

**ME-1851**  
**Examination –Nov- 2022**  
**B.Tech. V Sem : Mechanical Engineering**  
**Heat & Mass Transfer**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

**Note: Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any.**

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**Part c – Max 100 words and              Part d – Max 400 words.**

**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) What is the analogy between flow of heat and electricity? 02  
(b) State the Fourier's law of heat conduction. 02  
(c) What are the three different boundary conditions? 03  
(d) What is critical thickness of insulation for a pipe? Derive an expression for the same in case of a cylindrical geometry. 07

**OR**

Consider a 20 mm thick plate with uniform heat generation rate of  $80 \times 10^6 \text{ W/m}^3$ . The plate has constant thermal conductivity of  $200 \text{ W/m} \cdot ^\circ\text{C}$ . The left and right faces are kept at constant temperatures of  $160^\circ\text{C}$  and  $120^\circ\text{C}$  respectively. Determine the temperature distribution and heat transfer rate in the plate. 07

- Q.2 (a) What is the fin efficiency and fin effectiveness? 02  
(b) Differentiate between the Biot number and Nusselt number. 02  
(c) What is Lumped heat capacity system? 03  
(d) Derive an expression for the heat dissipation by a rectangular plate fin having uniform cross-section. 07

**OR**

A metallic ball of 24 mm diameter is to be annealed at a temperature of 1000 K to a final temperature of 400 K in an air environment at  $T_\infty = 300 \text{ K}$  and  $h_\infty = 25 \text{ W/m}^2 \cdot \text{K}$ . The properties of material of ball are  $k = 40 \text{ W/m} \cdot \text{K}$ ,  $\rho = 7800 \text{ kg/m}^3$  and  $C_p = 600 \text{ J/kg} \cdot \text{K}$ . Determine the time taken by the ball to cool to a temperature of 400 K. 07

- Q.3 (a) What the difference is between free and force convection? 02  
(b) State the Newton's law of cooling. 02  
(c) State the significance of Reynolds and Grashof number. 03  
(d) What is Buckingham-pi theorem? Explain its application in free and forced convective heat transfer analysis. 07

OR

The thermal insulation is removed from the 1 m long section of a steam pipe of inside diameter of 25 cm and carrying high-pressure, high-temperature steam at 180°C. If the air at -5°C flowing across the exposed section with a velocity of 6 m/s, determine the average heat transfer coefficient and the rate of heat loss from the 1 m long exposed section of the steam pipe to the cold air. The properties of air at the mean temperature are as:  $\nu = 2.184 \times 10^{-5} \text{ m}^2/\text{s}$ ,  $k = 0.0308 \text{ W/m.K}$  and  $Pr = 0.695$ .

Here for the flow over a circular cylinder the following correlation for the average Nusselt number is found appropriate:

$$Nu = 0.3 + \frac{0.62 Re^{1/2} Pr^{1/3}}{[1 + (0.4/Pr)^{2/3}]^{1/4}} \left[ 1 + \left( \frac{Re}{28200} \right)^{1/2} \right]$$

- Q.4 (a) What are heat exchangers? Classify heat exchangers. 02  
(b) State the Fick's law of mass transfer. 02  
(c) When is the NTU method most suitable over LMTD method in the analysis of heat exchanger? 03  
(d) What is LMTD? Derive an expression for LMTD of parallel flow heat exchanger. 07

OR

A counter-flow double-pipe heat exchanger is used to heat water ( $c_p = 4180 \text{ J/kg.K}$ ) from 20°C to 80°C at a rate of 1.2 kg/s. The heating is to be accomplished by geothermal water ( $c_p = 4310 \text{ J/kg.K}$ ) available at 160°C at a mass flow rate of 2 kg/s. The inner tube is thin-walled and has a diameter of 1.5 cm. The overall heat transfer coefficient of the heat exchanger is  $640 \text{ W/m}^2 \cdot \text{K}$ . Using the NTU method, determine the length of the tube required to achieve the desired heating. The NTU for counter flow heat exchanger can be determined from following the appropriate relation:  $NTU = \frac{1}{\epsilon - 1} \ln \left( \frac{\epsilon - 1}{\epsilon \epsilon - 1} \right)$  07

