

Code No: 126AM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

REFRIGERATION AND AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Distinguish between Engine and Refrigerator. [2]
- b) What is the difference between expander and compressor? [3]
- c) State the various types of evaporations used in refrigeration and air conditioning systems. [2]
- d) Explain about recuperation. [3]
- e) What are the properties of ideal refrigerant? [2]
- f) Differentiate between expansion cylinder and expansion valve. [3]
- g) What is the meaning of air conditioning? [2]
- h) Explain the relation between wet bulb temperature, sensible heaters, sensible cooling. [3]
- i) Explain how to calculate load on occupants. [2]
- j) Explain infiltration load. [3]

PART - B**(50 Marks)**

2. A Carnot refrigerator operates between the temperatures of -50°C and 50°C . Determine COP of the refrigerator. If the COP is to be made 4 by changing the temperatures such that increase or decrease in upper temperature is equal to decrease or increase in lower temperature, determine the new temperatures. [10]

OR

3. A refrigerator working on Bell – Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10°C . Air coming out of compressor is cooled to 30°C before entering the expansion cylinder. Expansion and compression follow the law $p.v^{1.35} = \text{constant}$. Determine C.O.P. of the system. Take $\gamma = 1.4$ and $C_p = 1 \text{ kJ/kg -k}$ for air. [10]

4. Explain with neat sketch the working principle of a screw compressor. [10]

OR

5. Explain with a neat sketch the working principle of Evaporative condenser. [10]

6. In an absorption type refrigerator, the heat is supplied to NH_3 generator by condensing steam at 2 bar and 90°C dry. The temperature to be maintained in the refrigerator is -5°C . The temperature of the atmosphere is 30°C . Find the maximum C.O.P. is 70% of the refrigerator. If the refrigeration load is 20 tons and actual C.O.P. is 70% of maximum C.O.P. Find the mass of steam required per hour.

OR

7. Draw a neat line diagram of Electrolux refrigerator and explain its working principles. What is the important role of hydrogen in this refrigeration system? [10]
8. A four rows coil with a face velocity of 150 m/min has a contact factor of 0.85. Calculate the contact factors for the following cases:
a) Face velocity 200 m/min and four rows.
b) Face velocity 100 m/min and four rows
c) Face velocity 150 m/min and eight rows
d) Face velocity 150 m/min and two rows. [10]

OR

9. A stream of moist air at 20°C dry bulb and 80 per cent relative humidity mixes with another stream of moist air at 30°C dry bulb and 10°C dew point in the ratio by mass of one part of the first to two parts of the second. Calculate the temperature and specific humidity of the air after mixing. [10]
10. A spray cooling coil is chosen to operate under the following conditions:
Air –inlet condition28°C DBT and 21°C WBT
Air-outlet conditions.....10°C DBT and 6°C WBT
Total amount of air flow 2000 m³/min.
The chilled water inlet and outlet temperatures are 7°C and 12°C respectively
Find the following:
a) The cooling load on the coil.
b) Water flow rate through the coil. [5+5]

OR

11. Differentiate between Central, District and Unitary air-conditioning systems. [10]

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Code No: 126BE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

ANALOG AND DIGITAL IC APPLICATIONS

(Mechanical Engineering (Mechatronics))

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Describe the chip size and circuit complexity. [2]
- b) Derive the expression for voltage gain of non-inverting amplifier. [3]
- c) Describe the introduction to voltage regulators. [2]
- d) Explain the features of 723. [3]
- e) Describe the operation of astable multivibrator. [2]
- f) Explain the principle of monostable multivibrator. [3]
- g) What are tristate gates? [2]
- h) Describe the operation of TTL open collector O/Ps. [3]
- i) Give the pin configuration of decade counter, 7490. [2]
- j) What are different shift registers? [3]

PART - B**(50 Marks)**

- 2.a) Derive the expression for voltage gain of instrumentation amplifier.
- b) An op-amp is being used as voltage-to-current converter. The value of resistance used in the circuit R is $6.6 \text{ K}\Omega$, $R_L = 2 \text{ K}\Omega$, $V_1 = 5\text{V}$, $V_2 = 0\text{V}$. Determine the values of I_L , V_L and V_o . Draw the circuit. [6+4]

OR

- 3.a) Describe the principle of op amp differentiator.
- b) In an op-amp I/V converter circuit, V_o is 6V , $R_F = 470 \text{ K}\Omega$. Determine the value of short circuit current I_{sc} . [6+4]
- 4.a) Describe the operation of all pass filters.
- b) Determine the component values for a fourth order Butterworth HPF with $f_c = 15 \text{ KHz}$, given $2K_1 = 0.765$ and $K_2 = 1.848$. [5+5]

