	3200	5	2550
2-5	7	1250	4	1800
3-4	6	600	3	1200
4-5	5	1500	3	1850
5-6	3	680	2	960

The indirect costs of the project work out to Rs.250 per day. Draw the network of the hproject and determine the normal cost of the project and optimum duration? If all the activities are crashed indiscriminately, what will be the cost? How many days, the project duration will be saved if all the activities are crashed?

- 6(a) Discuss in brief the resources allocation problem with example. What are the methods of solving the problem? Enumerate the objectives of resource smoothing. (9)
- (b) Briefly explain the fundamentals of precedence network analysis. (9)
- 7 Write short notes on following: (18)
- (a) Explain the method of time-cost optimization of project network.
- (b) What is Fulkerson's rule? Briefly explain with example?
- (c) Briefly explain the use of normal probability curve for determining standard deviation.

FACULTY OF ENGINEERING**M.E.(EEE-PE/PES) II-Semester (AICTE)(Main &Re-Registered Students)****Examination, October 2021****Subject: Advanced Topics in Power Electronics****Time: 2 Hours****Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may suitably be assume.

1 Answer any four questions from the following : (4x4=16M)

- (a) What is Neutron Transmutation Doping?
- (b) List the various control methods used to obtain an emulated resistance.
- (c) What is the need of an isolated transformer in isolated converters?
- (d) Classify the resonant type DC-DC converters.
- (e) Explain the significance of MLI.
- (f) List out the advantages of GaN devices over Silicon Carbide devices.
- (g) Explain the states of Z-source converters.

2(a) With a neat sketch explain the turn on and turn off mechanism of BRT.(9M)

(b) Explain the structure and operation of SiC thyristor. (9M)

3(a) Determine the emulated resistance value for the Boost convertor operating in continuous mode. (9M)

(b) Design three phase ideal rectifiers operating in continuous current mode. (9M)

4(a) Discuss the steps involved in designing a state feedback controller. (9M)

(b) Obtain the state space model of a buck boost convertor. (9M)

5(a) With a neat circuit and waveforms explain the principle of operation of a series-parallel resonant converter. (9M)

(b) ZVS converter is mostly preferred than ZCS converter, Explain. (9M)

6 With a neat circuit explain the diode clamped multilevel inverter for 9 level output. Give the modified version of diode clamped multilevel inverter. (18M)

7(a) List the advantages of vertical GaNFET compared to lateral GaNFE (9M)

(b) Explain with a neat sketch the operation of Modular MLC. (9M)

FACULTY OF ENGINEERING**M.E. (ECE-DS) II-Semester(AICTE) (Main &Re-Registered Students)****Examination October 2021****Subject: VLSI Design & Technology****Time: 2 Hours****Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may suitably be assume.

1 Answer any four questions from the following: (4x4=16M)

- (a) Draw the I_{ds} vs V_{ds} characteristics under non-saturation region.
 (b) Define Subthreshold conduction. Give the current equation in this region.
 (c) Draw the CMOS inverter and CMOS NAND gates.
 (d) Draw 4:1 MUX using Transmission gate.
 (e) With neat circuit diagram explain 4 bit Barrel Shifter.
 (f) Mention the differences between RAM and CAM.
 (g) What is Elmore delay calculation?
- 2(a) Explain CMOS transistor process flow with neat diagram. 9M
 (b) Explain the phenomenon of Latch up in CMOS circuits and its remedies to overcome. 9M
- 3(a) Construct SR Latch using CMOS logic and explain its operation 9M
 (b) Explain Static Power dissipation in CMOS circuits 9M
- 4(a) Discuss the design techniques to minimize the propagation delay of CMOS logic gates. 10M
 (b) A CMOS inverter has a pull up device that is $8\lambda:2\lambda$ and a pull down device that is $4\lambda:2\lambda$. It drives four identical inverters. Compute the load capacitance using $0.18\mu\text{m}$ technology parameters. Assume that the wire capacitance is negligible. 8M
- 5(a) What is the model to represent RC delay in interconnects in ICs. Derive the expression for the delay. 9M
 (b) Classify semiconductor memories and explain the read and write operation of a 6T SRAM cell. 9M
- 6(a) Explain how buffer insertion is used in long wires in order to minimize the cross talk. 9M
 (b) Explain interconnect inductance effects in VLSI. 9M

7 Write short notes on the following:

- (a) Scaling of MOS Transistors
- (b) Core memory Architecture
- (c) Cross talk in interconnects

4M
7M
7M

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FACULTY OF ENGINEERING**M.E.(ECE-ES) II-Semester (AICTE) (Main&Re-Registered Students)****Examination, October 2021****Subject: Programming and Interfacing with Microcontroller****Time : 2 Hours****Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may suitably be assume.