- Q.5 (a) What is thermal radiation? 02  
(b) State the Stefan-Boltzmann law of black body radiation. 02  
(c) Differentiate between the Boiling and Condensation heat transfer. 03  
(d) What is shape factor? Explain the application of shape factor in radiation heat transfer. 07

OR

Two large diffuse gray parallel plates, separated by a small distance, have surface temperature of 400 K and 300 K. If the emissivity of the surfaces is 0.8, determine the net radiation heat exchange between the two plates. Take the Stefan-Boltzmann constant,  $\sigma = 5.67 \times 10^{-8} \text{ W/m}^2 \text{K}^4$ . 07

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**ME-1852**  
**Examination –Nov- 2022**  
**B.Tech. V Sem : Mechanical Engineering**  
**Internal Combustion Engines**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

**Note: Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any.**

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**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) Define volumetric efficiency of an I.C. Engines? 02  
 (b) What Assumptions are made in the analysis of theoretical SI engine cycle? 02  
 (c) Explain the valve timing diagram for the four stroke petrol engine. 03  
 (d) What is heat balanced sheet. How it is prepared? 07

**OR**

A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6 % of stroke. Find the air standard efficiency of the cycle. 07

- Q.2 (a) What is a ignition lag? 02  
 (b) What do you mean by detonation in SI engines? 02  
 (c) Write short note on the A/F ratio requirement of S.I. engines from no load to full load. 03  
 (d) How does a flame propagate? Discuss the factors affecting the flame speed. 07

**OR**

Discuss the desirable's characteristics of combustion chamber design for spark ignition engines. 07

- Q.3 (a) Define delay period for C.I. engines? 02  
 (b) What do you understand by knock inhibitors? 02  
 (c) Compare the phenomenon of knock in SI and CI engines. 03  
 (d) Explain the various stages of combustion in C.I. engines. 07

**OR**

Explain the working and principle of rotary I.C. engine. 07

- Q.4 (a) What are the desired properties of a good I.C. engine fuel? 02

- (b) What do you mean by carburetion?
- (c) Write short note on MPFI.
- (d) Explain various methods of engine cooling.

**OR**

What is the function of fuel injection system? Explain any system with the help of a neat sketch. 07

- Q.5
- (a) What is supercharging? 02
  - (b) What are the differences between turbo charging and supercharging. 02
  - (c) Write down the limitations of supercharging. 03
  - (d) Sketches of various configurations of superchargers. 07

**OR**

Explain the effect of supercharging on the performance of engine. 07

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**B. Tech. V Sem : Mechanical Engineering  
Manufacturing Process - II**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

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- Q.1 (a) How the lathe machine are specified to show its capabilities? 02  
 (b) Differentiate between steady rest and follow rest. 02  
 (c) What are the difference between a Capstan lathe and a Turret lathe? 03  
 (d) Explain the taper turning method by taper turning attachment. 07

**OR**

Explain the following lathe operations: 07

- (i) Knurling  
 (ii) Chamfering

- Q.2 (a) How the drill size for tapping operation is fixed? 02  
 (b) State Indian Standard Marking System of grinding wheel. 02  
 (c) Explain the differences between drilling, reaming and boring operations. 03  
 (d) What is centerless grinding? Describe centerless grinding operations. 07

**OR**

What are different tool holding devices used in drilling machine? 07

- Q.3 (a) Differentiate between up milling and down milling. 02  
 (b) State the advantages and limitations of broaching. 02  
 (c) Describe elements of plain milling cutter with a neat sketch. 03  
 (d) Explain the following: 07  
     (i) Plain milling  
     (ii) End milling

OR

What do you understand by straddle milling? Explain the procedure adopted to mill a hexagonal bolt head by this method. 07

