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7E7011

7E7011

B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016

Mechanical Engineering

7ME1A Finite Element Methods

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks Main: 26

Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any ***five questions****, selecting* ***one question*** *from* ***each unit****. All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q.1 (a) Define General Procedure of FEM. [8]

(b) Solve the equations using gauss elimination method. [8]

$$x_1 + 2x_2 + x_3 - x_4 = 0$$

$$2x_2 + 3x_3 + 3x_4 = 8$$

$$x_1 - x_2 - 3x_3 - 4x_4 = -8$$

$$x_1 + x_2 + 5x_3 - 2x_4 = -8$$

OR

Q.1 (a) What does discretization men in FEM? [4]

(b) Derive Global stiffness matrix for a two spring system using local stiffness matrix for each element. [12]

2994

UNIT – II

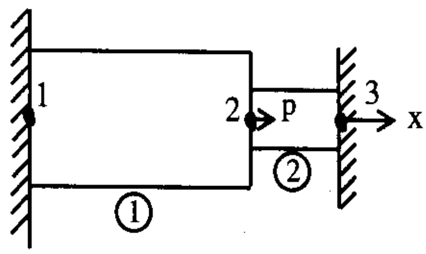
Q.2 (a) Define stress and strain tensor. [6]

(b) Consider the bar shown in fig. An axial load $P = 200 \times 10^3$ N is applied as shown. Using the penalty approach for handling boundary conditions, do the following - [10]

(i) Determine the nodal displacements.

(ii) Determine the stress in each element.

(iii) Determine the reaction forces.



Aluminum	Steel
$A1 = 2400\ mm^2$	$A2 = 600mm^2$
$E1 = 70 \times 10^9\ N/m^2$	$E2 = 200 \times 10^9 N/m^2$

OR

Q.2 (a) Derive strain displacement matrix for a beam element using shape function [10]

(b) State and explain the principle of minimum potential energy. [6]

UNIT – III

Q.3 (a) Evaluate the integral for 1 point and 2 point rule using gauss quadrature formula and compare the result with exact solution. [8]

$$I = \int_{-1}^{1} \left(2 + x + x^2\right) dx$$

(b) Define FEM formulation for plane stress and plane strain problems. [8]

OR

Q.3 (a) What is isoparametric formulation? Define for 1 Dimensional bar elements. **[8]**

(b) Define Constant Strain Triangle for simple three nodded triangular element. **[8]**

UNIT – IV

Q.4 (a) Write short note on Rayleigh – Ritz method. [4]

(b) The potential energy for the linear elastic one dimensional rod, with body force neglected, is - [12]

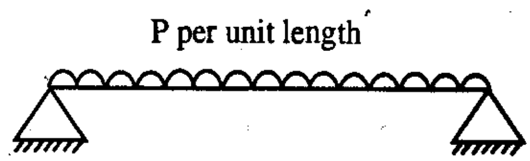
$$\pi = \frac{1}{2}\int_0^1 EA\left(\frac{du}{dx}\right)^2 dx - 2u,$$

where $u_1 = u(x = 1)$, let us consider a quadratic polynomial function. This must satisfy $u = 0$ at $x = 0$ and $u = 0$ at $x = 2$.

OR

Q.4 (a) Explain the term 'completeness' and 'compatibility.' [6]

(b) Find the approximate deflection of a simply supported beam under a uniformly distributed load P as in fig using the Galerkin method. [10]



UNIT – V

Q.5 (a) Define polynomial interpolation. [8]

(b) What are the advantages of FEM? [8]

OR

Q.5 (a) What is continuity? Derive their elements. [8]

(b) Give the applications of various finite element methods. [8]

7E7012	Roll No. ___________ Total No of Pages: 4

7E7012
B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016
Mechanical Engineering
7ME2A Refrigeration & Air-conditioning

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks Main : 26
Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Steam table and Psychrometry charts 2. Refrigerant property tables & charts

UNIT - I

Q.1 (a) Draw a schematic diagram of a refrigerating system having three evaporators at different temperatures with single compressor, multiple expansion valves and back pressures valves. Explain the working of this system with the help of p-h diagram. [8]

(b) Explain the effect of following on the performance of vapour compression refrigeration system with the help of T-S & p-h charts. [8]

(i) Change in evaporator pressure

(ii) Use of liquid – vapour regenerative heat exchanger

(iii) Superheating of suction vapour

(iv) Change in condenser pressure

OR

Q.1 (a) A single compressor using R-12 as refrigerant has three evaporators of capacity 30 TR, 20 TR and 10 TR. The temperature in the three evaporators is to be maintained at -10°C, 5°C and 10°C respectively. The condenser pressure is 9.609 bar. The liquid refrigerant leaving the condenser is sub-cooled to 30°C. The vapour leaving the evaporators is dry and saturated. Assuming isentropic compression, find - [10]

(i) The mass of refrigerant flowing through each evaporator

(ii) The power required to drive the compressor, and

(iii) C. O. P. of the system.