OR

- 5.a) Explain the principle of triangular waveform generator.
- b) Determine a second order BPF using op amps, given $2K = 1.414$, to pass signals in the band of 2 KHz to 20 KHz . [5+5]
- 6.a) Give the details of IC 1408 DAC.
- b) What is the percentage resolution of a 4-bit DAC given that the maximum number that can be represented using 4 bits is 15? [6+4]

OR

- 7.a) Explain the operation of dual slope ADC.
b) In a dual slope ADC, a $3\frac{1}{2}$ digit BCD counter is used and the signal is integrated until the two most significant bits of the counter are 1. What is the decimal count? [6+4]

- 8.a) Describe CMOS transmission gate.
b) The following sequences of bits (right-most bit first) appear on the inputs to a 4-bit parallel adder. Determine the resulting sequence of bits on each sum output. [4+6]
A₁ 1101 ; A₂ 1110 ; A₃ 0000 ; A₄ 1011
B₁ 1111 ; B₂ 1100 ; B₃ 1010 ; B₄ 0010

OR

- 9.a) Describe CMOS driving TTL.
b) Explain the principle of decoders and drives for LED and LCD display. [4+6]
- 10.a) Describe the familiarities with commonly available CMOS 40XX series of IC counters.
b) Design a counter to produce the following binary sequence. Use JK flip flops. [5+5]
1,4,3,5,7,6,2,1,-----

OR

- 11.a) Explain the function of synchronous DRAMs.
b) Draw a basic logic diagram for a 512×8 – bit static RAM, showing all the inputs and outputs.
c) Design a counter to produce the following sequence. Use J-K flip flops. [4+3+3]
00, 10, 01, 11, 00, -----

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Code No: 126BF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

MECHANICAL MEASUREMENTS AND CONTROL SYSTEMS

(Mechanical Engineering (Mechatronics))

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) Explain the role of sensing element of a measuring instrument. [2]
- b) What are uses of calibration? [3]
- c) Give the classification of level measuring instruments. [2]
- d) What are the advantages of using ultrasonic instrument for flow measurement? [3]
- e) What are the advantages of mechanical tachometers over electrical tachometers? [2]
- f) What is the working principle of seismic instrument? [3]
- g) List out the advantages of absorption psychrometer. [2]
- h) Explain the working principle of load cell. [3]
- i) What is the importance of control systems? [2]
- j) What is a servomechanism? Explain. [3]

PART - B

(50 Marks)

2. Considering the example of a pyrometer give the functional description of various elements. [10]

OR

- 3.a) Give the complete classification of various transducers used for displacement measurement and give their working applications.
- b) Explain the use of the principle of expansion for the measurement of pressure. [5+5]

4. Describe the construction and explain the working of bourdon tube used for pressure measurement. [10]

OR

5. Explain the construction, working, applications and limitations of laser Doppler anemometer. [10]

6. Derive an equation for the gauge factor of electrical strain gauge. [10]

OR

- 7.a) Describe a electrical tachometer and explain its working.
- b) Explain the use of resistance strain gauge for the measurement of torque. [5+5]

8. With the help of a line diagram explain the construction, working and application of sling and absorption psychrometer. [10]

OR

9. Give the complete classification of torsionmeters. Explain the construction and working of torsionmeters used for torque measurement. [10]

10.a) Explain the advantages and limitations of block diagrams for control system.

b) Comment about the use of closed loop control systems in the presence of errors. [5+5]

OR

11. With the help of line diagram explain the working of speed control system. [10]

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Code No: 126EA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May – 2016

INTELLECTUAL PROPERTY RIGHTS

(Common to EEE, ME, ECE, CHEM, EIE, IT, MCT, MMT, AE, AME, MIE, AGE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) List out the types of intellectual property rights. [2]
- b) Discuss the treaties of Intellectual property rights. [3]
- c) What is the purpose of trademark? [2]
- d) Discuss about the protectable matter. [3]
- e) What is rights of reproduction? [2]
- f) State international copyright law. [3]
- g) Define trade secret law. [2]
- h) Discuss about false advertising. [3]
- i) What are new developments in trademark law? [2]
- j) Explain international property audits. [3]

PART - B

(50 Marks)

2. With an example, outline the importance of intellectual property rights. [10]
- OR**
3. Explain the historical view of intellectual property rights. [10]
 4. Explain the procedure for registration of trade marks. What are the effects of registration of trade mark? [10]
- OR**
5. With the help of an example explain the process for acquisition of trademark rights. [10]
 6. List out the issues involved in copyright ownership. [10]
- OR**
7. Explain the process involved for searching of a patent. [10]
 8. State and explain the trade secret Law. Explain the liability for misappropriations of trade secrets. [10]
- OR**
9. Discuss the legalities involved in protecting against unfair competition. [10]
 10. Describe in detail about the international development in patent law. [10]
- OR**
11. What are the new developments in copy right law and patent law? Explain. [10]