- Q.4 (a) How the size of a shaper is specified? 02  
(b) Define Indexing. List the different methods of indexing used in gear cutting. 02  
(c) Describe the principle of quick return mechanism used in shaper. 03  
(d) Explain how the length of stroke and position of stroke adjust in crank and slotted link mechanism of shaper. 07

OR

What is compounding indexing? Write the procedure of determining the index circles. 07

- Q.5 (a) State the process of lapping. 02  
(b) Define numerical control. 02  
(c) Define numerical control. What functions of machine tools may be automated by using numerical control. 03  
(d) Write short notes on following: 07  
(i) Honing  
(ii) Polishing

OR

What do you understand by NC fear part programming? Explain G codes and M codes. 07

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- Q.1 (a) What is the function of flywheel? 02
- (b) A flywheel is fitted to the engine having  $W$  amount of indicated per revolution. Permissible limits of coefficient of fluctuation of energy and speed are  $C_E$  and  $C_S$  respectively. To prove the kinetic energy of the flywheel is  $KE = \frac{W.C_E}{2C_S}$  02
- (c) The maximum fluctuation of kinetic energy in an engine has been calculated 2600 J. Assuming that the engine runs at an average speed of 200 rpm, What is the polar mass moment of inertia (in  $\text{kg.m}^2$ ) of a flywheel to keep the speed fluctuation within  $\pm 0.5\%$  of the average speed? 03
- (d) The turning moment diagram for a multi-cylinder engine has been drawn to a vertical scale of  $1\text{mm} = 650 \text{ N.m}$  and a horizontal scale of  $1\text{mm} = 4.5^\circ$ . The areas above and below the mean torque line are  $-28, +380, -260, +310, -300, +242, -380, +265$  and  $-229 \text{ mm}^2$ . The fluctuation of speed is limited to  $\pm 1.8\%$  of the mean speed which is 400 rpm. Density of the rim material is  $7000 \text{ kg/m}^3$  and width of the rim is 4.5 times its thickness. The centrifugal stress in the rim material is limited to  $6 \text{ N/mm}^2$ . Neglecting the effect of the boss and arms, determine the diameter and cross section of the flywheel rim. 07

OR

With a neat sketch explain the turning moment diagram of a multi cylinder engine. 07

- Q.2 (a) What do you mean by balancing? 02
- (b) Why is balancing necessary for rotors of high speed engines? 02
- (c) Explain the terms Sensitiveness, Hunting and Stability relating to governors? 03
- (d) What is meant by effort and power of a governor? Find the expression for the effort and power in a porter Governor. 07

OR

Each ball of a porter governor has a mass of 3 kg and the mass of the sleeve is 15 kg. The governor has equal arms each 200 mm long and pivoted on the axis of rotation. When the radius of rotation of the balls is 120 mm, the sleeve begins to rise and 160 mm at the maximum speed. Determine: (i) the range of the speed (ii) the lift of the sleeve (iii) the effort of the Governor (iv) the power of the governor 07

- Q.3 (a) What are the Isochronisms / Isochronous Governors? 02
- (b) Classify the various types of Governors. 02
- (c) What do you mean by Controlling Force Curve? Draw the controlling force diagram of Hartnell Governor. 03

- (d) A Porter governor has equal arms 200mm long pivoted on the axis of the rotations. The mass of each ball is 3 kg and mass of the sleeve is 15 kg. The ball path is 120 mm when the governor begins to lift and 160 mm at the maximum speed. Determine the range of the speed. If the friction on the sleeve is equivalent of 10 N, find the coefficient of insensitiveness.

OR

The Controlling force ( $F_c$ ) in Newtons and the radius of rotation ( $r$ ) in meters for a spring controlled governor is given by the expression

$$F_c = 2800 r - 76$$

The mass of the ball is 5 kg and the extreme radii of rotation of the balls are 100 mm and 175 mm. Find the maximum and minimum speeds of the equilibrium. If the friction of the governor mechanism is equivalent to a force 5 N at each ball, find the coefficient of insensitiveness of the governor at the extreme radii.

