# OP JINDAL UNIVERSITY, RAIGARH (C.G.)
## END SEMESTER EXAMINATION, JAN-2023

OPJU
UNIVERSITY OF STEEL TECHNOLOGY AND MANAGEMENT

Course: **B.Tech.**　　　　　　　　　　　　　　　　　Time: **03 Hrs.**

Semester: **6th**　　　　　　Branch: **Mechanical**　　　Max. Marks: **100**

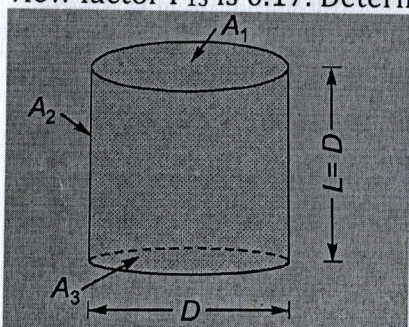Subject Code: **SOE-B-ME601**　　Subject: **Heat and Mass Transfer**

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**Note:** **Section A:** All Questions are compulsory. [10 x 02 marks]
　　**Section B:** Answer any 8 questions. [08 x 05 marks]
　　**Section C:** Answer any 5 questions [05 x 08 marks]
　　**HMT Databook is allowed**

| Q. No. | Section [A] | CO |
|---|---|---|
| Q1 a) | What do you mean by Fourier's Law of Heat Conduction? | 3 |
| Q1 b) | Define Fourier Number | 2 |
| Q1 c) | A fluid (Prandtl number, Pr = 1) at 400 K flows over a flat plate of 1.5 m length, maintained at 300 K. The velocity of the fluid is 5 m/s. Assuming kinematic viscosity, $\nu = 30 \times 10^{-6}$ m$^2$/s, obtain the thermal boundary layer thickness (in mm) at 0.5 m from the leading edge. | 3 |
| Q1 d) | Define fin efficiency. | 2 |
| Q1 e) | What do you mean by thermal conductivity? | 1 |
| Q1 f) | What is Wien's Law in radiation heat transfer? | 4 |
| Q1 g) | Give a suitable classification of fins | 5 |
| Q1 h) | A stainless-Steel Plate 2cm thick maintained at a temperature of 550oC on the left side and 50oC on the other face. Obtain the value of heat transfer per unit area. K=19.1 W/mK. | 1 |
| Q1 i) | Define thermal diffusivity | 1 |
| Q1 j) | What is Grashof Number. | 5 |

| Q. No. | Section [B] | CO |
|---|---|---|
| Q2 a) | For the circular tube of equal length and diameter shown in the figure below, the view factor F₁₃ is 0.17. Determine view factor F₁₂.  | 5 |
| Q2 b) | What is unsteady heat transfer? What is Biot Number | 2 |
| Q2 c) | What do you mean by film wise condensation? Explain in brief | 5 |
| Q2 d) | Air at 20oC at atmospheric pressure flows over a flat plate at a velocity of 3 m/s. if the plate is 1 m wide and 80oC, calculate the following at x = 300 mm. Hydrodynamic boundary layer thickness, Thermal boundary layer thickness, Local friction coefficient, Average friction coefficient, Local heat transfer coefficient. | 3 |
| Q2 e) | Assuming the sun to be a black body at a temp of 5800 K. Calculate | 4 |

| | | |
|---|---|---|
| | a) Total emissive Power<br>b) The wavelength at which intensity is max. | |
| Q2 f) | Name the different regimes of boiling and represent in a figure. | 5 |
| Q2 g) | A steel pipe (K = 45.0 W/m.K) having a 0.05m O.D is covered with a 0.042 m thick layer of magnesia (K = 0.07W/m.K) which in turn covered with a 0.024 m layer of fiberglass insulation (K = 0.048 W/m.K). The pipe wall outside temperature is 370 K and the outer surface temperature of the fiberglass is 305K. What is the interfacial temperature between the magnesia and fiberglass? Also, calculate the steady-state heat transfer. | 1 |
| Q2 h) | Draw the temperature distribution for Parallel and counter flow heat exchanger. | 5 |
| Q2 i) | The temperature at the inner and outer surfaces of a boiler wall made of 20 mm thick steel and covered with an insulating material of 5 mm thickness are $300^0$ C and $50^0$C respectively. If the thermal conductivities of steel and insulating material are 58W/m$^0$C and 0.116 W/m$^0$C respectively, determine the rate of flow through the boiler wall. | 1 |
| Q2 j) | Give a suitable classification of fins | 2 |