Code No: 126EB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, May - 2016

HUMAN VALUES AND PROFESSIONAL ETHICS

(Common to EEE, ME, ECE, EIE, IT, MCT, AE, MIE, PTE, AGE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) What is the need for 'Value Education' in technical and other professional institutions? [2]
- b) What is the difference between 'belief' and 'understanding'? [3]
- c) Suggest any 2 programs that you can undertake to improve the health of your body? [2]
- d) How do we go into conflicts when our activities are not guided by one natural acceptance? [3]
- e) Explain the term "Anu - Sangita". [2]
- f) What can be the basis of an undivided society- the "World family"? [3]
- g) Define sah-astitva? [2]
- h) Explain the term "nature submerged in space" with reference to existence? [3]
- i) What are the objectives of professional ethics? [2]
- j) Differentiate existence and co-existence. [3]

PART - B

(50 Marks)

- 2.a) Justify the role of self exploration as in the process of Value Education? [5+5]
 - b) What are pre conditions? What is their source? [5+5]
- OR
- 3.a) Critically examine the prevailing notion of happiness and prosperity and their consequences? [5+5]
 - b) What is the true essence of happiness and prosperity? [5+5]
- 4.a) What are the consequences of confusion between Sukh and Suvidha? [5+5]
 - b) "Human being is more than just the Body"- explain? [5+5]
- OR
- 5.a) Why are the Physical facilities required? What do you mean by right utilization of Body? [5+5]
 - b) How does realization and understanding lead to definiteness of human conduct? [5+5]

- 6.a) The major crisis in today's society is that of Trust and Respect-Elucidate?
b) What is "Justice" what are its four elements? Is it a continuous or a temporary need? [5+5]

OR

- 7.a) Explain the dimensions of human Endeavour in society conducive to manaviya Vyavastha?
b) What is the meaning of Education and Sanskara? How does Sanskara follow education? [5+5]

- 8.a) Briefly explain the holistic perception of harmony at all levels of existence.
b) Describe the recyclability and self-regulation of nature. [5+5]

OR

- 9.a) Explain the four orders in nature.
b) Differentiate between units and space. How are units self-organized in space? [5+5]
10. Mention the steps that you can take to promote ethics among your colleagues over unethical practices prevailing? [10]

OR

- 11.a) Explain the holistic alternatives and describe the vision for the holistic alternatives.
b) Explain the competence process in professional ethics. [5+5]

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SKYUPS MEDIA

Code No: 126EC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech III Year II Semester Examinations, May - 2016
DISASTER MANAGEMENT

(Common to EEE, ME, ECE, CHEM, EIE, BME, IT, AE, AME, MIE, PTE, MSNT, AGE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) What is environmental hazard? [2]
- b) How to prevent a Hazard from changing into a disaster? [3]
- c) Give examples of Planetary Hazards. [2]
- d) What are various types of environmental Hazards? [3]
- e) Distinguish between tropical cyclones and local storms. [2]
- f) What monitoring systems are used for tracing the path of cyclones? [3]
- g) What are the hazardous effects of volcanoes? [2]
- h) What causes earthquakes? [3]
- i) What are the three stages of disaster management? [2]
- j) List three pre-disaster activities to reduce the impact of cyclones. [3]

PART - B

(50 Marks)

- 2.a) Distinguish between environmental stress, hazard and disaster giving examples.
- b) Describe Ecosystem approach to mitigate environmental stress. In what way it is different from the perception approach? [5+5]

OR

- 3.a) How does human perception changes with environmental degradation? Discuss.
- b) How does landscape approach aid in reducing environmental stress? Give examples. [5+5]

- 4.a) How is environmental hazard linked to ecology? Explain with respect to Drought.
- b) Drought and floods occur in the same region but at different times. Explain the reason. [5+5]

OR

- 5.a) Distinguish between endogenous and exogenous hazards giving examples.
- b) Under what category will cyclones come? Explain with reasons. [5+5]

- 6.a) In what Zones earthquakes occur in India? Explain the reason why it occurs in those Zones?
- b) What are the pre-disaster measures are taken to prevent loss of life due to this hazard? [5+5]

OR

- 7.a) What are the environmental effects due to volcanic eruption?
b) Discuss the methods that can be adopted to reduce the effect of volcanic eruption. [5+5]

- 8.a) Under what category will you put Bhopal Gas tragedy in India?
b) What are toxic chemicals and describe a few measures that can be taken to reduce the impact of such events? [5+5]

OR

- 9.a) Describe the areas of flood hazard in India. What causes floods?
b) Describe at least three flood control measures to reduce the impact of flood disaster. [5+5]

- 10.a) What are the pre-disaster measures taken to manage earthquake disaster?
b) Relate the building collapse during earthquake to impact of earthquake disaster and explain both pre and post disaster measures undertaken to mitigate the sufferings of people in an earthquake situation. [5+5]