- Q.4 (a) What is logarithmic decrement? Derive the relation for the same.
- (b) In a spring mass system, the natural frequency of vibration is 3.56 Hz. When the amount of the suspended mass is increased by 5 kg, the natural frequency is lowered to 2.9 Hz. Determine the original unknown mass and the spring constant.
- (c) Define the terms: (i) Critical Damping Coefficient, (ii) Damping Coefficient (iii) Damping Factor & (iv) Magnification factor in case of forced vibration
- (d) The disc of torsional pendulum has a moment of inertia of 600 kg-cm<sup>2</sup>. The brass shaft of pendulum has a diameter of 10 cm and length of 40 cm. When the pendulum is vibrating in viscous oil, the amplitude on the same side of the rest position are 9°, 6° and 4° for successive cycles. Determine : (i) Logarithmic decrement (ii) Damping torque at unit velocity (iii) Periodic time of vibration, Take  $G = 4.4 \times 10^{10} \text{ N/m}^2$  for brass.

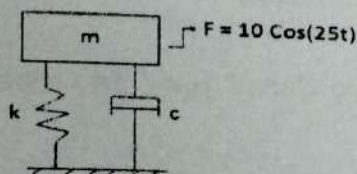
OR

A vibrating system consists of a mass of 20 kg, a spring of stiffness 20 kN/m and a damper. The damping provided is only 30% of the critical value. Determine: (i) The damping factor (ii) the critical damping coefficient (iii) Natural frequency of damped vibrations (iv) the logarithmic decrement (v) the ratio of two consecutive amplitudes.

- Q.5 (a) What do you mean by whirling of shafts? What is whirling or critical speed? Explain.
- (b) Define the terms vibration isolation and transmissibility.
- (c) Explain with the help of transmissibility vs. frequency ratio curves at various damping ratios.
- (d) A precision instrument package ( $m = 1 \text{ kg}$ ) needs to be mounted on a surface vibrating at 60 Hz. It is desired only 5% of the base surface vibration amplitude be transmitted to the instrument. Assuming that the isolation is designed with its natural frequency significantly lesser than 60 Hz, so that the effect of damping may be ignored. What is the stiffness of the required mounting pad?

OR

A mass-spring-dashpot system (as shown in Fig.) with mass  $m = 10 \text{ kg}$ , spring constant  $k = 6250 \text{ N/m}$  is excited by a harmonic excitation of  $10 \cos(25t) \text{ N}$ . At the steady state, the vibration amplitude of the mass is 40 mm. What is the damping coefficient ( $c$  in Ns/m) of the dashpot.





ME-1855

Examination –Nov- 2022

**B.Tech. V Sem : Mechanical Engineering  
Operation Research**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

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- Q.1 (a) Define Operation Research. Give the historical background of operation research. 02
- (b) Discuss the significance and scope of OR in modern management. 02
- (c) A company produces two types of Hats. Each hat of the first type requires twice as much labour time as the second type. If all hats are of the second type only, the company can produce a total of 500 hats a day. The market limits daily sales of the first and second type to 150 and 250 hats. Assuming that the profits per hats are Rs 8 for A and Rs 5 for type B. Formulate the problem as a linear programming model in order to determine the number of hats to produced for each type as to maximize the profit. 03
- (d) Find a geometrical interpretation and solution as well as for the following LP problem: 07
- Max. :  $Z = X_1 + X_2$   
 Subject to :  $X_1 + 2X_2 \leq 2000$ ,  $X_1 + X_2 \leq 1500$ ,  $X_2 \leq 600$   
 and  $X_1, X_2 \geq 0$