| Q. No. | Section [C] | CO |
|---|---|---|
| Q3 a) | Derive an expression to show that Nu = f(Re,Pr) for a flat plate using dimensional analysis. | 3 |
| Q3 b) | A long carbon steel rod of length 40 cm and diameter 10 mm (k = 40 w/mK) is placed in such that one of its end is $400^0$ C and the ambient temperature is $30^0$ C. the flim co-efficient is 10 w/m$^2$K. Determine a) temperature at the mid-length of the fin | 2 |
| Q3 c) | Water flows at the rate of 65 kg/min through a double pipe counterflow heat exchanger. Water is heated from $50^0$ C to$75^0$C by an oil flowing through the tube. The specific heat of the oil is 1.780 kj/kg.K. The oil enters at 115$^0$C and leaves at 70$^0$C.the overall heat transfer co-efficient is 340 W/m2K. calculate the following<br>    a) Heat exchanger area<br>    b) Rate of heat transfer | 5 |
| Q3 d) | Air at 25 $^0$C flows past a flat plate at 2.5 m/s. the plate measures 600 mm X 300 mm and is maintained at a uniform temperature at 95 $^0$C. Calculate the heat loss from the plate, if the air flows parallel to the 600 mm side. | 3 |
| Q3 e) | Derive an expression for three-dimensional general heat conduction equation. | 1 |
| Q3 f) | The filament of a 75 W light bulb may be considered as a black body radiating into a black enclosure at $70^0$ C. the filament diameter is 0.10 mm and length is 5 cm. considering the radiation, determine the filament temperature . | 4 |
| Q3 g) | Derive an expression for LMTD related to parallel-flow heat exchanger | 5 |

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| | | | | M | CO | KL |

**Course Code: SOE-B-ME602**

# O P JINDAL UNIVERSITY
### B. Tech. VI Semester Backlog Examinations
### Machine Tool and Machining
#### (Offered to ME)

OPJU

Time: 3 Hrs.

Max. Marks: 100

Answer any one question from each unit
All questions carry equal marks

## Section-A

| | | | M | CO | KL |
|---|---|---|---|---|---|
| 1 | a. | What is meant by Machining? | 2 | 1 | 1 |
| | b. | What is the function of the lead screw on a lathe? | 2 | 1 | 1 |
| | c. | Explain up-milling and down-milling with a neat sketch. | 2 | 2 | 1 |
| | d. | Explain indexing in milling operation. | 2 | 2 | 1 |
| | e. | Differentiate between Orthogonal and Oblique cutting. | 2 | 3 | 1 |
| | f. | Differentiate between continuous and dis-continuous chips. | 2 | 3 | 1 |
| | g. | What is Flank wear and Crater wear? | 2 | 4 | 1 |
| | h. | Name different types of tool materials. | 2 | 4 | 1 |
| | i. | What do you understand by nontraditional machining? | 2 | 5 | 1 |
| | j. | What do you understand by hybrid machining processes? | 2 | 5 | 1 |

## Section-B:
## Unit-I

| | | | M | CO | KL |
|---|---|---|---|---|---|
| 2 | a. | Explain anyone the quick return mechanism of the Shaper machine with a neat sketch. | 8 | 1 | 2 |
| | b. | Discuss in detail Generatrix and Directrix. | 8 | 1 | 3 |

### OR

| | | | M | CO | KL |
|---|---|---|---|---|---|
| 3 | a. | Briefly explain the following lathe operations with neat sketches: -(i) Facing (ii) Threading (iii) Knurling (iv) Taper turning (v) Parting | 8 | 1 | 2 |
| | b. | A C.I. plate measuring 300 mm x 100 mm x 40 mm is to be roughly shaped along its wider face. Calculate the machining time taking approach = 25 mm, overtravel = 25 mm, cutting speed = 12 m/min, return speed = 20 m/min, allowance on either side of plate width = 5 mm, and feed per cycle = 1 mm. | 8 | 1 | 2 |

