

Total No. of Printed Pages:4

**SUBJECT CODE NO:- H-147**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Project Management and Operations Research**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Solve any three questions from each section.
  2. Assume suitable data. If required.
  3. Draw neat sketches, wherever necessary.

**Section A**

- Q.1 a) Discuss the various phases of operations research. 06
- b) Solve graphically. 07  
 Maximize,  
 $Z = 7x_1 + 10x_2$ ;  
 Subjected to,  
 $x_1 + x_2 \leq 30,000$ ,  
 $x_2 \leq 12,000$ ,  
 $x_1 \geq 6,000$ ,  
 $x_1 \geq x_2$ ,  
 $x_1, x_2 \geq 0$ .
- Q.2 Solve by Big M method 13  
 Maximize,  
 $Z = 4x_1 + 5x_2 + 3x_3$ ;  
 Subjected to,  
 $x_1 + x_2 + x_3 = 10$ ,  
 $x_1 + x_2 \geq 1$ ,  
 $2x_1 + 3x_2 + x_3 \leq 30$ ,  
 $x_1, x_2, x_3 \geq 0$
- Q.3 Solve by simplex method 13  
 Minimize  
 $Z = x_1 - 3x_2 + 2x_3$ ;  
 Subjected to,  
 $3x_1 - x_2 + 3x_3 \leq 7$ ,  
 $-2x_1 + 4x_2 \leq 12$ ,  
 $-4x_1 + 3x_2 + 8x_3 \leq 10$ ,  
 $x_1, x_2, x_3 \geq 0$

Q.4 The following table shows the cost of transportation from each plant to each warehouse. 14

		Warehouses			
		1	2	3	4
Plants	X	40	44	48	35
	Y	37	45	50	52
	Z	35	40	45	50

The present associations are as follows:

$X \text{ to } 1 = 80, X \text{ to } 2 = 80, Y \text{ to } 3 = 10, Y \text{ to } 4 = 30 \text{ \& } Z \text{ to } 4 = 190$

Check whether these present associations are optimum or not? If not, find the optimum solution and the min. cost of transportation.

Q.5 a) Solve the assignment problem given below. 07

		Machines					
		I	II	III	IV	V	VI
Jobs	1	5	3	4	7	1	6
	2	2	3	7	6	5	4
	3	4	1	5	2	4	3
	4	6	8	1	2	3	7
	5	4	2	5	7	1	6
	6	3	5	6	4	6	5

b) A manufacturer finds from his past records that the cost per year associated with a purchase price of Rs. 50,000 are given below. 06

Year	1	2	3	4	5	6	7	8
Maintenance Cost	15000	16000	18000	21000	25000	29000	34000	40000
Scrap value	35000	25000	17000	12000	10000	5000	4000	4000

Determine the optimum policy.

**Section B**

Q.6 a) A branch of a nationalized bank has only one typist. Since the typing work varies in length, the typing work is randomly distributed by Poisson's distribution with a mean service rate of 8 letters per hour. The letter arrives at the rate of 5 per hour during the entire 8 hour work day. If the typist is paid for Rs. 4 per hour. 07

Determine:-

- i) Equipment utilization
- ii) Time for which the typist remains idle
- iii) Cost of idle time
- iv) Average time the letter has to wait.

b) Solve the following game using the dominance property.

		Player 'B'			
		1	2	3	4
Player 'A'	1	3	2	4	0
	2	3	4	2	4
	3	4	2	4	1
	4	3	4	3	4

06

Q.7

a) The following table shows the time required for different jobs on different machines.

08

Find out

- i) The optimum sequence.
- ii) Min. elapsed time.
- iii) Idle time for each machine.

Each job is processed in the order  $m_1 - m_2 - m_3 - m_4$

Machines →	$m_1$	$m_2$	$m_3$	$m_4$
jobs ↓				
1	20	8	9	22
2	15	6	8	16
3	12	5	7	15
4	18	7	6	20
5	25	10	12	23

b) What are the assumptions used in sequencing model? Explain in brief.

05

Q.8

a) Explain the various costs associated with inventory.

06

b) An ABC corporation has got a demand for a particular part at 10,000 units per year. The cost per unit is Rs. 2 and it costs Rs. 36 to place an order and process the delivery. The inventory carrying cost is estimated as 9% of the average inventory

07

Find:-

- i) Economic order quantity.
- ii) Optimum no. of orders.
- iii) Minimum total cost.