(b) Explain how an actual cycle differs from a theoretical vapour compression cycle. [6]

UNIT – II

Q.2 (a) Describe with a neat sketch the working of reduced ambient air refrigeration system. [8]

(b) An air refrigeration system used for food storage provides 25 TR. The temperature of air entering the compressor is 7°C, and the temperature of exit of cooler is 27°C. Find -

(i) C. O. P. of the cycle

(ii) Power per tonne of refrigeration required by the compressor. The quantity of air circulated in the system is 3000 kg/hour. The compression and expansion both follow the law $PV^{1.3}$ = constant.

Take $\gamma = 1.4$ and $Cp = 1$ kJ/kg for air [8]

OR

Q.2 (a) The higher we go, cooler we find is factually true, then why air crafts are air conditioned when they cruise at an altitude of 10000m? [6]

(b) The cockpit of a jet plane flying at a speed of 1200 km/h is to be cooled by a simple air cooling system. The cockpit is to be maintained at 25°C and the pressure in the cockpit is 1 bar. The ambient air pressure and temperature are 0.85 bar and 30°C. The other data available is as follows: Cockpit cooling load = 10 TR, main compressor pressure ratio = 4, Ram efficiency = 90%, temperature of air leaving the heat exchanger and entering the cooling turbine = 60°C, pressure drop in heat exchanger = 0.5 bar, pressure loss between the cooler turbine and cockpit = 0.2 bar. Assuming the isentropic efficiencies of main compressor and cooler turbine as 80%, find the quantity of air passed through the cooling turbine and C. O. P. of the system. Take $\gamma = 1.4$ and Cp = 1 kJ /kg k. [10]

UNIT – III

Q.3 (a) Describe the working of Lithium-Bromide water vapour absorption refrigeration system with neat sketch. [8]

(b) Explain with the help of neat sketch, the working of a steam jet refrigeration system. [8]

OR

Q.3 (a) What are the desirable properties of an ideal refrigerant? What is an azeotrope? Give some examples to indicate its importance. [8]

(b) Explain the working of an automatic expansion valve. Why it is called constant pressure expansion valve? [8]

UNIT – IV

Q.4 (a) Explain the following terms - [8]

(i) Wet bulb temperature

(ii) Sensible heat factor

(iii) Relative humidity

(iv) Degree of saturation

(b) The humidity ratio of atmospheric air at 28°C DBT and 760 mm of Hg is 0.016 kg/kg of dry air. Determine - [8]

(i) Partial pressure of water vapour

(ii) Relative humidity

(iii) Dew point temperature

(iv) Specific enthalpy

OR

Q.4 (a) Define the term "Effective temperature" and explain its importance in the design of air conditioning system. [8]

(b) Define the term" Human comfort" and explain the factors which affect human comfort. [8]

UNIT – V

Q.5 (a) Following data refers to an air conditioning system to be designed for an industrial process for hot and wet climate:

Outside condition = 30°C DBT and 75% RH

Required inside condition = 20°C DBT and 60% RH

The required condition is to be achieved first by cooling and dehumidifying and then by heating. If $20m^3$ of air is absorbed by plant every minute, find - [16]

(i) Capacity of the cooling coil in tons of refrigeration

(ii) Capacity of the heating coil in kW, and

(iii) Amount of water removed per hour.