## Unit-II

| | | | M | CO | KL |
|---|---|---|---|---|---|
| 4 | a. | Explain the following drilling operations with a neat sketch: Counter boring, Reaming, Lapping, Tapping, and Centering. | 8 | 2 | 2 |
| | b. | What is meant by Grinding? The designation of grinding wheel is given by 250 x 25 x 32 W A 36 L 5 V 23. Explain the significance of various elements of the codes. | 8 | 2 | 2 |

### OR

| | | | M | CO | KL |
|---|---|---|---|---|---|
| 5 | a. | Discuss in detail the Column & Knee type horizontal Milling machine with | 8 | 2 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| | | a neat sketch. | | | |
| | b. | Explain the following milling operations with a neat sketch: Plain Milling, Face Milling, Side Milling, and Side & Face Milling. | 8 | 2 | 2 |

## Unit-III

| | | | | | |
|---|---|---|---|---|---|
| 6 | a. | What is tool nomenclature? With a suitable sketch explain the geometry of the single-point cutting tool. | 8 | 3 | 2 |
| | b. | In the orthogonal turning of an engineering alloy, it has been observed that the friction force acting at the chip-tool interface is 402.5 N and the friction force is also perpendicular to the cutting velocity vector. The feed velocity is negligibly small with respect to the cutting velocity. The ratio of friction force to normal force associated with the chip-tool interface is 1. The uncut chip thickness is 0.2 mm and the chip thickness is 0.4 mm. The cutting velocity is 2 m/s. Calculate the shear force acting along the primary shear plane. | 8 | 3 | 2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7 | a. | Identify the forces involved in a cutting operation. Show them on the Merchant circle diagram. Which force contributes to the power required? What is Specific cutting energy? | 8 | 3 | 2 |
| | b. | A carbide-tipped tool of designation 0-10-5-5-8-90-1mm is used to turn a steel workpiece of 50 mm diameter with a cutting speed of 240 m/min and uncut chip thickness of 0.25 mm. The data obtained shows the cutting force = 1766 N, tangential thrust force = 981 N, and chip thickness = 0.32 mm. Calculate the shear angle, shear force, the normal force acting on the shear plane, friction force, and velocity of chip flow. | 8 | 3 | 2 |

## Unit-IV

| | | | | | |
|---|---|---|---|---|---|
| 8 | a. | What is Machinability? Explain the various factors affecting machinability in detail. | 8 | 4 | 2 |
| | b. | The following equation for tool life is given for a turning operation: $$V\,T^{0.12}\,f^{0.7}\,d^{0.3} = C$$ A 100-minute tool life was obtained while cutting at V = 25 m/min, feed (f) = 0.3 mm/rev, and depth of cut (d) = 2.0 mm. Determine the change in tool life, if the cutting speed, feed, and depth of cut are increased by 25% individually and taken together. | 8 | 4 | 2 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 9 | a. | Compare the tool life of two catting tools (HSS and carbide) at a speed of 30 m/min. The tool life is 130 min. The tool life equation for the HSS tool is given by $VT^{1/7} = C_1$ and for carbide, $VT^{1/5} = C_2$ at a cutting speed of 24 m/min. | 8 | 4 | 2 |
| | b. | What is the effect of high cutting temperature on the tool and workpiece? Explain how chip-tool interface temperature can be measured. | 8 | 4 | 2 |

2

## UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 10 | a. | Explain the working principle of Abrasive jet machining. Discuss about the effect of various input process parameters on performance characteristics, advantages and limitations. | 8 | 5 | 3 |
| | b. | Explain the working principle, application, advantages, and limitations of Laser Beam Machining with a neat sketch. | 8 | 5 | 2 |
| **OR** | | | | | |
| 11 | a. | Explain the material removal phenomenon in the electrical discharge machining process. Also give advantages, limitations, and application of the process. | 8 | 5 | 2 |
| | b. | Explain the working principle, characteristics, advantages, and disadvantages of Electron Beam Machining with a neat sketch | 8 | 5 | 3 |

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| | Course Code: SOE-B-ME603 | | | |
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**O P JINDAL UNIVERSITY**
**B.Tech. VI Semester Backlog Examinations**
**DESIGN OF MACHINE ELEMENT**
**Mechanical**

OPJU
UNIVERSITY OF STEEL TECHNOLOGY AND MANAGEMENT

| Time: 4 Hrs. | Max. Marks: 100 |
|---|---|

All questions carry equal marks.