- Q.9 For the following set of activities,
- i) Draw the network
  - ii) Identify the critical path.
  - iii) Find earliest time & latest time
  - iv) Total, free & independent float.

13

Activity	Proceeding Activity	Duration (Hours)
A	-	3
B	-	5
C	-	8
D	A	12
E	A	5
F	B, D, C	7
G	E	9
H	E, F	12
I	H, G	10

- Q.10 A project consists of the following activities; find the optimum project time and minimum total project cost by crashing the appropriate activities. The Indirect cost per day is Rs. 160.

14

Activities	Normal		Crash	
	Cost (Rs.)	Time (days)	Cost (Rs.)	Time (days)
1-2	360	3	400	2
2-3	1440	6	1620	4
2-4	2160	9	2380	5
2-5	1120	7	1600	5
3-4	400	8	800	4
4-5	1600	5	1770	3
5-6	480	3	760	2

Total No. of Printed Pages:1

**SUBJECT CODE NO: H-222**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Elective-II : Computational Fluid Dynamics**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Solve any three questions from each section A & B
  - ii) Assume suitable data, if necessary

**Section A**

- Q.1 Explain procedure to determine the lift for an arbitrary two dimensional body using source panel method. 13
- Q.2
- a) Explain elliptic partial differential equation applicable to CFD 08
  - b) Discuss vortex panel method applied to lifting flow over flat plate 05
- Q.3 Explain the conservative upwind discretization for hyperbolic system using suitable examples 13
- Q.4 Explain concept of numerical dissipation with suitable examples 13
- Q.5 Short notes on (any two) 14
- i) Weak formulation
  - ii) Application of CFD
  - iii) Explicit finite difference method of viscous flow

**Section B**

- Q.6 Explain Runge-kutta and multi stage time stepping 13
- Q.7
- a) Explain PESO solver algorithm 08
  - b) Explain power law schemes 05
- Q.8
- a) Explain finite difference formulation of steady one dimensional conduction equation. 08
  - b) Discuss the properties of discretization schemes 05
- Q.9 Explain various flux-splitting schemes in details. 13
- Q.10 Short notes on (any two) 14
- i) Lax- wendroff time stepping
  - ii) Hybrid scheme
  - iii) Problem solving with CFD

Total No. of Printed Pages:01

**SUBJECT CODE NO: H-221**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Elective-II : Machine Tool Design**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Solve any three questions form each section
  - ii) Figures to the right indicate full marks
  - iii) Assume suitable data if required & state it clearly

**Section A**

- |                  |  |    |
|------------------|--|----|
| Q.1              | a) Discuss working & auxiliary motions in machine tools                          | 06 |
|                  | b) With the help of schematic diagram explain rotary hydraulic drive             | 07 |
| Q.2              | a) What are the key requirements in layout of machine tool?                      | 06 |
|                  | b) What is the aim of speed and feed rate regulation?                            | 07 |
| Q.3              | Discuss the various laws of stepped regulation of speed for design of speed box. | 13 |
| Q.4              | a) Describe the concept of speed chart (Assume suitable example)                 | 08 |
|                  | b) Discuss special cases of gear box design.                                     | 05 |
| Q.5              | a) Describe design criteria for machine tool structure.                          | 07 |
|                  | b) Explain basic design procedure for machine tool structure.                    | 07 |
| <b>Section B</b> |  |    |
| Q.6              | a) Explain functions and types of slide ways.                                    | 07 |
|                  | b) Describe methods of adjusting clearances in slide ways.                       | 06 |
| Q.7              | a) Discuss design of antifriction guide ways.                                    | 07 |
|                  | b) Write down functions and requirements of spindle unit.                        | 06 |
| Q.8              | Discuss design calculations of spindles  | 13 |
| Q.9              | a) With the help of suitable block diagram discuss closed loop machining system  | 06 |
|                  | b) Describe dynamic characteristic of the equivalent elastic system              | 07 |
| Q.10             | a) Describe dynamic characteristic of the cutting process                        | 07 |
|                  | b) Write a shot note on forced vibration of machine tool                         | 07 |

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-304**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**I.C. Engines**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i) Solve any three questions from each section.
  - ii) Support your answer with figure wherever possible.
  - iii) Figures to the right indicate full marks.
  - iv) Assume suitable data, if necessary.
  - v) Use of non-programmable electronic calculator, is permitted.