OR

Q.5 (a) Explain the working of year round air conditioning system. [8]

(b) Explain the term cooling load. Explain the method of estimating heat gain due to infiltration of air. [8]

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7E7013

Roll No. ____________ Total No of Pages: 4

7E7013

B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016
Mechanical Engineering
7ME3A Operations Research

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks Main : 26

Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any ***five questions,*** *selecting* ***one question*** *from* ***each unit.*** *All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

1. NIL 2. NIL

UNIT – I

Q.1 Maximize $Z = 2x_1 + 4x_2 + x_3 + x_4$

Subject to $x_1 + 3x_2 + x_4 \leq 4$

$2x_1 + x_2 \leq 3$

$x_2 + x_3 + x_4 \leq 3$

$x_1, x_2, x_3, x_4 \geq 0$ **[16]**

OR

Q.1 (a) Solve the following transportation problem by:

(i) Minimum cost method

(ii) NWC method

State which of the methods is better. Cell entries represent the unit transportation cost: **[8]**

	D_1	D_2	D_3	D_4	Availability
S_1	21	16	25	13	11
S_2	17	18	14	23	13
S_3	32	27	18	41	19
Requirement	6	10	12	15	

(b) **Find an optimal solution to an assignment problem with the following cost matrix.** [8]

	J_1	J_2	J_3	J_4
M_1	10	9	7	8
M_2	5	8	7	7
M_3	5	4	6	5
M_4	2	3	4	5

UNIT – II

Q.2 Solve the following integer problem by branch and bound technique using graphical method. Show the mode branch tree.

Max $Z = 21x_1 + 11x_2$

Subject to $7x_1 + 4x_2 \leq 13$

$x_1, x_2 \geq 0$ and integer [16]

OR

Q.2 A manufacturer is offered two machines A and B. A is priced at ₹500 and running costs are estimated at ₹800 for each of the first five years, increasing by ₹200 per year in the sixth and subsequent years. Machine B is having cost of ₹1200 per year for six year increasing by ₹200 per year thereafter. If the time value of money is 10% per year which machine should be purchased? [16]

UNIT – III

Q.3 Arrival rate of telephone calls at a telephone booth are according to Poission Distribution with an average time of 9 minutes between two consecutive arrivals. The length of telephone call is assumed to be exponentially distributed with mean 3 minutes.

(a) Determine the probability that a person arriving at the booth will have to wait. [2]
(b) Find the average queue length that is formed from time to time. [2]
(c) Telephone Company will install a second booth when convinced that an arrival would except to have to wait at least 4 minutes for the phone. Find the increase in flow of arrivals which will justify a second booth. [3]
(d) What is probability that an arrival will have to wait for more than 10 minutes before the phone is free? [3]
(e) What is the probability that he will have to wait for more than 10 minutes before the phone is available and the call is also complete? [3]
(f) Find the fraction of the day that the phone will be in use. [3]

OR

Q.3 (a) Determine optimum and value of the game for the following pay-off matrix. [8]

		Y		
		R	S	T
X	P	200	-10	-100
	Q	100	110	130

(b) Use the relation of dominance to solve the rectangular game whose payoff matrix is given below: [8]

	I	II	III	IV	V	VI
I	0	0	0	0	0	0
II	4	2	0	2	1	1
III	4	3	1	3	2	2
IV	4	3	7	-5	1	2
V	4	3	4	-1	2	2
VI	4	3	3	-2	2	2

UNIT – IV

Q.4 (a) Write short notes on Decision Trees. [8]

(b) A manufacturing company purchases 9,000 parts of machine for its annual requirements, ordering one month use at a time. Each part costs ₹ 20. The ordering cost per order is ₹ 15 and the carrying charges are 15% of the average inventory per year. Suggest a more economical purchasing policy for the company. How much would it be possible for the company to save per year? [8]

OR

Q.4 (a) Write short note on Deterministic Inventory Model. [8]

(b) The data given below pertains to a component used by Engineering India (P) Ltd. in 20 different assemblies.

Purchase price (P) = ₹ 15 per 100 units,
Annual usage = 1,00,000 units,
Cost of buying office = ₹ 15,575 per annum (Fixed),
Variable cost = ₹ 12 per order,
Rent of component = ₹ 3,000 per annum,
Heating cost = ₹ 700 per annum,
Interest = ₹ 25 per annum,
Insurance = 0.05% per annum based on total purchase,
Depreciation = 1% per annum of all items purchased

(i) Calculate EOQ of the component.

(ii) The percentage changes in total annual variable costs relating to component if the annual uses happens to be (a) 1,25,000 & (b) 75,000. **[8]**

UNIT – V

Q.5 (a) A newspaper boy buys for 0.05 paise each and sells them for 0.06 paise each. He cannot return unsold newspapers. Daily demand 'r' for newspapers follows the distribution:

Demand 'r'	10	11	12	13	14	15	16
Probability P (r)	0.05	0.15	0.40	0.20	0.10	0.05	0.05

If each days demand is independent of the previous days demand, how many papers should be ordered each day? **[8]**

(b) What is the need of simulation? Also discuss the advantages and disadvantages of simulation methods. **[8]**

OR

Q.5 (a) The demand for a particular product is continuous and shows the following probability distribution.