**OR**

- Consider the LP problem: Maximize :  $5X_1 + 6X_2$  07  
 subject to :  $3X_1 + 4X_2 \leq 12$ ;  $5X_1 + 2X_2 \leq 20$ , and  $X_1, X_2 \geq 0$ .  
 Solve by algebraic method and answer the following:
- (I) The objective function corresponding to the optimum solution is \_\_\_\_\_
- (II) The number of basic solutions is \_\_\_\_\_
- (III) The number of basic feasible solutions is \_\_\_\_\_
- (IV) If we solve for  $X_1$  and  $X_3$  as basic and the other variables as non basic, the value of  $X_2$  is \_\_\_\_\_
- (V) If we solve for  $X_2$  and  $X_3$  as basic and the other variables as non basic, the value of  $X_3$  is \_\_\_\_\_

- Q.2 (a) What is the difference between transportation and assignment problem? 02
- (b) What is assignment problem? Is it true to say that it is special case of the transportation problem? 02
- (c) List down various classification of models in transportation problem. 03

(d) Consider the transportation (minimization) problem given below:

5	7	6	40
4	8	6	30
7	4	6	20
25	50	15	

Start with the Northwest corner solution and continue with MODI method. Find the following (i) The variable that enters the solution takes a value \_\_\_\_\_ in the next iteration (ii) The reduction in the objective function is \_\_\_\_\_

OR

Solve the 4 x 4 Assignment problem (minimization). The value of the objective function at optimum is 07

4	7	6	8
3	5	4	6
2	5	4	7
6	8	7	9

Find the following (i) The number of assignments in the initial allocations is \_\_\_\_\_ (ii) The value of  $\theta$  in the first iteration is \_\_\_\_\_ (iii) The value of the objective function at the optimum is \_\_\_\_\_

- Q.3 (a) How does PERT differ from CPM? 02
- (b) State the rules for construction of a network. 02
- (c) In a project, the activity times estimates are optimistic time( $t_o$ ) is 2 weeks, most likely time ( $t_m$ ) is 5 weeks and pessimistic time( $t_p$ ) is 14 weeks. Then the variance and standard deviation of the activity is respectively. 03
- (d) A small project is composed of the following activities whose time estimates are given : 07

Activity	$T_o$	$T_m$	$T_p$
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

What is the probability that the project will be completed

- (a) At least 4 weeks earlier than expected time?
- (b) Not more than 4 weeks later than expected time?
- (c) Find the project duration at 95 percent probability?

OR

The following table shows for each activity of a project the normal and crash times and also the normal and crash costs. The contract includes a penalty clause of Rs.200 per day in excess of 19 days. Overhead cost is Rs. 400 per day

07

Activity	Time (Days)		Cost (Rs)	
	Normal	Crash	Normal	Crash
1-2	6	4	600	1000
1-3	4	2	600	1400
2-4	5	3	500	1500
2-5	3	1	450	650
3-4	6	4	900	2000
4-6	8	4	800	3000
5-6	4	2	400	1000
6-7	3	2	450	800

- (i) Draw the project network and determine the critical path.
- (ii) Find the cost of completing the project in normal time.
- (iii) Crash the project activities and determine the cost of completing the project in the minimum time.
- (iv) What is the optimal duration of the project and what is the cost involved.

- Q.4 (a) What are the basic characteristics of a queuing system? 02
- (b) Write down its properties and terminology used in game theory. 02
- (c) Define the following terms : 03
- (i) Saddle point
  - (ii) Zero-sum-game
  - (iii) Mixed Strategies
- (d) Consider the sum of four subtraction games discussed in lecture 7. For the first game, let  $m = 12$  starting with 93 chips. For the second game, take  $m=10$  and there are 60 chips. The third game has  $m = 7$  and the pile has 41 chips. The fourth game has  $m=8$  and the pile has 66 chips. Find the following : (i) The value of  $g(93, 60, 41, 66)$  is (ii) Thus optimal move from this initial position  $g(93, 60, 41, 66)$  is to remove (iii) Winner of this combined game is 07

OR

In a service department manned by one server, on an average 8 customers arrive every 5 minutes while the server can serve 10 customers in the same time assuming Poisson distribution for arrival and exponential distribution for service rate. Determine: 07

- (i) Average number of customers in the system.
- (ii) Average number of customers in the queue.
- (iii) Average time a customer spends in the system.
- (iv) Average time a customer waits before being served.