## Section A

- |     |   |    |
|-----|---|----|
| Q.1 | a) In what respect four stroke cycle CI engine differ from that of an SI engine?  | 07 |
|     | b) What is dissociation? Explain its effect on maximum temperature & brake power how does the presence of co affect dissociation?                                       | 07 |
| Q.2 | a) What do you mean by solid injection systems name the different type of solid injection system? Explain any one with neat sketch.                                     | 07 |
|     | b) Describe with neat sketch crankcase scavenged two stroke engine.   | 06 |
| Q.3 | a) What are the functions of fuel injections nozzles? With sketches explain any two types of fuel injection nozzle.   | 07 |
|     | b) Write a short note on 'Alternative fuels'  | 06 |
| Q.4 | a) Describe with the help of simple diagram. T-type, L-type and I-type combustion chamber head.   | 07 |
|     | b) Briefly explain the composition factors that affects knock in SI engines.  | 06 |
| Q.5 | a) Discuss the effect of following engine variables on knock in SI engine.  | 07 |
|     | <ol style="list-style-type: none"> <li>1. Compression ratio</li> <li>2. Spark timing</li> <li>3. Inlet temperature</li> <li>4. The mass of inducted charges.</li> </ol> |    |
|     | b) Explain the stages of combustion in SI engine with P- $\theta$ diagram.  | 06 |

## Section B

- Q.6 a) Describe the Influence of following factors on delay period in CI engines. 07
1. Intake pressure
  2. Injection pressure
  3. Engine size
  4. Compression ratio
- b) Enlist the types of IDI type combustion chamber for CI engines? Explain any one with neat sketch. 07
- Q.7 a) Briefly describe the different methods used to control knock in CI engines. 07
- b) Describe the phenomenon of knock in CI engines. 06
- Q.8 a) State different methods used for measuring the friction power. Explain any one. 06
- b) An eight- cylinder four stroke SI engine of 80mm bore and 100 mm stroke is tested at 4500 rpm on dynamometer which has 55 cm arm. The dynamometer scale reading was 40 kg. The time for 100 cc of fuel consumption is recorded as 9.55 sec. The calorific value of fuel is. 44,000 kj/kg Air at 1 bar and 27<sup>0</sup>C was supplied to carburettor at the rate of 6 kg/min Assume specific gravity of fuel to be 0.7 clearance volume of each cylinder 65CC. Determine:- 07
1. bp
  2. bmep
  3. bsFc
  4. brake thermal efficiency
  5. Relative efficiency.
- Q.9 Write a short note on:-
- a) Stirling engine 07
  - b) HCCI engine 06
- Q.10 a) What is the effect of following variables on CI engine exhaust emission? 07
1. Injection timing
  2. Type of fuel
  3. F/A ratio
  4. Intake air dilution
- b) Discuss 'EURO Emission Norms'. 06



Total No. of Printed Pages:3

**SUBJECT CODE NO:- H-182**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Refrigeration and Air Conditioning**  
**(REVISED)**

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Solve any three questions from each section.
  2. Figure to the right indicate full marks.
  3. Use of refrigerant table, steam tables & psychometric chart is allowed.
  4. Assume suitable data wherever necessary.