1 Answer any four questions from the following : (4x4=16M)

- (a) List some open source platforms used for the microcontroller programming.
- (b) Explain the approach for programming problem.
- (c) Difference between git and Github
- (d) Explain the characteristics of wired networks.
- (e) Draw TCP/IP header format.
- (f) What are the different communication protocols?
- (g) List different ADC chips and their number of channels?

2 (a) Draw circuit and write program for the temperature sensor. (9M)

(b) Write the processing structure and flow control of programming? (9M)

3 (a) Explain Arduino IDE and the programming style. (9M)

(b) Distinguish analog and digital circuits. (9M)

4 (a) Explain SPI communication in detail? (9M)

(b) Write a short note on open frameworks. (9M)

5 (a) Explain data persistence systems? (9M)

(b) How to establish a data base connection in microcontroller programming? (9M)

6 (a) Explain Bluetooth experiment and its communication. (9M)

(b) Explain UDP in detail in network communication? (9M)

7 (a) What are the Arduino compactable microcontrollers and boards? (9M)

(b) Explain different wireless networks in Arduino communication? (9M)

FACULTY OF ENGINEERING

M.E. (ECE-ES&VLSI,ES&VLSI Design) II-Semester (AICTE)(Main&Re-Registered Students)Examination, October 2021

Subject: ANALOG & MIXED SIGNAL IC DESIGN

Time : 2 Hours

Max. Marks: 70

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may suitably be assume.

1 Answer any four questions from the following : (4x4=16M)

- (a) What is channel length modulation? Explain its effect on drain current.
- (b) Derive the expression for output impedance of Cascode Current mirror.
- (c) In operational amplifiers, which types of MOSFETs(n-channel or p-channel) are preferred to use as input stage. Justify.
- (d) What are non-overlapping clocks in switched capacitor circuits. Draw the logic diagram which produces non-overlapping clocks.
- (e) Define Resolution and Integral non-linearity error of Nyquist rate A/D Converters.
- (f) Why Oversampling data converters are preferred to use for high resolution.
- (g) Compare CMOS and BICMOS comparators.

2 (a) Draw the circuit diagram of Differential Amplifier with current mirror load and explain its operation. (10M)

(b) Draw the circuit diagram of CD Amplifier with basic current mirror and obtain the expression for voltage gain. (8M)

3 (a) Explain the operation of two stage operational amplifier with neat diagram and derive the expressions for output impedance and Voltage gain. (10M)

(b) Explain what is meant by Phase margin in Operational Amplifiers and its importance in the operation of OPAMPs. (8M)

4 (a) Draw the circuit diagram of an OPAMP based Comparator which eliminates input offset voltage error. (9M)

(b) Explain the operation of Parasitic insensitive non-inverting integrator and derive the expression for its Transfer function. (9M)

5 (a) Derive the expression for SNR of A/D Converter for sinusoidal input. (8M)

(b) Explain the operation of thermometer code D/A Converters. (10M)

-2-

- 6 (a) Explain the operation of Successive approximation type ADC with an Example. (9M)
- (b) Explain the operation of Sigma delta A/D Converter with neat block diagram and waveforms. (9M)
- 7 (a) Explain about noise shaping in oversampling ADCs. (9M)
- (b) Draw the schematic diagram of charge pump based Phase Comparator and explain its operation. (9M)

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FACULTY OF ENGINEERING

M.E. (Mech-Cad/Cam) II-Semester (Main & Re - Registered Students) (AICTE)

Examination, October 2021

Subject : Computer Aided Mechanical Design and Analysis

Time : 2 Hours

Max. Marks : 70

Note i) First Question is compulsory and answer any three questions from the remaining six questions.

ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.

iii) Missing data, if any, may suitably be assumed.