- Q.5 (a) What are different types of inventories? Explain 02
- (b) How would you deal with replacement of items that fail completely and suddenly? 02
- (c) What are the advantages and limitations of ABC analysis? 03
- (d) Ten items are kept in inventory. The details regarding the number of items used per annum and price per unit are given ahead: 07

Part	Unit cost (\$)	Annual Usage No.
1	60	90
2	350	40
3	30	130
4	80	60
5	30	100
6	20	180
7	10	170
8	320	50
9	510	60
10	20	120

Classify the items into A, B, and C class.

**OR**

XYZ corporation currently practices the following system for the procurement of an item: 07

Number of orders placed in a year = 8

Ordering cost = Rs. 750/order

Each time order quantity = 250

Carrying cost = 40 % of cost per unit

Cost per unit = Rs. 40

Comment on ordering policy of the company and estimate the loss to the company in not practicing scientific inventory policy.

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**ME-1861**  
**Examination –Nov.- 2022**  
**B.Tech. VI Sem : Mechanical Engineering**  
**Manufacturing Science**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

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- Q.1 (a) How metal removed in metal cutting? 02  
 (b) How are cutting tool classified? 02  
 (c) Explain Briefly the region of heat generation in metal cutting. 03  
 (d) During the Orthogonal cutting of mild steel at 2m/s with rake angle 15deg. The width of cut and depth of cut are 5mm and 0.18mm, respectively. The shear angle was measured to be 34deg. If the cutting force and thrust force are 500N and 200N, respectively. Calculate the percentage of total energy that is dissipated in shear plane during cutting. 07

**OR**

Explain mechanism of chip formation during machining of metal? 07

- Q.2 (a) What are the various forms of wear found in cutting tool? 02  
 (b) What are the function of cutting fluids? 02  
 (c) State the factors on which machinability depends? 03  
 (d) What are the broad general classification of cutting fluids? 07

**OR**

Discuss briefly Cemented carbide, Carbon steel Stellites, high speed steel. Name the various cutting tool material 07

- Q.3 (a) Define the process of Mechanical working of metals? 02  
 (b) What is difference between wire and rod? 02  
 (c) Which of the idealized stress-strain curves is applicable for each of the following process 03  
     (i) Hot forging for copper product  
     (ii) Cold rolling of steel sheet

(d) It is required to draw a 6 mm diameter wire at a reduction 20% at speed 3m/s. The wire is made of annealed copper with hardening parameter  $K=315\text{Mpa}$ ,  $n=0.54$ . The semi-dia angle is 6 deg. and coefficient of friction is 0.1. Calculate following

- (1) The ideal pressure
- (2) The pressure which friction is considered
- (3) The total pressure
- (4) The drawing force and Power

**OR**

How are surface area to volume ratio of a forging affect the design of die?

07

- Q.4
- (a) What are the function of chip breaker? 02
  - (b) What are difference between jigs and fixtures? 02
  - (c) What are diamond pins, how they are used? 03
  - (d) What is drill jigs? What is difference between drill jigs and a fixtures? 07

**OR**

Enumerate various types of fixtures? Explain briefly following fixtures

07

- (i) Turning fixtures
- (ii) Milling fixtures
- (iii) Indexing fixtures

- Q.5
- (a) Define Computer Aided Manufacturing? 02
  - (b) List the benefits of CIM. 02
  - (c) Give with suitable example the use of IOT in Manufacturing. 03
  - (d) What are the normally used sequence to establish an effective manufacturing process. 07

**OR**

Discuss briefly the strategies integrated product design and process design.