**Section A**

- Q.1
- a) Explain the Ton of refrigeration & show that it is equivalent to 3.5 kW. 03
  - b) Differentiate between; Refrigerator & Heat pump with neat sketch. 03
  - c) The capacity of refrigerator is 200TR when working between  $-6^{\circ}\text{C}$  &  $25^{\circ}\text{C}$ . Determine the mass of ice produced per day from water at  $25^{\circ}\text{C}$  also find the power required to drive the unit. Assume that cycle operates on reversed Carnot cycle & latent heat of ice is 335 kJ/kg. 07
- Q.2 In a 15TR ammonia refrigeration plant the condensing temperature is  $25^{\circ}\text{C}$  & evaporating temperature is  $-10^{\circ}\text{C}$ . The refrigerant ammonia is sub cooled by  $5^{\circ}\text{C}$  before passing through throttle valve. The vapour leaving evaporator is 0.97 dry. 13
- Find:-
- 1) C.O.P
  - 2) Power required
- Specific heat of liquid refrigerant = 4.6 KJ/ Kg-k & Specific heat of super-heated Vapour = 2.8 KJ/ Kg-k.
- Q.3 A vapour compression system with ammonia as a refrigerant works between pressure limit of 2 bar & 12 bar with three stage compression. The vapour leaving the water intercoolers at a pressure 4 bar & 8 bar are in a saturated state. If the load is 10TR, 13
- Find:-
- a) Power required to drive the three compressors
  - b) Compare the C.O.P of this system with simple saturation cycle, working between the same overall pressure limit.
- Q.4 A dense air refrigeration system operates between 4 bar & 12 bar. The air temperature heat rejection to surrounding is  $37^{\circ}\text{C}$  and the air temperature at the exit is  $7^{\circ}\text{C}$ . The isentropic efficiency of compressor & turbine are 0.85 & 0.82 respectively, determine. 13
1. Compressor and turbine work per tonne of refrigeration
  2. COP
  3. Power per tonne of refrigeration.

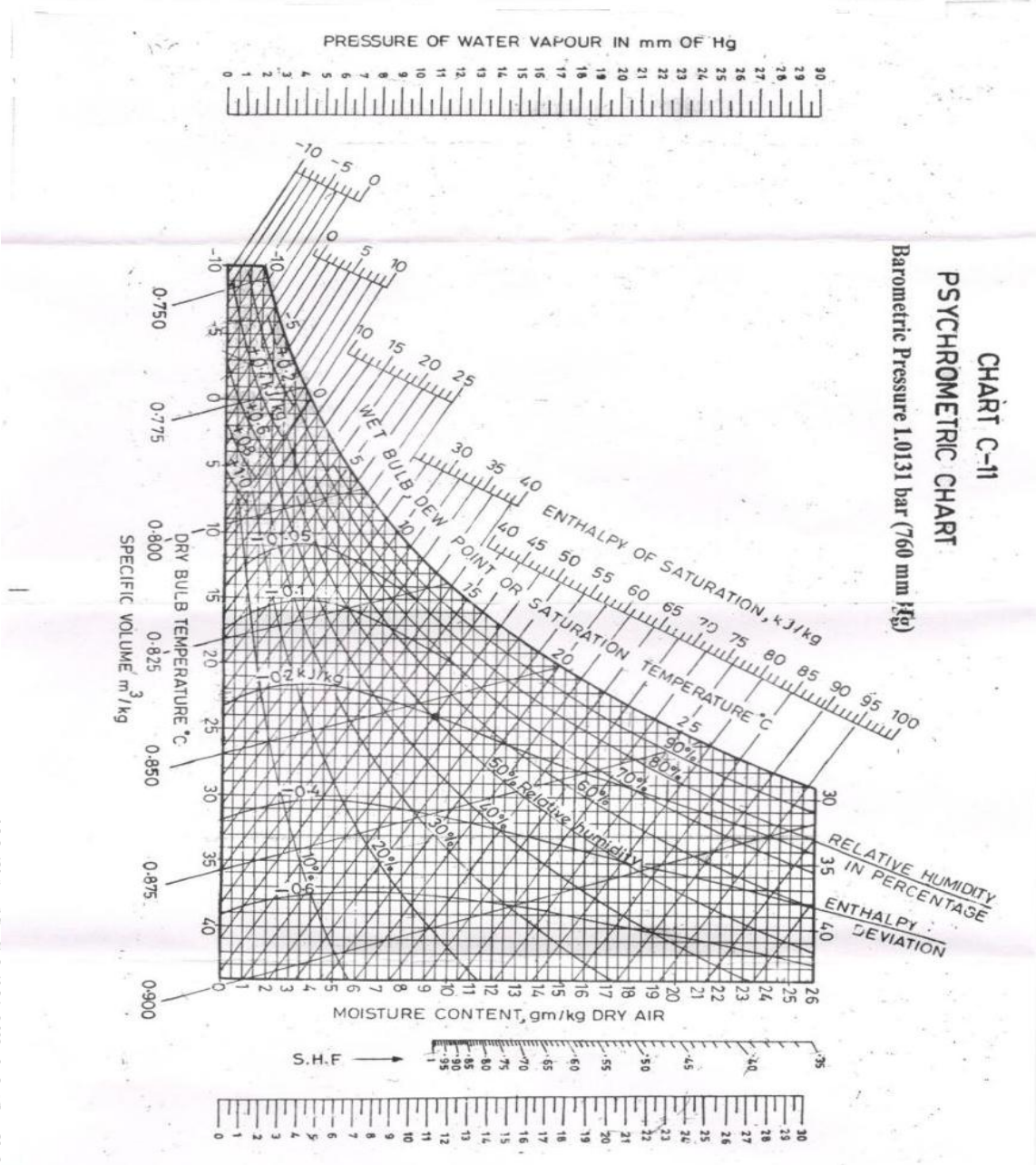
Draw the cycle on P.V and T.S diagrams. Take  $\gamma = 1.4$  &  $C_p = 1.005 \text{ KJ/kg} - k$  for dense air.