1. Answer any Four Questions from the following (4 X 4 = 16Marks)

- a) Derive the expression for dilation of a thin cylindrical pressure vessel.
- b) What is autofrettage of thick cylinders?
- c) What is buckling phenomenon in cylinders?
- d) Derive the expression for Hoop stress and Longitudinal stress of a cylindrical vessel
- e) Write about Rayleigh damping.
- f) Explain Shrink-fit stresses in built up cylinders
- g) Explain Component mode synthesis

2. If a rectangular plate is bent in two perpendicular directions with bending moment

$$M_1 = M_2 = M, \text{ show that the curvature of the spherical surface, } \frac{1}{r} = \frac{M}{D(1+\mu)} \quad 18$$

3. a) Write about thermal stresses and their significance 8

b) Derive the equation $\sigma_t - \sigma_r - r \frac{d\sigma_r}{dr} = 0$ for a thick cylinder where σ_t and σ_r are tangential and radial stresses respectively. 10

4. Determine the tangential stresses at the inner, outer and mating surfaces of the built up steel cylinder subjected to an internal pressure, $P_i = 140 \text{ N/mm}^2$, when radii at inner, mating and outer surfaces are 150mm, 200mm and 250mm respectively. Take the shrinkage, $\delta = 0.1 \text{ mm}$ and $E = 2.05 \times 10^5 \text{ N/mm}^2$. Show the stresses on the cylinder. 18

5. a) Write the properties of eigen values and eigen vectors 6

b) Find eigen values and eigen vectors of the matrix $[A] = \begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix}$ 10

4. For a given system of $[K]$ and $[M]$, find the natural frequencies using sturm sequence 18

$$[K] = \begin{bmatrix} 15 & -10 & 0 & 0 \\ -10 & 25 & -15 & 0 \\ 0 & -15 & 35 & -20 \\ 0 & 0 & -20 & 20 \end{bmatrix} \text{ and } [M] = \begin{bmatrix} 10 & 0 & 0 & 0 \\ 0 & 20 & 0 & 0 \\ 0 & 0 & 30 & 0 \\ 0 & 0 & 0 & 40 \end{bmatrix}$$

7 a) Explain Wilson – θ method 9

b) Explain Newmark method 9

FACULTY OF ENGINEERING**M.E. (Mech-HVAC) II-Semester (AICTE) (Main & Re-registered students)****Examination, October 2021****Subject: Ventilation and Indoor Air Quality****Time: 2 Hours****Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may suitably be assume.

1 Answer any four questions from the following: (4x4=16M)

- (a) What is meant by good Indoor Air Quality? (9M)
- (b) What is the differences between register, grill and diffuser? (9M)
- (c) What are the factors that affect the duct design? (9M)
- (d) Explain the types of kitchen hoods. (9M)
- (e) What is Sick Building syndrome? (9M)
- (f) What are the common pollutants present inside buildings? (9M)
- (g) Explain the combination hood. (9M)
- 2(a) Discuss the need for building ventilation in buildings. (9M)
- (b) Elaborate on the effect of Relative Humidity on building ventilation. (9M)
- 3(a) Write about the various methods of duct designing? (9M)
- (b) Explain the various types of air filters used in air-conditioning. (9M)
- 4(a) Describe the calculation process of ventilation in buildings. Elaborate about the air ventilation rates. (9M)
- (b) What are the differences between general exhaust system and local exhaust system? (9M)
- 5(a) Explain the main features of an effective kitchen ventilation system. (9M)
- (b) Write about the strategies to meet the makeup air requirements for kitchen ventilation. (9M)
- 6(a) Explain the important aspects of ventilation in commercial and residential buildings. (9M)
- (b) What is negative and positive pressurization in ventilation of buildings? Explain the significance and give examples of application. (9M)
- 7(a) How is Indoor Air Quality related to Ventilation in buildings? Explain with a sketch. (9M)
- (b) Explain the IAQ procedure and the Ventilation Rate Procedure, and the Natural ventilation procedure as per ASHRAE Standard 62.1. (9M)

FACULTY OF ENGINEERING

M.Tech(CSE-CSE) II-Semester (AICTE) (Main &re-registered students)

Examination, October 2021

Subject: Artificial Intelligence

Time: 2 Hours

Max. Marks: 70

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may suitably be assume.