OR

- 11.a) Describe the measures taken during a land slide disaster.
b) What pre disaster measures would have reduced the impact of land slide disaster? Explain. [5+5]

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Code No: 126ED

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

DESIGN OF MACHINE MEMBERS – II

(Common to ME, AME)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (25 Marks)

- 1.a) Define static load carrying capacity of ball bearing. [2]
- b) State any two advantages and disadvantages of deep grooving ball bearing. [3]
- c) What are the basic functions of piston rings? [2]
- d) Under what forces the big end bolt and caps are designed. [3]
- e) What is the polygon action in roller chain? [2]
- f) What is the effect of centrifugal tension on power transmitted by a belt drive? [3]
- g) What is dynamic load? What are its causes? [2]
- h) What is the velocity factor for bevel gears? [3]
- i) What is self locking of power screw [2]
- j) What is collar friction? [3]

PART - B (50 Marks)

2. Design a bearing and journal to support a load of 4500N at 600 rev/min using a hardened steel journal and a bronze backed Babbitt bearing. The bearing is lubricated by oil rings. Take room temperature as 21⁰C and the oil temperature as 80⁰C. [10]

OR

3. A ball bearing operates on the following work cycle:

Element No	Radial load (N)	Speed (R.P.M)	Element time (%)
1.	3000	720	30
2.	7000	1440	40
3.	5000	900	30

The dynamic load capacity of the bearing is 16600N. Calculate

- a) The average speed of rotation; b) The equivalent radial load c) the bearing life. [10]
4. Design a cast iron piston for a single acting four stroke engine for the following specifications:
Cylinder bore =100mm, Stroke=120mm, Maximum gas pressure =5 N/mm²
Brake mean effective pressure=0.65 N/mm², Fuel consumption= 0.227 kg/KW/hr
Speed=2200 rev/min, Assume suitable data. [10]

OR

5. The following data refer to a 4-stroke cycle, single cylinder diesel engine
Suction pressure = 0.095 MPa, Cylinder diameter = 200 mm, Stroke = 200 mm
Ratio of compression = 15, Engine speed = 7450rpm, Equivalent mass of reciprocating parts 2 N/sq.mm of piston area, Ratio of connecting rod length to crank length is 4. Design Nickel steel connecting rod of I section choosing the suitable values for the permissible stresses for the material. [10]

6. In a horizontal belt drive for a centrifugal blower, the blower is belt driven at 600 r.p.m by a 15KW, 1750 r.p.m electric motor. The centre distance is twice the diameter of the large pulley, The density of the belt material =1500 kg/m³; maximum allowable stress=4MPa; $\mu_1=0.5$ (motor pulley) $\mu_2=0.4$ (blower pulley); peripheral velocity of the belt =20m/s. Determine the following:
 a) Pulley diameter; b) Belt length; c) Cross-sectional area of the belt; d) Minimum initial tension for operation without slip; and e) Resultant force on the plane of the blower with an initial tension 50 percent greater than the minimum value. [10]

OR

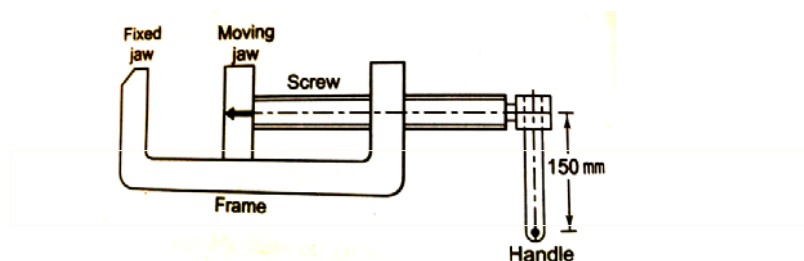
7. Select a wire rope for a vertical mine hoist to lift a load of 20 kN from a depth of 500 meters. A rope speed of 3 m/s is to be attained in 10 seconds. [10]
8. A compressor running at 300 rev/min is driven by a 15KW, 1200 rev/min motor through a $14\frac{1}{2}$ full depth spur gears. The centre distance is 0.375 m. the motor piston is to be of C-30 forged steel hardened and tempered, and the driven gear is to be cast steel. Assuming medium shock condition:
 a) Determine the module, the face width, and the number of teeth on each gear.
 b) Check the gears for dynamic load and wear
 c) Design the drive completely. [10]