07

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**ME-1862**  
**Examination –Nov- 2022**  
**B.Tech. VI Sem: Mechanical Engineering**  
**Computer Integrated Manufacturing**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

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- Q.1 (a) What you mean by CIM? 02  
 (b) Draw CIM wheel? 02  
 (c) Give the advantages and limitation of CIM system. 03  
 (d) List the CIM hardware and software system and bring out the various benefits of implementing CIM system. 07

**OR**

- (d) Give details about CIM elements? also explain role of this system in modern manufacturing. 07

- Q.2 (a) What do you mean by automation? Explain through block diagram. 02  
 (b) What do you mean by PLC system? 02  
 (c) Explain Linear and Non-linear systems through suitable example. 03  
 (d) Describe seven layer of OSI model (computer networking in CIM). 07

**OR**

- (d) Explain the components of local area network and network topologies. 07

- Q.3 (a) Define NC, CNC, and DNC machine. 02  
 (b) List advantages of CNC machine over NC machine. 02  
 (c) How do axes designated in CNC machine? Sketch and designated the axes in CNC lathe machine. 03  
 (d) Which are the format used in manual part programming? Explain word address format. 07

**OR**

- (d) Explain the tooling on CNC machine also explain the fixtures use in CNC system. 07

- Q.4 (a) Give brief about AS/RS system. 02  
(b) Explain role of Robot technology in Automation. 02  
(c) Give details about Robot control system; also give brief about accuracy and repeatability. 03  
(d) What are the different type of gripper used in Robot? Explain two in detail. 07

**OR**

- (d) Explain detail about AGV also give detail description of its function with neat sketch. 07

- Q.5 (a) Give brief about Cellular manufacturing. 02  
(b) What you mean by FMS? Give brief about it. 02  
(c) What is Group Technology? Explain in brief various methods of grouping parts into part families. 03  
(d) What is part classification and coding requirements in GT. Explain OPTIZ system of coding? 07

**OR**

- (d) Explain Expert system with neat diagram. 07

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**ME-1862(A)**  
**Examination –Nov.- 2022**  
**B.Tech. VI Sem : Mechanical Engineering**  
**Mechatronics and Automation**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

**Note:** Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any.

Word limit be observed as follows:

Part a – Max 50 words,

Part b – Max 50 words,

Part c – Max 100 words and

Part d – Max 400 words.

Word limit NOT to be followed for diagram, numerical, derivation.

- Q.1 (a) What is the purpose of studying Transfer function of a system? 02  
 (b) Explain the Procedure for determining the transfer function of system. 02  
 (c) What is the condition for time-invariant system? 03  
 (d) Analyze the Mathematical modelling of a translational system. 07
- OR**
- Analyze the Characteristics of Time-domain Analysis. 07
- Q.2 (a) Explain Passive Transducers. 02  
 (b) What are Piezoelectric sensors? 02  
 (c) All transducers are not sensors. Explain. 03  
 (d) Analyze operational amplifier used in control systems. 07
- OR**
- Analyze the Characteristics parameters used in transducers. 07
- Q.3 (a) What are the components of a hydraulic system used to store the sufficient amount of hydraulic oil? 02  
 (b) What is the function of the flow control valve? 02  
 (c) What are the components of FRL unit? 03  
 (d) Analyze the different components of electro pneumatic systems. 07
- OR**
- Analyze the Pneumatic and hydraulic circuits. 07

- Q.4 (a) Explain the application of PLC. 02  
(b) What are stepper motors? 02  
(c) Explain electrical and mechanical actuating systems. 03  
(d) Analyze servomotor and DC Motors. 07

**OR**

Analyze the cloud connected PLC and Internet of Thing (IoT). 07

- Q.5 (a) Explain levels of automations. 02  
(b) Explain different AGVs. 02  
(c) What are different Strategies of Automation? 03  
(d) Analyze different Automatic identification methods: 07

**OR**

Analyze the applications of machine learning in Industry 4.0. 07

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**ME-1863**  
**Examination –Nov.- 2022**  
**B.Tech. VI Sem : Mechanical Engineering**  
**Automobile Engineering**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