1 Answer any four questions from the following: (4x4=16M)

- (a) What is the Turing test?
- (b) Show that $(A \wedge B) \wedge (B \rightarrow \neg A)$ is unsatisfiable using tableau method?
- (c) Why do we need an explanation sub system in expert systems?
- (d) Give the range for measure of belief and certainty factor?
- (e) Explain the neuron model with diagram?
- (f) What is perceptron? What are its limitations?
- (g) List any three speech acts?

2 (a) Explain A* algorithm with an example? 9M

(b) Solve the following constraint satisfaction problem. 9M

S E N D + M O R E = M O N E Y

3 (a) Draw the architecture of Expert System and explain the each component? 9M

(b) Explain the Bayesian belief network with example? 9M

4 (a) Consider the following set of sentences: 9M

“john likes all kinds of food”

“apples are food”

“bill eats peanuts and is still alive”

Convert the sentences into clausal form?

(b) Prove that john likes peanuts using resolution? 9M

5 (a) Discuss the relationship between artificial intelligence and neural networks 9M

(b) What is error correction learning? Discuss with an example? 9M

-2-

6 Write the grammar and parse tree to parse the following sentence: 18M

“The girl saw a man in the park with a cat”

7 Write short notes on the following:

(a) Support Vector Machine 9M

(b) Alpha-Beta Pruning. 9M

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FACULTY OF ENGINEERING**M.Tech. (CSE-CSE) II-Semester (Main & Re - Registered Students) (AICTE)****Examination, October 2021****Subject : Mathematical Foundation of Computer Science****Time : 2 Hours****Max. Marks : 70**

Note : i) First Question is compulsory and answer any three questions from the remaining six questions.

ii) Answers to each question must be written at one place only and in the same order as they occur in the question paper.

iii) Missing data, if any, may suitably be assumed.

1. Answer any Four Questions from the following (4 X 4 = 16Marks)

- a) Write Regression equations.
- b) What is sampling?
- c) Explain Hypothesis Testing.
- d) Define Covariance Matrix.
- e) What is a Planar Graph?
- f) What is Euler Cycle?
- g) What role MFCS plays in Distributed Systems and Bio informatics?
2. a) Explain about the concept of Markov chain. 9
- b) Discuss about univariate and multivariate data and its analysis. 9
3. a) What is Random Sampling and Non Random Sampling. 9
- b) Explain the Maximum Likelihood. 9
4. a) Find the mean and variance of Binomial distribution. 9
- b) Explain Principal Components Analysis. 9
4. a) Explain with an example whether a graph is isomorphic or not. 9
- b) Explain permutation and combination with and without repetition with example problems 9
5. a) Write short notes on Public key and Private key encryption. 9
- b) Discuss about Association Rule Mining and states its applications. 9
6. a) Explain with example Hamiltonian circuit?. 9
- b) Find the regression equation X on Y for the following data 9

X	1	2	3	4	5	6	7	8	9	10
Y	10	12	16	28	25	36	41	49	40	50

FACULTY OF ENGINEERING**M.Tech(CSE-CSE) II-Semester (Main&Re-Registered Students) AICTE****Examination, October 2021****Subject: Advanced Data Structures****Time: 2 Hours****Max. Marks: 70**

Note: (i) First question is compulsory and answer any three questions from the remaining six questions.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may suitably be assume.

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- 1 **Answer any four questions from the following :** (4x4=16M)
- (a) What are the types of dictionary?
 - (b) Write a note on hash code
 - (c) Draw a simple skip list
 - (d) What is prefix code in text compression?
 - (e) Write any two applications of Priority Search Tree
 - (f) Mention some of the advantages of tries over hash tables
 - (g) Define Quadratic Probing
- 2(a) Explain in detail about Rehashing 9M
- (b) What do you meant by extendible hasing? Write a program to implement extendible hashing? 9M
- 3(a) Write an algorithm to remove elements in the skip list 9M
- (b) How will you perform probabilistic analysis of skip lists? 9M
- 4 Write routines to implement the AVL tree operations 18M
- 5(a) Write a brief note on Boyer Moore Algorithm 9M
- (b) Describe in detail about Compressed Tries 9M
- 6(a) Write an algorithm for 1D tree range searching 9M
- (b) Explain the procedure for construction of k-D tree? 9M
- 7 With necessary diagram explain in detail in detail about B tree 18M