OR

9. A helical cast steel gear with 30° helix angle has to transmit 35 kW at 2000 rpm. If the gear has 25 teeth, find the necessary module, pitch diameters and face width for 20° full-depth involute teeth. The static stress for cast steel may be taken as 100MPa. The face width may be taken as 3 times the normal pitch. The tooth form factor is given by expression $y = 0.154 - 0.912 / T_E$, where T_E represents the equivalent number of teeth. The velocity factor is given by $C_v = \frac{5}{(6 + V)}$ where V is the peripheral speed of the gear in m/s. [10]
10. A double square thread power screw with ISO metric trapezoidal threads, is used to raise load of 300kN. The nominal diameter is 100mm and the pitch is 12mm. The coefficient of friction at screw threads, is used to raise a load of 300kN. The nominal diameter is 100mm and the pitch is 12mm. The coefficient of friction at screw threads is 0.15. Neglecting collar friction, calculate
 a) Torque required raising the load
 b) Torque required lowering the load and
 c) The efficiency of the screw. [10]

OR

11. A machine vice, as shown in figure, has single start, square threads with 22mm nominal diameter and 5mm pitch. The outer and inner diameters of the friction collar are 55mm and 45mm respectively. The co-efficient of friction for thread and collar are 0.15 and 0.17 respectively. The machinist can comfortably exert a force of 125N on the handle at a mean radius of 150mm. Assuming uniform wear for the collar, Calculate: (a) The clamping force developed between the jaws. (b) The overall efficiency of the clamp. [5+5]



Figure

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Code No: 126EE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

FINITE ELEMENT METHODS

(Common to ME, AE, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (25 Marks)

- 1.a) What is the principle of finite element method? [2]
- b) Write the stress strain relations for 2 D plane stress and plane strain conditions. [3]
- c) Differentiate between truss and beam element based on degree of freedom. [2]
- d) What is Hermite shape function? [3]
- e) Write the formula for the load vector of a triangular element subjected to body force. [2]
- f) What is the size of the stiffness matrix for axisymmetric triangular element? [3]
- g) What is the degree of freedom for the thermal problems? [2]
- h) Where do you apply finite element analysis for thermal problems? [3]
- i) Explain convergence requirement. [2]
- j) Explain the importance of lumped mass matrix. [3]

PART - B (50 Marks)

- 2.a) Why polynomial type of interpolation function is preferred over trigonometric functions? Explain.
- b) Draw the Pascal's triangle and Pascal's tetrahedron for understanding the interpolations functions. Explain the salient features. [5+5]

OR

- 3.a) Explain the steps involved in obtaining an approximate solution using finite element method.
- b) Explain the equilibrium state of the system, when the system is subjected to different types of loads and explain the stress and equilibrium relations. [5+5]

4. For a two-dimensional truss structure, as shown in the figure 1, determine displacements of the nodes and normal stresses developed in the members using FE. Use $E = 30 \times 10^6 \text{ N/cm}^2$ and a diameter of the circular cross-section of 0.25 cm. [10]

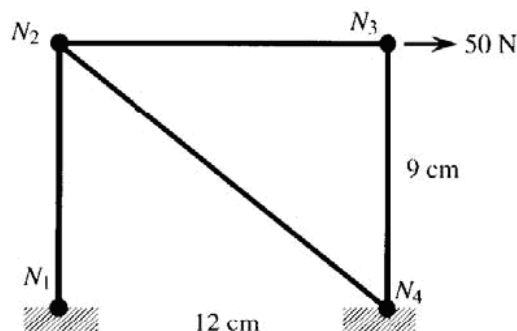


Figure 1
OR

5. A beam is fixed at one end and supported by a roller at the other end, has a 20 kN concentrated load applied at the centre of the span of 10 m. Calculate the deflection and slope and also construct shear force and bending moment diagrams. Take $I = 2500 \text{ cm}^4$ and $E = 20 \times 10^6 \text{ N/cm}^2$. [10]

- 6.a) Evaluate the axisymmetric stiffness matrix \mathbf{K} of the triangular element shown in the figure 2. Consider the coordinates of nodes as 1 (2, 1), 2 (4, 0), and 3 (3, 2). Also assume $E = 2.6 \text{ GPa}$ and $\nu = 0.2$.

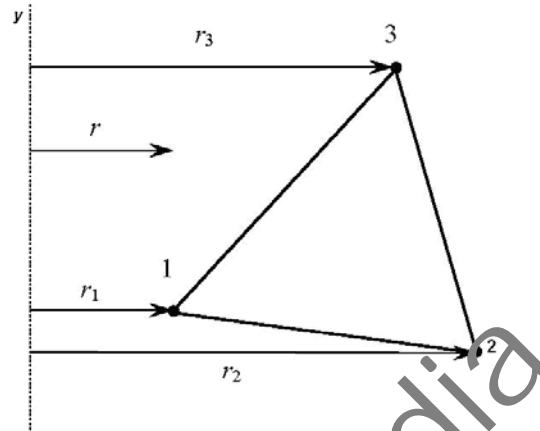


Figure 2

- b) Differentiate between CST and LST with respect to the triangular element. [5+5]