Demand	0	1	2	3	4	5 or more
Probability	0.16	0.10	0.30	0.24	0.20	0.00

Find out the optimum stock level if the cost of shortage is ₹ 40 per unit and the cost of holding is ₹ 10 per unit. The shortage cost is proportional to both time and quantity short. **[8]**

(b) Write short note on Monte – Carlo method of simulation. **[8]**

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7E7014

7E7014
B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016
Mechanical Engineering
7ME4A Turbomachines

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any ***five questions****, selecting* ***one*** *question from* ***each unit****. All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q.1 (a) How are the following laws and governing equations applied to the Turbo-machine? [2+2+2+2=8]

(i) Steady flow energy equation

(ii) Second law of thermodynamics

(iii) Newton's second law of motion

(iv) Continuity equation

(b) A turbine develops 7500kW under a head of 24.7m at 135 rpm. What is the specific speed? What would be its normal speed and output under a head of 19.5m? [8]

OR

Q.1 (a) Explain Geometric, kinematic and dynamic similarities. State two governing parameters for each kind of similarity. [6]

(b) Prove the following equation for the performance of a turbo compressor. [10]

$$\frac{P_{01}}{P_{02}} = \left(\frac{N}{\sqrt{T_{01}}}, \frac{m\sqrt{T_{01}}}{P_{01}}\right)$$

UNIT – II

Q.2 (a) Explain following performance parameters: [2+2+2+2=8]

(i) Power input factor

(ii) Pressure coefficients

(iii) Slip factor

(iv) Compressor efficiency

(b) A centrifugal compressor has to deliver 35kg of air per sec. The impeller is 76 cm diameter revolving at 11,500 rpm with an adiabatic efficiency of 80%. If the pressure ratio is 4:2:1, estimate the probable axial width of the impeller at the impeller tip if the radial velocity is 120 m/s. The inlet conditions are 1 bar and 47°C. [8]

OR

Q.2 (a) Draw a sketch of an axial flow compressor with inlet guide vanes and explain working principle and performance coefficients. [8]

(b) Derive an expression of Degree of reaction for axial flow compressor. [8]

UNIT – III

Q.3 (a) State the main components of a centrifugal pump and describe the function of each. [8]

(b) A centrifugal pump has to deliver 20 liters/sec of water when running at 1200rpm. The inlet vane angle is 30° and exit vane angle is 45°. If the velocity of flow is constant in the impeller, the power supplied to run the pump by motor is 40kW. Assuming the mechanical efficiency 90%, find the inlet and outlet diameters of the impeller. Take $D_2 = 2D$. [8]

OR

Q.3 (a) Define cavitations and explain causes for creating the cavitations. Mention the effects of cavitations. [8]

(b) The piston area of a single acting reciprocating pump 0.15 m^2 and stroke is 30cm. The water is lifted through a total head of 15m. The area of delivery pipe is 0.03m^2. If the pump is running at 50 rpm, find the percentage slip, coefficient of discharge and the power required to drive the pump.
The actual discharge is 350 L/sec. Take mechanical efficiency 85%. [8]

UNIT – IV

Q.4 (a) Derive the expression for specific work output and efficiency of a simple gas turbine cycle with intercooler. [8]

(b) A gas turbine cycle has a perfect heat exchanger. Air enters the compressor at a temperature and pressure of 300K and 1 bar and discharges at 475K and 5 bar. After passing through the heat exchanger the air temperature increases to 655K. The temperatures of air entering and leaving the turbine are 870°C and 450°C. Assuming no pressure drop through the heat exchanger, compute –

(i) The output per kg of air

(ii) The efficiency of the cycle

(iii) The work required to drive the compressor. [8]

OR

Q.4 (a) Explain working of turboprop engine with the help of neat sketch and T-S diagram. Write the basic characteristics and application also. [8]

(b) Explain with suitable graphs the performance of a turbojet engine. What are the advantages and disadvantages of a turbojet engine? [8]

UNIT – V

Q.5 (a) How do you differentiate between an impulse and a reaction turbine? With neat sketch explain the working of an impulse and a reaction stage. [8]