- Q.5 Write short notes on (any three) 14
- Cascade refrigeration system
  - Necessity of air-cooling in aero plane
  - Bell- Coleman cycle
  - Actual vapour compression cycle
  - DART

### Section B

- Q.6 a) Explain Lithium-bromide vapour absorption system with neat sketch. 06
- b) Distinguish between vapour absorption refrigeration systems with vapour compression refrigeration system. 07
- Q.7 a) Explain the procedure for designation of refrigerants. 06
- b) Explain the necessity of finding alternatives to CFC's. What are the better options available for CFC's? 07
- Q.8 a) Define the following terms. 06
- Degree of saturation.
  - Humidity
  - Dew point temperature
- b) The readings from a sling psychrometer are Dry bulb temperature= $30^{\circ}\text{C}$ ; wet bulb temperature =  $20^{\circ}\text{C}$ ; Barometer reading = 740mm of Hg. Using steam table determine. 07
- Dew point temperature
  - Relative Humidity
  - Specific humidity
  - Degree of saturation
- Q.9 An air conditioned auditorium is to maintained at  $27^{\circ}\text{C}$  dry bulb temperature and 60% relative humidity. The ambient condition is  $40^{\circ}\text{C}$  dry bulb temperature and  $30^{\circ}\text{C}$  wet bulb temperature. The total sensible heat load is 100000 kJ/h and total latent heat load is 40 000 kJ/h. 60% of the return air is recirculated and mixed with 40% of make-up air after the cooling coil. The condition of air leaving the cooling coil is at  $18^{\circ}\text{C}$ . Determine 13
- Room sensible heat factor;
  - The condition of air entering the auditorium
  - The amount of make-up air;
  - Apparatus dew point temperature
  - By-pass factor of cooling coil.

- Q.10 Write short note on (any three)
- i) GWP and ODP
  - ii) Human comfort
  - iii) Practical vapour absorption system
  - iv) Central air conditioning
  - v) Sling psychrometer



Total No. of Printed Pages:02

**SUBJECT CODE NO: H-223**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Elective-II : Industrial Engineering**  
**(REVISED)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Solve any three questions from each section.
  - 2) Figure to the right indicates full marks.
  - 3) Assume suitable data if required & State it clearly.

**SECTION – A**

- Q.1 a) Enlist the factors influencing productivity. Explain how each factor will affect productivities. 06  
 b) Explain partial productivity measures and total productivity measure and what are the advantages and limitations of both. 07
- Q.2 a) Explain basic work content and excess work content. What are the reasons for excess work content? 07  
 b) Define work. What are the components of work study? 06
- Q.3 a) Explain the procedure for method study. 07  
 b) What are therbligs? Give any five therbligs with symbols. 06
- Q.4 a) Draw a material type flow process chart for “Machining of the component”. 08  
 b) Explain various method study symbols with suitable examples. 05
- Q.5 Write short note on the following (any two) 14  
 i) Principles of motion economy related to arrangement of work place.  
 ii) Design of controls in ergonomics.  
 iii) Aspects of man – machine system.

**SECTION – B**

- Q.6 a) Explain the various types of elements with examples for each. 05  
 b) Explain various timing method in stop watch technique. 04  
 c) Explain the terms qualified worker and normal worker. 04

- Q.7 a) What is work sampling? What are its merit & limitations? Also write steps in work sampling study. 09
- b) Explain the concept of predetermined motion time study. 04
- Q.8 a) Why it is necessary to give allowances? What are the different types of allowances? 06
- b) Explain the concept of job evaluation & merit rating. 07
- Q.9 a) Define Kaizen concept. Also discuss relationship between Kaizen and PDCA cycle. 06
- b) Discuss Kaizen umbrella for quality improvement. 07
- Q.10 Write short note on the following (any two) 14
- i) Single minute exchange of dies.
- ii) Push and pull system of manufacturing.
- iii) Toyota production system.