OR

7. Derive the stiffness matrix for the four noded quadrilateral element in terms of natural coordinate system. [10]

8. Consider a brick wall of thickness 0.3 m, $k=0.7 \text{ W/m K}$. The inner surface is at 28°C and the outer surface is exposed to cold air at -15°C . The heat transfer coefficient associated with the outside surface is $40 \text{ W/m}^2 \text{ K}$. Determine the steady state temperature distribution within the wall and also the heat flux through the wall. Use two elements and obtain the solution. [10]

OR

9. Derive the conductivity matrix for two dimensional triangular element subjected to convection on one face of the element. [10]

10. For the stepped bar shown in the figure 3. Develop the global stiffness and mass matrices and also determine the natural frequencies and mode shapes. Assume $E = 200 \text{ GPa}$ and mass density $= 7850 \text{ kg/m}^3$, $L_1 = L_2 = 0.3 \text{ m}$, $A_1 = 350 \text{ mm}^2$, $A_2 = 600 \text{ mm}^2$. [10]

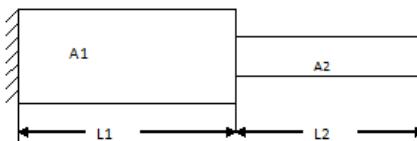


Figure 3

OR

- 11.a) Derive the shape functions for the four noded tetrahedron element from the first principles.

- b) Discuss the importance of semi automatic meshing and auto mesh along with the practical applications. [5+5]

Code No: 126EF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

HEAT TRANSFER

(Common to ME, AME, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) Define thermal diffusivity. [2]
- b) What is the difference between homogeneous and isotropic material. [3]
- c) Discuss about semi infinite body. [2]
- d) What are Biot and Fourier numbers? Explain their physical significance. [3]
- e) State the scope and application of dimensional analysis in heat transfer process. [2]
- f) Draw boundary layer growth in a pipe for laminar and turbulent flows in a pipe and indicate salient features. [3]
- g) Define irradiation and radiosity. [2]
- h) What are the differences between drop wise and film wise condensation? [3]
- i) What is the difference between regenerator and recuperator? [2]
- j) What is LMTD correction factor? [3]

PART - B**(50 Marks)**

- 2.a) Derive general heat conduction equation in Cartesian Co-ordinates.
- b) What is meant by conduction shape factor? Explain its significance along with periodic and aperiodic heat transfer. [5+5]

OR

3. What is the use of initial and boundary conditions? Discuss the conditions:
 - a) Prescribed surface temperature
 - b) Prescribed heat flux
 - c) Convective condition in detail. [3+3+4]

- 4.a) Define the overall heat transfer coefficient? Obtain the expression for composite wall with three layers with convective conditions over the wall.
- b) Distinguish between steady state conduction and unsteady state conduction. [6+4]

OR

- 5.a) Develop an expression for temperature distribution in a slab made of single material.
- b) Sheets of brass and steel, each of thickness 1cm, are placed in contact. The outer surface of brass is kept at 100°C and the outer surface of steel is kept at 0°C. What is the temperature of the common interface? The thermal conductivities of brass and steel are in the ratio of 2:1. [5+5]

- 6.a) Differentiate between mechanisms of heat transfer by free and forced convection. Mention some of the areas where these mechanisms are predominant.
- b) A nuclear reactor with its core constructed of parallel vertical plates 2.25 m high and 1.5 wide has been designed on free convection heating of liquid bismuth. Metallurgical considerations limit the maximum surface temperature of the plate to 975°C and the lowest allowable temperature of bismuth is 325°C . Estimate the maximum possible heat dissipation from both sides of each plate. The appropriate correlation for the convection coefficient is $Nu = 0.13(Gr Pr)^{1/3}$ where the different parameters are evaluated at the mean film temperature. [5+5]

OR

- 7.a) How are the local and average convection coefficients for flow past a flat plate are related? Derive the relationship.
- b) Water at 75°C flows through a 0.005 m diameter tube with a velocity of 1m/s. If the tube wall temperature is 25°C , make calculations for the heat transfer coefficient. Use the correlation, $St = 0.023 Re^{0.2} Pr^{-0.667}$.
The thermo-physical properties of water are:
Thermal conductivity is 0.647 W/(m.K); Viscosity is 0.977 kg/h.m;
Density is 1000 kg/m^3 ; Specific heat 4.187 kJ/(kg.K) [5+5]

- 8.a) What is Stefan-Boltzmann Law? Explain the concept of total emissive power of a surface.
- b) Saturated steam at 2 bar condenses on a cylindrical vertical drum having an outside diameter of 25 cm and a temperature of 90°C . Calculate how long must the drum be to condense 50 kg of steam per hour. Also estimate the thickness of condensate layer. [5+5]