(b) What do you understand by pressure compounding of a multistage impulse turbine? Show Enthalpy-Entropy diagram for flow through a gas turbine stage.[8]

OR

Q.5 (a) Explain following: [2+2+2=6]

(i) Loading coefficient

(ii) Flow coefficient

(iii) Velocity triangles for a impulse turbine

(b) Gas at 7 bar and 300°C expands to 3 bar in an impulse turbine stage. The nozzle angle is 70° with reference to the exit direction. The rotor blades have equal inlet and outlet angles, and the stage operates with the optimum blade speed ratio. Assuming that the isentropic efficiency of the nozzle is 0.9, and that the velocity at entry to the stage is negligible, deduce the blade angle used and the mass flow required for this stage to produce 75kW. [10]

Take, Cp = 1.15kJ/kgk.

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7E7015

B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016
Mechanical Engineering
7ME5A Operation Management

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks Main : 26

Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any ***five questions,*** *selecting* ***one question*** *from* ***each unit.*** *All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Calculator ________ 2. ________

UNIT - I

Q.1 (a) What do understand by operations management? What is operations strategy? Explain various types of operation strategies. [8]

(b) Explain the strengths, weakness, opportunities and threats [SWOT] analysis of your organization. What strategic did you gain? [8]

OR

Q.1 (a) What is forecasting? Discuss and differentiate simple moving average method and weighted moving average methods. [6]

(b) A firm uses simple exponential smoothing with $\alpha = 0.2$ to forecast demand. The forecast for the first week of January 400 units, whereas actual demand turned out to be 450 units.

(i) Fore cast the demand for the second week of January.

(ii) Assume that the actual demand during the second week of January turned out to be 460 units, forecast the demand up to February third week, assuming the subsequence demands as 465, 434, 420, 498, and 462 units. [4+6=10]

UNIT – II

Q.2 (a) Define product and service? Explain the types of production system and briefly discuss their characteristics. [8]

(b) What is meaning of capacity planning? Explain the steps involved in capacity planning process. [8]

OR

Q.2 (a) What is process matrix? Explain. A manufacturing firm has four work stations A, B, C, and D in services with individual capacities of 480, 395, 375 and 410 units per day, find the system and the system efficiency. [3+5=8]

(b) A turning department wants to install enough semi automatic lathes to produce 2,50,000 good components per year. The turning operation takes 1.5 minutes per component. But it is observed that the output of lathe will have 3 percent defectives. How many lathes will be required if one isn available for 2000 hours of capacity per year? [8]

UNIT – III

Q.3 (a) Discuss the objectives and functions of production planning. [8]

(b) What is aggregate planning strategy? Explain the various aggregate planning strategic techniques. [8]

OR

Q.3 (a) What is meaning of MRP? Explain difference between MRP and MRP - II with a suitable example. [8]

(b) Write short notes on followings: [3+3+2=8]

(i) Line balancing

(ii) Master scheduling

(iii) Introduction of ERP

UNIT – IV

Q.4 (a) Explain the term scheduling and discuss different factors affecting scheduling. [8]

(b) What is Bellman – Jahnson Algorithm method? Consider two machines and five jobs as follows: Find out the optimum scheduling and priority by using the Bellman and Johnson algorithm. [8]

Jobs →	A	B	C	D	E
Machine ↓					
I	14	5	7	3	10
II	2	6	1	9	4

OR

Q.4 (a) What is term Just-in-Time (JIT) production? Explain its aims and applications. [8]

(b) Write short notes on following: [2+3+3=8]

(i) Routing

(ii) Expending and follow up

(iii) Lean operations system

UNIT – V

Q.5 (a) What is meaning of material management? Explain its objectives. [8]

(b) What is scope of material management? Explain the procedure of material procurement. [8]

OR

Q.5 (a) What is meaning of terms PERT and CPM techniques? [6]

(b) A Limited company produces a product which has monthly demand of 4000 units. The product required the component A which is purchased at ₹ 20. For every finished product, 1 unit of product is required. The ordering cost ₹ 120 per order and the holding cost is 10% per annum. You are required to calculate:

(i) EOQ [3]

(ii) If the minimum lot size to be supplied is 4000 units, what is the extra cost the company has to incur? [4]

(iii) What is the minimum carrying cost the company has to incur? [3]

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7E7018

Roll No. ______________________ [Total No. of Pages : 2]

7E7018

B. Tech. VII Sem. (Main) Exam, Dec.-2016

Mechanical Engineering (Common with P&I)

7ME6.3A CNC Machines and Programming

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

Attempt any **five questions**, selecting one question from each unit. Marks of questions are indicated against each question. Draw neat and comprehensive sketches wherever necessary to clearly illustrate your answer. Assume missing data suitably if any and specify the same.