**Note: Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any.**

**Word limit be observed as follows:**

**Part a – Max 50 words,                      Part b – Max 50 words,**

**Part c – Max 100 words and              Part d – Max 400 words.**

**Word limit NOT to be followed for diagram, numerical, derivation.**

- Q.1 (a) Explain Chassis. 02
- (b) Define Frame with suitable sketch. 02
- (c) What do you mean by 6 X 4 drive chassis vehicle? 03
- (d) Compare the advantage and disadvantage of front wheel and rear wheel drive automobiles. What is four wheel drive and what are typical condition in which four wheel drive is preferred? 07
- OR**
- Give the classification of chassis. 07
- Q.2 (a) Explain toe-in & toe-out. 02
- (b) What is Centre point steering? 02
- (c) Explain the term oversteering and understeering. 03
- (d) Explain steering ratio? Describe different type of steering gears. 07
- OR**
- Explain different angle related to wheel alignment with neat sketches. 07
- Q.3 (a) Why is gear box necessary in cars? 02
- (b) Define torque converter. 02
- (c) Explain the necessity of differential in an automobile. 03
- (d) Explain the working principles of synchromesh gearbox. Enlist its advantages and limitations over constant mesh gear box. 07
- OR**
- Explain briefly with neat sketch the construction and working of multi-plate clutch. 07

- Q.4 (a) Explain telescopic damper? 02  
(b) Define ply tyres and tubeless tyres. 02  
(c) Explain Air bleeding of hydraulic brakes. 03  
(d) Describe Macpherson strut assemble of independent system. 07

**OR**

Explain with neat sketch the function of master cylinder in hydraulic brake system. 07

- Q.5 (a) Define lighting system of car. 02  
(b) Define electronic control unit (ECU) in automobile. 02  
(c) Explain Exhaust Gas Recirculation (EGR). 03  
(d) What is the need starting drive in automobiles? Mention various types of starting devices and explain any one in brief. 07

**OR**

Briefly describe the construction of lead acid battery with the help of neat sketches. 07

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ME-1865

Examination –Nov.- 2022

**B.Tech. VI Sem : Mechanical Engineering**  
**Introduction to Economy and Finance**

Time : 3 Hrs

Max. Marks : 70

Min. Marks : 22

**Note: Total number of questions are 05. All Questions are compulsory. Each Question has 4 parts (a, b, c, d). Part a, b & c are compulsory while Part d has internal Choice. Assume missing data, if any. Word limit be observed as follows:**

Part a – Max 50 words,                      Part b – Max 50 words,

Part c – Max 100 words and              Part d – Max 400 words.

Word limit NOT to be followed for diagram, numerical, derivation.

- Q. 1 (a) What are the types of economics? 02  
 (b) What are main sectors of an economy? 02  
 (c) What is law of demand and supply? 03  
 (d) What is market economy? How it differs from the controlled economy? Discuss. 07

**OR**

Draw demand and supply curve and show the equilibrium price on it. Discuss how the slope of the curves affect the equilibrium price. 07

- Q. 2 (a) Name a few financial instruments. 02  
 (b) What is theory of interest rate? 02  
 (c) What is yield curve and its shape? 03  
 (d) Write a note about the financial system in India and mechanism to regulate them. 07

**OR**

What is inflation? Discuss its causes and effects. 07

- Q. 3 (a) What do we mean by financial instruments? 02  
 (b) What are the financial instruments that are available for investments? 02  
 (c) What are government bonds? Why are the purpose of these bonds? 03  
 (d) What are major risks associated in the financial market? Discuss. 07

**OR**

What are the short term and long term financial instruments? Discuss with examples. 07

- Q. 4 (a) State the purpose of accounting. 02  
 (b) Why does cash flow statement is prepared? 02  
 (c) What is the importance of financial statements of a company? 03

(d) What are important financial ratio that can be derived from financial statements? Discuss their utility. 07

OR

What are major important financial statements that every manufacturing organization prepares? Discuss their utility. 07

- Q. 5 (a) What is the function of forex market? 02
- (b) Who are the buyers and sellers in the forex market? 03
- (c) Why currency stability is important for any country? 07
- (d) How emotions affects decision making process? Discuss with examples. 07

OR

What is derivative market? Discuss its instruments. 07

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