OR

- 9.a) Derive general relation for the radiation shape factor in case of radiation between two surfaces.
- b) A copper pan of 35 cm diameter contains water and its bottom surface is maintained at 115°C by an electric heater. Calculate the power required to boil water in this pan and the rate at which water evaporates from the pan due to the boiling process. Also make calculations for the heat flux for these conditions. [5+5]

10. It is required to design a shell and tube heat exchanger for heating 9000 kg/hr of water from 15°C to 88°C by hot engine oil ($C_p = 2.35\text{ kJ/kg-K}$) flowing through the shell of the heat exchanger. The oil makes a single pass, entering at 150°C and leaving at 95°C with an average heat transfer coefficient of $400\text{ W/m}^2\text{-K}$, the water flow through 10 thin walled tubes of 25mm diameter with each tube making 8 passes through the shell. The heat transfer efficient on the water side is $3000\text{ W/m}^2\text{-K}$. Find the length of the tube required for the heat exchanger. [10]

OR

- 11.a) Derive an expression for LMTD in case of a counter – current flow double pipe heat exchanger.
- b) A hot fluid enters a heat exchanger at a temperature of 200°C at a flow rate of 2.8 kg/sec (sp. heat 2.0 kJ/kg-K) it is cooled by another fluid with a mass flow rate of 0.7 kg/sec (Sp. heat 0.4 kJ/kg-K). The overall heat transfer coefficient based on outside area of 20 m^2 is $250\text{ W/m}^2\text{-K}$. Calculate the exit temperature of hot fluid when fluids are in parallel flow. [5+5]

Code No: 126EH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, May - 2016
AUTOMOBILE ENGINEERING
(Common to ME, MCT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
 Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) What is the use of carburetor in S.I. engine? [2]
- b) Explain about the requirements of diesel injection system. [3]
- c) What is the spark advance and retard mechanism? [2]
- d) Explain about the starting system of automobile. [3]
- e) What are the functions of clutch? [2]
- f) Why the shock absorbers are used in automobile. [3]
- g) What do you mean by master cylinder? [2]
- h) Explain about the king pin rake. [3]
- i) What are the advantages of using hydrogen as fuel? [2]
- j) What are the merits and demerits of biomass? [3]

PART - B**(50 Marks)**

- 2.a) Discuss about the fuel supply system in S.I. engine.
 - b) Explain about the different types of air filters. [5+5]
- OR**
- 3.a) Explain about the formation of spray in C.I. engine.
 - b) Discuss about the chassis and body components in automobile. [5+5]
- 4.a) What do you mean by the term "Ignition"? How is it related with "combustion"?
 - b) Sketch and explain different types of Ignition systems used in automotive engines. [5+5]
- OR**
- 5.a) Explain in detail about the liquid cooling system with a diagram.
 - b) Discuss about the bendix drive mechanism. [5+5]
- 6.a) Discuss the working principles of
 - i) Torque tube drive.
 - ii) Hotchkiss drive.
 - b) What are the functions of universal joint and Propeller shaft? [5+5]
- OR**
- 7.a) Describe in detail about single plate clutch with a neat diagram.
 - b) Explain about the differential rear axle with neat sketch. [5+5]

- 8.a) Explain the working principles of Hydraulic braking system with neat sketches.
b) Sketch and explain various steering geometries. [5+5]
- OR**
- 9.a) Discuss about the Davis steering mechanism in the automobiles.
b) Describe about the mechanical brake system. [5+5]
10. Describe in detail about the multipoint fuel injection for S.I. engines. [10]
- OR**
- 11.a) What are the pollution standards for automobile.
b) Discuss different energy alternatives with their merits and demerits. [5+5]

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Code No: 126EJ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to ECE, CSE, MMT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A**(25 Marks)**

- 1.a) What is a normative statement? [2]
- b) Differentiate complementary goods from the substitutes. [3]
- c) What are implicit costs? Give suitable examples. [2]
- d) How do average fixed cost per unit and average variable cost per unit vary with output level? [3]
- e) What is the minimum and maximum number of partners in a non banking partnership firm? [2]
- f) What is the basic difference between monopolistic condition and duopoly? [3]
- g) Define profitability index. [2]
- h) What items constitute current assets? Give suitable examples. [3]
- i) Define ROI. [2]
- j) Define any of the two activity ratios and illustrate with assumed data. [3]

PART - B**(50 Marks)**

- 2.a) What are the disadvantages of statistical techniques of demand forecasting?
- b) What are the determinants of demand? [5+5]

OR

- 3.a) A consumer was viewing movie in multiplex 8 times in a year with his family when his annual income was Rs.5,00,000. When the income was raised to Rs.8, 00,000 on his promotion, the frequency of entertainment of his family on movies per year became 12 times. Calculate the income elasticity of demand of entertainment.
- b) How does knowledge of managerial economics enable one to take better business decisions? [5+5]