Note: *Use of PSG Design Data Book is permitted. Use your judgement for unspecified data, if any*

| | | | M | CO | KL |
|---|---|---|---|---|---|
| | | **Section-A** | | | |
| 1 | a. | Explain the importance of hunting tooth in gear train | 2 | 1 | 2 |
| | b. | What is basic dynamic load rating? | 2 | 3 | 1 |
| | c. | Why bevel gears are used? What are its major types. | 2 | 2 | 2 |
| | d. | What do you mean by helical gear and what are the different types of helical gear. | 2 | 2 | 1 |
| | e. | What is meant by journal bearing? | 2 | 3 | 1 |
| | f. | What do you mean by life of an individual bearing? | 2 | 3 | 2 |
| | g. | What do you mean by clutch? What are its different types. | 2 | 4 | 1 |
| | h. | What is self-energizing brake. | 2 | 4 | 2 |
| | i. | How to select the types of blade for centrifugal pump. | 2 | 5 | 2 |
| | j. | What are the benefits of using IoT-enabled pumping systems? | 2 | 5 | 2 |
| | | **Section-B:** | | | |
| | | **Unit-I** | | | |
| 2 | a. | A single stage spur gear box is used to transmit 15 kW power at 1440 rpm of pinion. The desire transmission ratio is 4:1. Assume 20 degree FD in-volute profile and material C55Mn1 for pinion and gear.<br>i) Find the module<br>ii) Check gear for Lewis Dynamic Load<br>iii) Check gear for wear strength<br>iv) Write Constructional Details. | 16 | 1 | 5 |
| | | **OR** | | | |
| 3 | a. | Derive Lewis beam strength equation | 6 | 1 | 2 |
| | b. | Explain various types of gear tooth failure. | 6 | 1 | 2 |
| | c. | How gears are classified? | 4 | 1 | 2 |
| | | **Unit-II** | | | |
| 4 | a. | Design a helical gear to transmit 25 KW, driver is running at 1800 rpm and driver at 600 rpm, pinion has 24 teeth and $30^0$ helix angle. | 16 | 2 | 5 |
| | | **OR** | | | |
| 5 | a. | A pair of bevel gear are made of carbon steel C-50 and gray cast iron-25. The number of teeth on pinion is 30 and gear is 40. Design if it take P=10 KW, $N_1$=1440 rpm. | 16 | 2 | 5 |

## Unit-III

| | | | | | |
|---|---|---|---|---|---|
| 6 | a. | Single row deep groove ball bearing is to be designed for a radial load of 180 Kgf and axial load of 45.5 kgf at 6% of probability of failure. Life of bearing is 5000 hrs at 1000 rpm. Diameter of shaft = 45 mm. | 16 | 3 | 5 |
| | | **OR** | | | |
| 7 | a. | Give a brief description on lubrication of bearings. | 8 | 3 | 2 |
| | b. | Briefly explain about: Nominal life and Average life of rolling bearing | 8 | 3 | 4 |

## Unit-IV

| | | | | | |
|---|---|---|---|---|---|
| 8 | a. | A differential band brake is operated by a lever of length 500 mm. The brake drum has a diameter of 500 mm and the maximum torque on the drum is 1000 N-m. The band brake embraces 2/3rd of the circumference. One end of the band is attached to a pin 100 mm from the fulcrum and the other end to another pin 80 mm from the fulcrum and on the other side of it when the operating force is also acting. If the band brake is lined with asbestos fabric having a coefficient of friction 0.3, find the operating force required. Design the steel band, shaft, key, lever and fulcrum pin. The permissible stresses may be taken as 70 MPa in tension, 50 MPa in shear and 20 MPa in bearing. The bearing pressure for the brake lining should not exceed 0.2 N/mm². | 16 | 4 | 5 |
| | | **OR** | | | |
| 9 | a. | Design a multiplate disk clutch transferring 15 KW power at 1440 rpm? | 16 | 4 | 5 |

## UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 10 | a. | The following data refers to Centrifugal pump for pumping water: Static Suction Head = 2.5 m Length of suction pipe = 6 m Static delivery head = 15 m Length of delivery pipe = 30 m Discharge = 1200 LPM Design completely a centrifugal pump for given application which include the design of impeller, shaft, bearing and casing. Also draw suitable layout for this pump. | 16 | 5 | 5 |
| | | **OR** | | | |
| 11 | a. | Explain with sketch hydraulic circuit for the Milling machine. | 10 | 4 | 3 |
| | b. | Explain the types of sensors that can be attached to centrifugal pumps | 6 | 5 | 4 |

**Course Code: SOE-B-605(6)**

# O P JINDAL UNIVERSITY

**B. Tech. VI Semester Backlog Examinations**

**Power Plant Engineering – Prof. Elective - 1**

(Branch: Mechanical Engineering)

OPJU

Time: 3 Hrs.