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-452**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Elective-I : Production Planning and Control**  
**[REV]**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Solve any three questions from each section.
  - 2) Use of non – programmable calculator is permitted.
  - 3) Assume suitable data, if required, clearly stating the relevant assumptions made.

## Section A

- Q.1 a) Draw a typical decentralized organization chart of PPC used in industry. 07
- b) Briefly explain the functions of PPC in detail. 07
- Q.2 a) Write on objectives and advantages of PPC in an industry. 05
- b) Explain any 3 types of qualitative techniques used in sales forecasting. 08
- Q.3 a) Briefly explain use of Exponential smoothing and correlation in sales forecasting. 05
- b) An XYZ company has an old forecast of 350 lakhs initially, using  $\alpha = 0.5$  and  $\beta = 0.1$ . Find out the new forecast for the following series of 10 observations of sales (in Rs Lakhs) 390,390,320,370,340,330,380,340, 390,310. 08
- Q.4 a) Differentiate between the P system and Q system of selective control techniques with suitable graph. 05
- b) The demand for the particular item is 15,000 per year. The ordering cost is Rs 110 per order. The carrying cost is Rs 0.5 per unit per year. Determine the
- a. EOQ
  - b. Number of orders per year
  - c. Total inventory cost

- Q.5 a) Following table shows the incomplete material requirement planning (MRP-1) of XYZ Company, final goods. Calculate the MRP and shows when planned order release to be made  
Lead time = 3; Order quantity = 100

Requirements		50	0	30	20	0	0	70	20
Scheduled receipts			100						
On hand	60								
Planned order Release									

- b) Discuss in detail MRP- I (Material Requirement Planning) and ERP (Enterprise Resource Planning) 08

Section B

- Q.6 a) Describe the routing procedure in detail. 06  
 b) Define loading? Write on any 2 types of scheduling methods. 07
- Q.7 a) Differentiate between line balancing and line of balance (LOB) 05  
 b) Write on 4 types of documents maintained by dispatching department. 08
- Q.8 a) Define follow up? Briefly explain any 3 types of follow up. 07  
 b) Discuss in detail Gantt chart and master production schedule. 06
- Q.9 a) Discuss mistake proofing techniques. 06  
 b) Write the steps used for set up time reduction technique. 07
- Q.10 Write a short note on (any two) 14  
 a) JIT and Lean  
 b) Factors affecting routing procedure  
 c) BOM and Master schedule

Total No. of Printed Pages:01

**SUBJECT CODE NO:- H-451**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E (Mechanical)**  
**Elective –I : Power Plant Engineering**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B 1. Question no. 1 and 6 are compulsory. Solve any two from remaining questions in each section.

## Section A

- |     |   |    |
|-----|---|----|
| Q.1 | a) Discuss in detail the different sources of energy.                 | 06 |
|     | b) Describe load curve & load duration curve.                         | 06 |
| Q.2 | a) Describe the layout of modern thermal power plant.                 | 07 |
|     | b) Explain single retort stoker.                                      | 07 |
| Q.3 | a) Describe electrostatic precipitator in detail.                     | 07 |
|     | b) Enlist advantages of thermal power over Diesel Engine Power Plant. | 07 |
| Q.4 | a) Describe the screw conveyor and bucket elevator.                   | 07 |
|     | b) Discuss the applications of diesel engine power plant.             | 07 |
| Q.5 | a) Describe Spalsh lubrication system with neat sketch.               | 07 |
|     | b) Discuss advantages and disadvantages of Diesel Engine Plant.       | 07 |