UNIT- I

1. (a) Give the classifications of a NC system? Describe them in brief and draw figures wherever possible. 8

(b) What are the historical developments in automation? Write in detail. 8

OR

1. (a) Define automation. What are different types of automation? Compare hard automation and soft automation. 8

(b) What do you meant by architecture of NC Systems? Describe it briefly. 8

UNIT- II

2. (a) Write short notes on the following:

i. Spindle unit of NC machine

ii. coolant system of NC machine 8

(b) How many types of drives can be used in a NC system? Also write down about spindle and feed drive. 8

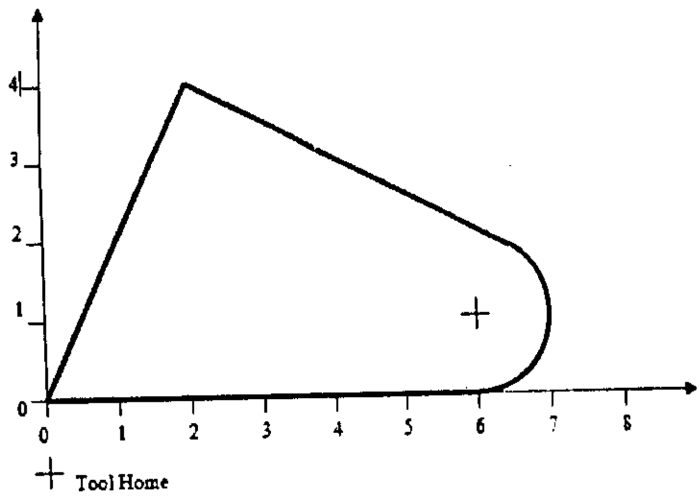
OR

2. (a) Explain Interpolators and Control loops in NC Machine. 8

(b) Define Sensors and their applications in Numerical control machines? Also write down various types of sensors. 8

UNIT- III

3. Write down Manual Part Programming of the part shown in figure given below. The processing parameters are: (a) feed rate is 5.39 inches per minute; (b) spindle speed is 573 revolutions per minute; (c) a coolant is to be used to flush the chips; (d) the cutter diameter is to be 0.5 inches, and (e) the tool home position is (0, -1, 0). 16



OR

3. (a) Write Short Notes on:

i. Manual part programming
ii. Computer assisted part programming.
iii. Automation part program generation
iv. Geometric modeling programming 4x4=16

UNIT- IV

4. (a) Explain CAPP Systems in detail. 8

(b) What are the different programming used in robots? Explain 8

OR

4. (a) Describe NC simulation. What do you mean by Kinematic simulation and volumetric simulation? 8

(b) What are the applications of Volumetric NC simulation and Kinematics simulation? 8

UNIT- V

5. (a) What are the tooling and Instruments for NC special considerations in High Speed Cutting? 8

(b) What do you mean by Die sinking operation? Explain and Draw neat and clean figures wherever possible. 8

OR

5. (a) Explain Adaptive control and off-line adaptive control with neat sketch. 8

(b) Differentiate Hardware Adaptive control and Software adaptive control. 8

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7E4060

7E4060
B. Tech. VII Sem. (Back) Exam., Nov.-Dec.-2016
Mechanical Engineering
7ME1(O) Computer Aided Design
Common for PI

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks Main: 26
Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any ***five questions****, selecting* ***one question*** *from* ***each unit.*** *All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. NIL 2. NIL

UNIT – I

Q.1 (a) How many types of standard algorithms are available for line generation? Explain with anyone. [8]

(b) Draw a circle with centre at the origin and radius of 10 unit with the help of Bresenham's algorithm. [8]

OR

Q.1 Explain various technologies used for graphics display devices with neat and clean diagram. [16]

UNIT – II

Q.2 (a) Derive the expression for a point on a cubic Bezier curve. [8]

(b) Give the parametric representation of Ellipse. [8]

OR

Q.2 (a) Find the parametric equation of a line connecting two points. [8]