**Max. Marks: 100**

Answer any one question from each unit

All questions carry equal marks

| | | | M | CO | KL |
|---|---|---|---|---|---|
| | | **Section-A** | | | |
| 1 | a. | What is mean by Conventional and non- conventional energy sources? Give the suitable examples. | 2 | 1 | 1 |
| | b. | What is function of Surgetank Head in case of hydro-electric power plant. Draw its line diagram. | 2 | 3 | 1 |
| | c. | What is mean by wind? Enlist different types of wind | 2 | 3 | 1 |
| | d. | What is function of control rod in case of Nuclear Power Plant | 2 | 4 | 1 |
| | e. | What is mean by Head in case of hydro-electric power plant. Draw its line diagram. | 2 | 3 | 1 |
| | f. | What is mean by Clicker and how it forms in the thermal power plant | 2 | 3 | 2 |
| | g. | What is mean by fission and fusion chain reaction in case of Nuclear Power Plant | 2 | 4 | 2 |
| | h. | What is mean by Storage and pond age? Write its function in the hydro-electric power plant. | 2 | 3 | 2 |
| | i. | Define the following terms: a) Load factor b) Capacity factor | 2 | 5 | 1 |
| | j. | What is mean by Power plant economics | 2 | 5 | 1 |
| | | **Section-B:** | | | |
| | | **Unit-I** | | | |
| 2 | a. | What are the prospects of non – conventional energy sources in India? Explain in brief. | 8 | 1 | 2 |
| | b. | Explain the working, principles, and applications of a Solar electric power plant. | 8 | 1 | 2 |
| | | **OR** | | | |
| 3 | a. | What is mean by Yawing and Pitching in case of Wind Energy Conversion System (WECS). Explain in brief. | 8 | 1 | 3 |
| | b. | Draw and explain general arrangements of the hydroelectric power plant. Explain the function of each element. | 8 | 1 | 2 |
| | | **Unit-II** | | | |
| 4 | a. | What is meant by coal handling? Explain with block diagram various steps involved, with block diagram | 8 | 2 | 2 |
| | b. | Discuss any four-element cycles in Steam Power Plant explain with neat sketches. | 8 | 2 | 3 |
| | | **OR** | | | |
| 5 | a. | Name the various methods of ash handling. Describe the pneumatic system of ash handling. Why it is essential to quench the ash before handling? | 8 | 2 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | b. | Draw the general arrangements of an electrostatic precipitator and briefly write it's working. | 8 | 2 | 2 |

## Unit-III

| | | | | | |
|---|---|---|---|---|---|
| 6 | a. | What is meant by "Governing of Turbine" explain what is effect on it when load is increases and load in decreases. | 8 | 3 | 3 |
| | b. | Draw and explain working, Construction of Wind Energy Conversion System. State advantages and disadvantages. | 8 | 3 | 3 |

### OR

| | | | | | |
|---|---|---|---|---|---|
| 7 | a. | At a proposed site of HEPP the available discharge and head is 330 m3/s & 28m respectively. The turbine efficiency is 86%. The generator is directly coupled to the turbine. The frequency of the generator is 50 HZ and number of the poles used are 24. Find, the number of machines/turbine required if, i) A Francis turbine with Sp. Speed of 260 is used. ii) A Kaplan turbine with a sp. Speed of 700 is used. | 8 | 3 | 3 |
| | b. | Give the detail classifications of hydroelectric power plant? | 8 | 3 | 3 |

## Unit-IV

| | | | | | |
|---|---|---|---|---|---|
| 8 | a. | Draw the schematic of the Boiled water reactor. State advantages and disadvantages. | 8 | 4 | 3 |
| | b. | What is mean by Gas-cooled reactor? Explain its working with neat sketch | 8 | 4 | 2 |