## Section B

- |      |  |    |
|------|--|----|
| Q.6  | a) How cost of electricity generation is calculated. Discuss each cost in detail.            | 06 |
|      | b) Discuss the various criteria used for selecting the generating equipments in power plant. | 06 |
| Q.7  | a) “Surge tank act as safety device on Hydroelectric Plant”. Justify the statement.          | 07 |
|      | b) Explain governing of impulse turbine.   | 07 |
| Q.8  | a) What is dam? Discuss various types of dam.  | 07 |
|      | b) Discuss classification of Hydroelectric Power Plant in detail.                            | 07 |
| Q.9  | a) Explain multiplication and thermal utilization factor.                                    | 07 |
|      | b) Discuss advantages and disadvantages of Nuclear Power Plant.                              | 07 |
| Q.10 | a) Explain in detail the CANDU reactor.  | 07 |
|      | b) Describe the working of fast breeder reactor with neat diagram.                           | 07 |



Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-338**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Automatic Control System**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

1. Attempt any three questions from each section.
2. Use of semi log paper and graph paper allowed.
3. Make necessary assumptions and state them clearly.
4. Figures to the right indicate full marks.

Section A

- Q.1 a) Give the classification of control system and list the difference between feedback and feedforward system. 06  
 b) What are basic modelling elements of mechanical and electrical system? 07
- Q.2 a) Obtain overall T.F.  $\frac{C(S)}{R(S)}$  for the system shown in fig.1 07

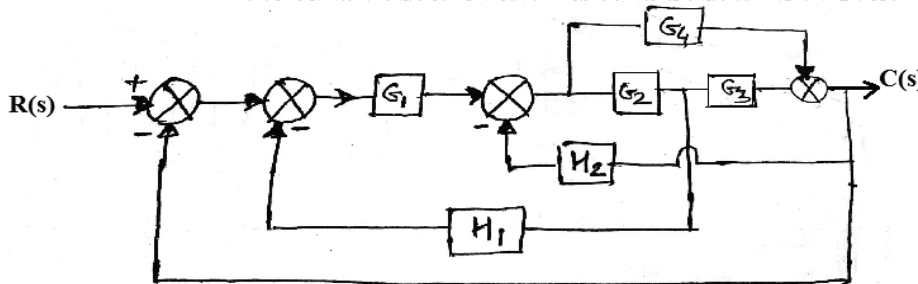


Fig.1 Block Diagram

- b) Explain the terminologies related to signal flow graph. 06
- Q.3 a) Obtain Transfer Function of the lead Network shown below fig.2 07

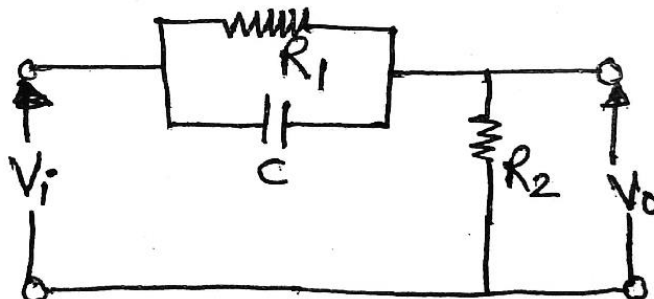


Fig .2 Network

b) Find  $\frac{C(S)}{R(S)}$  using Massons Gain formula for given SFG below in fig.3

06

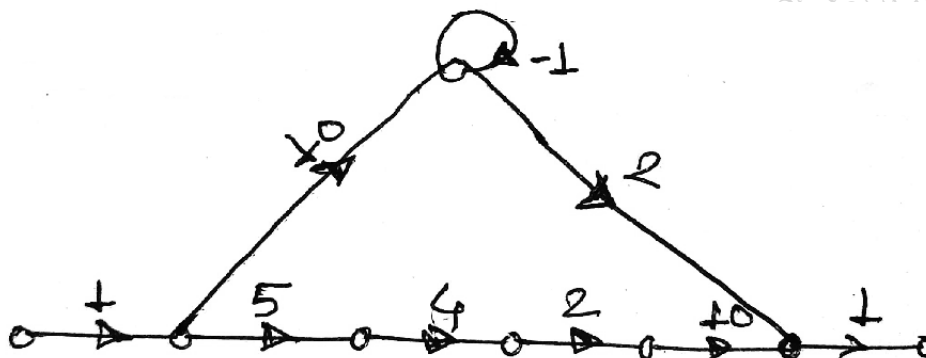


Fig.3 Signal Flow Graph

Q.4 a) Obtain an expression for Transfer function for an armature controlled D.C. servomotor? 07  
 b) Give the classification of industrial controllers and explain ON-OFF controller with example. 06