(b) Write short note on: [4×2=8]

(i) Blending of curves

(ii) Wire frame modeling

UNIT – III

Q.3 (a) What do you mean by solid model? Discuss various entities of solid modeling. [8]

(b) What are the various schemes of solid representation? Explain in brief. [8]

OR

Q.3 (a) Explain the Blending of Hermite cubic spline segments. [8]

(b) Explain the following: - [4×2=8]

(i) Eular Equation

(ii) Rules Surface

(iii) Surface of revolution

(iv) Hermite cubic curve

UNIT – IV

Q.4 (a) What do you mean by projections? Differentiate between parallel and perspective projections. [8]

(b) A line AB with |A| = [3 2 6 1] and [B] = [5 5 8 1] is rotated by an angle 30° about y axis, followed by reflection about xy plane. Find the co-ordinates of the transformed line. [8]

OR

Q.4 (a) Describe different types of parallel projections used in computer graphics. [8]

(b) What do you mean by homogeneous co–ordinates? How these co-ordinates are useful in transformations? [8]

UNIT – V

Q.5 (a) Explain techniques and algorithm for hidden line and surface removal. [8]

(b) Explain point clipping and line clipping. [8]

OR

Q.5 (a) What do you mean by view specifications and view volume? Describe with suitable diagram. [8]

(b) How does back face removal solves the hidden surface problem for convex objects? Explain with example. [8]

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B. Tech. VII Sem. (Back) Exam., Nov.-Dec.-2016

Mechanical Engineering

7ME4 (O) Steam Turbines & Steam Power Plant

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks Main: 26

Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any ***five questions,*** *selecting* ***one question*** *from* ***each unit.*** *All questions carry* ***equal*** *marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. Steam table
2. Mollier diagram

UNIT – I

Q.1 (a) Explain the principle of steam turbine. Define role of velocity triangles for steam turbine. [6]

(b) The velocity of steam entering a simple impulse turbine is 1000 m/s and the nozzle angle is 20°. The mean peripheral velocity of blades is 400 m/s and the blades are symmetrical. If the steam is to enter the blades without shock, what will be the blade angles? [10]

(i) Neglecting the friction effects on the blades, calculate the tangential force on the blades and the diagram power for a mass flow of 0.75 kg/s. Estimate also the axial thrust and diagram efficiency.

(ii) If the relative velocity at exit is reduced by friction to 80% of that at inlet, estimate the axial thrust, diagram power and diagram efficiency.

OR

Q.1 (a) Differentiate the impulse and reaction turbines. How is degree of reaction defined? [6]

(b) Drive an expression for the isentropic enthalpy drop in 2– row Curtis stage. [10]

UNIT – II

Q.2 (a) Drive an expression for the fraction of kinetic energy of jets of steam issuing from nozzle which is converted to shaft work. [6]

(b) At a certain point in a 50% reaction turbine the steam leaving a moving blade row is at 1.5 bar, 0.90 dry. The steam flow rate is 7 kg/s and the turbine speed is 4500 rpm. At entry to the moving blade row 0.75 times the mean blade velocity. The exit angles of both fixed and moving blades are 20°, measured from the plane of rotation, and the height of moving blades at exit is 1/10 of the mean diameter. Determine the height of the moving blades at exit and the power developed in the blade row. [10]

OR

Q.2 (a) Explain the role of different efficiencies for steam turbine. [6]

(b) Explain the mechanisms of different types of governing methods to govern the turbine performance. [10]

UNIT – III

Q.3 (a) Explain the importance and mechanism of regenerative feed heating. [4]

(b) If α is 'total enthalpy rise of feed water' and β is 'constant difference of the local enthalpy on the expansion line at a given pressure and the enthalpy of saturated water at that pressure', show that the efficiency gain due to regeneration is- [12]

$$\Delta n = \frac{\alpha^2 \beta}{(\alpha+\beta)\,(\alpha+2\beta)^2}$$

OR

Q.3 (a) Enlist the advantages and disadvantages of reheating. [4]

(b) The steam at 100 bar and 500°C expands in the turbine upto 8.5 bar with an isentropic efficiency of 85%. The steam is then reheated to original temperature and then it expands in the lower stage of the turbine upto the condenser pressure of 0.05 bar. The isentropic efficiency of the lower stage of the turbine is 90%. Find the thermal efficiency of the cycle assuming the pressure loss in the reheater of 0.5 bar. If the expansion of the steam is allowed to continue in the lower part of the turbine with an isentropic efficiency of 80% without reheating, then find the thermal efficiency of the cycle. Neglect the pump work in both cases. [12]