### OR

| | | | | | |
|---|---|---|---|---|---|
| 9 | a. | Draw the general arrangement of nuclear power plant with essential component. Write in brief about each component | 8 | 4 | 2 |
| | b. | What do you understand by "Pump storage plant"? state the advantages and limitations of the same. Where can such schemes best applied? | 8 | 4 | 3 |

## UNIT-V

| | | | | | |
|---|---|---|---|---|---|
| 10 | a. | The following demand of power station is 96000 KW and daily load curve is described below; <br><br> Determine: a) load factors of power station. <br> b) What is the load factor to stand by equipment rated at 30 Mw that takes up all load in excess of 72 MW. Also calculate its use factor | 8 | 5 | 3 |
| | b. | What is mean by tariff? What are the objectives, types and requirement of tariff? | 8 | 5 | 2 |

The load curve table referenced in question 10.a:

| Time in hrs. | 0-6 | 6-8 | 8-12 | 12-14 | 14-18 | 18-22 | 22-24 |
|---|---|---|---|---|---|---|---|
| Load in Mw | 50 | 60 | 72 | 60 | 90 | 96 | 48 |

### OR

| | | | | | |
|---|---|---|---|---|---|
| 11 | a. | What factors are considered while selecting the site for a Thermal Power Plant Support your answer power plant economic point of view | 8 | 5 | 2 |
| | b. | Explain with suitable examples; future trends of power industries in India. | 8 | 5 | 2 |

# OP JINDAL UNIVERSITY, RAIGARH (C.G.)

## END SEMESTER EXAMINATION, JANUARY 2023

OPJU
UNIVERSITY OF STEEL TECHNOLOGY AND MANAGEMENT

| Program Name: | B Tech (Mech.) | Program Code: | | Time: **2 Hrs.** |
|---|---|---|---|---|
| Semester: | **6th** | | | Max. Marks: **50** |
| Course Code: | **SOE-B-ME 610** | Course Name: **Principles of Management** | | |

Answer one question from each section.

| | | All questions carry equal marks. | M | CO | KL |
|---|---|---|---|---|---|
| | | **Section A (Unit-I) ( 20 marks)** | | | |
| 1 | a. | How does a team-based organization differs from a network-based organization? | 5 | 1 | 1 |
| | b. | What are the different styles of Management? List and explain them. | 5 | 1 | 1 |
| | | **OR** | | | |
| 2 | a. | List the functions of HRM. | 5 | 1 | 1 |
| | b. | What are the characteristics of an effective plan? | 5 | 1 | 1 |
| | | **Section B (Unit-II) ( 20 marks)** | | | |
| 3 | a. | Explain how a company sets its goals objectives and applies MBO. | 5 | 2 | 2 |
| | b. | Differentiate Management from Administration based on the functional requirements. | 5 | 2 | 2 |
| | | **OR** | | | |
| 4 | a. | Explain horizontal and vertical organization structures with suitable examples. | 5 | 2 | 2 |
| | b. | Explain the desired changes in strategies when a department of an organization moves from centralized to decentralized approach. | 5 | 2 | 2 |
| | | **Section C (Unit-III) ( 20 marks)** | | | |
| 5 | a. | What are the functions of management? Write one such reason for each function for which it is important over others. | 5 | 3 | 2 |
| | b. | Explain with examples, how the managerial applications differ from formal to informal organizations. | 5 | 3 | 2 |
| | | **OR** | | | |
| 6 | a. | Explain the international business operations with managerial applications like import, export, SEZs, free trade zones, globalization, MNC operations etc. | 5 | 3 | 2 |
| | b. | What is the difference between an *SEZ* and a *Free Trade Zone*? | 5 | 3 | 2 |
| | | **Section D (Unit-IV) ( 20 marks)** | | | |
| 7 | a. | What is the difference in direction and delegation of a senior to his subordinate? Can both the functions be clubbed in any circumstance – when and how? | 10 | 4 | 3 |
| | | **OR** | | | |
| 8 | a. | After five years of work in your dream company, what will you look for – *Job Enlargement* or *Job Enrich*, why? | 10 | 4 | 3 |
| | | **Section E (Unit-V)( 20 marks)** | | | |
| 9 | a. | Explain in detailed the Maslow's Theory of Hierarchical Needs. | 10 | 3 | 2 |
| | | **OR** | | | |
| 10 | a. | Explain in detailed the McGregor's Theory-X and Theory-Y. | 10 | 3 | 2 |