- 4.a) How does marginal cost differ from average cost?
- b) A company is selling a product at Rs.20 of which variable cost is Rs.2. The fixed overheads of the company amount to Rs.1,80,000. What is the break- even point? What is the turnover required to earn a profit of Rs.36, 000? [5+5]

OR

- 5.a) With the usual notation write the equation for Cobb-Douglas production function.
- b) What are the internal economies of production? Explain each of them briefly. [3+7]

- 6.a) What are the forms of privatization?
- b) Which are the two cost-based pricing methods? What are their limitations? [5+5]

OR

- 7.a) Compare perfect completion with monopoly.
- b) What is partnership deed and mention its components? [6+4]

- 8.a) What factors influence the volume of working capital needed by an organization?
b) Explain the concept of working capital cycle. [5+5]

OR

9. A corporation has to decide as to which of the following two machines need to be bought. The outlay for each of the projects is /Rs.2, 00,000.

Year	Cash flow for project A Rs.	Depreciation for project A Rs.	Cash flow for project B Rs.	Depreciation for project B Rs.
1	1,00,000	20,000	50,000	40,000
2	50,000	20,000	60,000	40,000
3	60,000	20,000	50,000	40,000
4	20,000	20,000	50,000	40,000
5			50,000	40,000

Calculate the payback period for each of the projects and rank them. [10]

- 10.a) A firm maintains a provision for bad debts at 5% and a provision for discount at 2% on total debtors. From the following particulars, write up the provision and reserve account.

Balances on 1st April 2014.

Provision for bad debts Rs.45,000.

Provision for discount on debtors Rs.40, 000.

Total debtors were on 31st March 2015 Rs. 10, 00,000 after writing off bad debts of Rs.25,000 and allowing discount of Rs.30,000.

On 31st March 2016 Rs.6, 00,000 after writing off bad debts of Rs.15, 000 and allowing discount of Rs.17,500.

- b) What are the limitations of ratio analysis? [5+5]

OR

- 11.a) A company's sales for the year was Rs.12,00,000/-, 60% of which were on credit basis. At the beginning of the year the opening Sundry debtors showed Rs. 80,000 and the closing balance was Rs. 40,000. Calculate debtor turnover ratio.

- b) Define 'Double entry principle' and elaborate the Accounting records to be maintained by an organization. [6+4]

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Code No: 126EX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year II Semester Examinations, May - 2016

INDUSTRIAL MANAGEMNET

(Common to MCT, AME, MIE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) List out the functions of a good management. [2]
- b) What is Taylor's Scientific Management Theory? [3]
- c) What do you mean by virtual organization? [2]
- d) Describe the inverted pyramid structure. [3]
- e) Define value analysis. [2]
- f) What are the objectives of operations management? [3]
- g) What are the OC curves? [2]
- h) What do you understand by work sampling? [3]
- i) What do you understand by project crashing? [2]
- j) State the benefits of job evaluation. [3]

PART - B

(50 Marks)

- 2.a) What do you understand by Maslow's theory of human needs?
 - b) State and describe the various systems approaches to management. [5+5]
- OR**
- 3.a) Explain the scope of management in an entrepreneurship and organization.
 - b) State and describe the various leadership styles in management. [5+5]
- 4.a) What are the merits, demerits and suitability of lean and flat organization structures?
 - b) List and explain the various types of organization structures. [5+5]
- OR**
- 5.a) Explain the role of departmentation and decentralization in an organizational structure.
 - b) State and explain the working of a boundary less organization. [5+5]
- 6.a) State and explain the various phases of product design process.
 - b) State and describe the RPW method of line balancing. [5+5]
- OR**
- 7.a) Compare rural and urban areas in connection with selection of site for industry.
 - b) State and explain the various types of plant layouts. [5+5]

- 8.a) Differentiate between method study and work measurement.
 b) In a factory producing spark plug the number of defectives found in inspection of 20 lots of 100 each, is given below:

Lot No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
No. of defectives	5	10	12	8	6	4	6	3	3	5	4	7	8	3	3	4	5	8	6	10

Construct appropriate control chart and state whether the process is in statistical control. [5+5]

OR

- 9.a) State and explain in brief the steps involved in method study procedure. [5+5]
 b) Differentiate between variable charts and attribute charts.
 10.a) Describe factor comparison method of job evaluation with its merits and demerits.
 b) Table below gives the schedule of welding activities in an assembly shop.

Activity No.	0-1	1-2	0-3	2-5	3-4	4-5	5-6
Duration Days	2	4	2	1	2	5	3

- i) Draw the network diagram
 ii) Calculate EST, LST, EFT, LFT and floats
 iii) Mark the critical path and total project duration. [4+6]

OR

- 11.a) Enumerate the various steps involved in job evolution procedure.
 b) Differentiate between CPM and PERT. [5+5]