UNIT – IV

Q.4 (a) What is back pressure? How it is related with performance of steam turbine? [8]

(b) Explain the cogeneration of power and process heat with pass out turbine. [8]

OR

Q.4 (a) With needful sketches, discuss the role of pressure and temperature on performance of Boiler, Turbine, Process heater and Pump of steam power plant. [8]

(b) Explain the governing system for mixed pressure turbine. [8]

UNIT – V

Q.5 (a) What is pulverized fuel firing system? Discuss the advantages and disadvantages of it. [8]

(b) Discuss the latest developments in the steam boilers. [8]

OR

Q.5 (a) Explain the role and mechanism of air-pre-heater. [4]

(b) Enlist the useful components to select the location of steam power plant explaining their positive and negative impacts if not properly selected. [12]

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B. Tech. VII Sem. (Main/Back) Exam., Nov.-Dec.-2016
Mechanical Engineering
7ME6.2 (O) Mechatronics

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks Main: 26

Min. Passing Marks Back: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT – I

Q.1 (a) Explain the parameters to be considered for designing an intelligent Mechatronics system. [8]

(b) Explain what is meant by control automation with a suitable example. [8]

OR

Q.1 (a) The automatic control system for the temperature of a bath of liquid consists of a reference voltage fed into a differential amplifier. This is connected to a relay which then switches on or off the electrical power to a heater in the liquid. Negative feedback is provided by a measurement system which feeds a voltage into the differential amplifier. Sketch a block diagram of the system and explain how the error signal is produced. [10]

(b) Explain the difference between open and closed-loop control. [6]

UNIT – II

Q.2 (a) Identify and explain the sensor, signal conditioner and display element in the measurement system of a Bourden pressure gauge. [8]

(b) What are the advantages and disadvantages of the plastic film type of potentiometer when compared with the wire-wound potentiometer? [8]

OR

Q.2 (a) Identify the various elements present in the temperature control system used in a refrigeration system with a simple circuit. [8]

(b) Suggest a sensor that could be used, as part of a control system, to determine the difference in levels between liquids in two containers. The output is to provide an electrical signal for the control system. [8]

UNIT – III

Q.3 (a) Compare the hydraulic and pneumatic actuation systems used in automation. [8]

(b) A hydraulic cylinder is to be used to move a work piece in manufacturing operation through a distance of 50 mm in 10 second. A force of 10 kN is required to move the work piece. Determine the required working pressure and hydraulic liquid flow rate if a cylinder with a piston diameter of 100 mm is available. [8]

OR

Q.3 (a) With a neat diagram, describe the working of solenoid. [6]

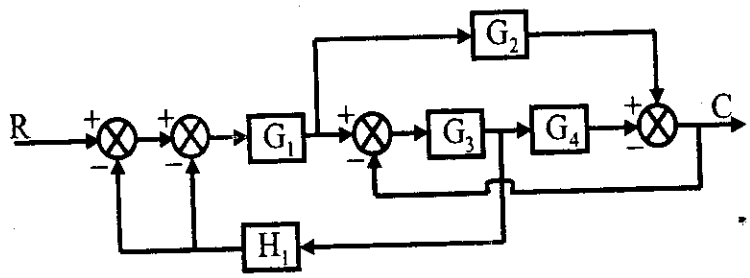
(b) Explain the application of various types of actuators. [6]

(c) Highlight the properties of a stepper motor. [4]

UNIT – IV

Q.4 (a) Obtain the transient analysis of a Second Order system. Finally draw the response. [8]

(b) Find the Transfer function of the following block diagram using block diagram reduction method. [8]



OR

Q.4 (a) Differentiate ADC and DAC with suitable examples [6]

(b) Define stability. Applying Routh criterion find the value of k if the system is stable. [10]

$$G(s)H(s) = \frac{k(s+2)}{s(s+3)(s^2+2s+3)}$$

UNIT – V

Q.5 Discuss the Mechatronic design of the pick and place robot with a neat control circuit. [16]

OR

Q.5 (a) Discuss the various stages involved in the design of a Mechatronics system. [6]

(b) Compare and contrast the "traditional" and "Mechatronics design approach" applicable for on-line inspection. [10]