Q.5 Write short Note on any Three 14  
 a) Pneumatic Flapper Nozzle Amplifier  
 b) Requirements of Good Control System  
 c) Concept of Grounded chair representation  
 d) Force Voltage and Force Current Analogy  
 e) AC servomotor

Section B

Q.6 a) Explain Need for standard test Input Signals. What are the different types standard Input Signals? 06  
 b) A unity feedback control system has an Open Loop Transfer Function  $G(S) = \frac{5}{s(s+1)}$  find  $t_d$ ,  $t_r$ ,  $t_p$ ,  $t_s$  and % Mp for step input of 10 units. 07

Q.7 a) Find the range of 'K' for system to stable for given unity feedback system has 07  
 $G(S) = \frac{K}{s(s+10)(s^2+4s+5)}$   
 b) Explain Nyquist stability criterion. 06

Q.8 a) Give the difference between time response analysis and frequency response analysis. 06  
 b) Draw an polar plot of  $(s) = \frac{10}{s(s+1)(s+2)}$ . 07

Q.9 a) Sketch the Bode Plot and hence find Gain Cross over frequency, phase crossover frequency, Gain Margin, Phase Margin and also comment on stability  $G(s) = \frac{10(1+0.1s)}{s(1+0.01s)(1+s)}$  13

Q.10

- a) Sketch the Root Locus of system has OLTF  $G(s) = \frac{K}{s(s+5)(s+10)}$ .
- b) Write down procedure for constructing the Root Locus.

10

04

Total No. of Printed Pages:1

**SUBJECT CODE NO:- H-454**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Elective – I : Modern Management Techniques**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Q.No.1 and Q.No.6 are compulsory
  2. Solve any two questions from Q.2 to Q.5 in section A.
  3. Solve any two questions from Q.7 to Q.10 in section B.
  4. Draw neat sketches, wherever necessary.
- Section A
- |           |   |    |
|-----------|---|----|
| Q.1       | a) Define TQM & explain dimensions of Quality with examples.                  | 08 |
|           | b) Enlist old & new QC tools with applications.                               | 08 |
| Q.2       | a) Explain evolution six sigma with example.                                  | 06 |
|           | b) Enlist & explain wastages in JIT.  | 06 |
| Q.3       | a) What are the advantages & disadvantages with examples?                     | 06 |
|           | b) Explain five why analysis with examples.                                   | 06 |
| Q.4       | a) Explain poka yoke method with examples.                                    | 06 |
|           | b) Explain SMED with examples.  | 06 |
| Q.5       | a) Explain elements of JIT with examples.                                     | 06 |
|           | b) Define & explain role of TQM in an industry.                               | 06 |
| Section B |   |    |
| Q.6       | a) Define QFD & explain QFD with examples.                                    | 08 |
|           | b) Define & explain value engineering with examples.                          | 08 |
| Q.7       | a) Explain the parameters of overall equipment effectiveness with example.    | 06 |
|           | b) Explain five TPM development activities with examples.                     | 06 |
| Q.8       | a) Differential creativity & innovation with examples.                        | 06 |
|           | b) What are characteristics & significance of creativity & innovation?        | 06 |
| Q.9       | a) Differentiate between vertical thinking & parallel thinking with examples. | 06 |
|           | b) Explain six thinking hats with examples.                                   | 06 |
| Q.10      | a) What are features & elements of factor of QWC & explain these.             | 06 |
|           | b) Differentiate between QWL & WLB with example.                              | 06 |

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-225**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Elective – II : Piping System Engineering**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Solve any three questions from each section.
  2. Use of data book/property tables is permitted.
  3. Marks are reserved for figures, charts, graphs wherever necessary.
  4. Assume suitable data if required.

## Section A

- |     |   |    |
|-----|---|----|
| Q.1 | a) Explain use of piping in oil/petroleum industries.                         | 06 |
|     | b) Discuss the role of process engineer, stress analyst in piping industries. | 07 |
| Q.2 | a) Explain need and use of pressure relieving (PRV) valves /device.           | 06 |
|     | b) Sketch commonly used reducers and couplings.                               | 07 |
| Q.3 | a) How software's help in network analysis.                                   | 06 |
|     | b) Explain with neat sketch control valve.                                    | 07 |
| Q.4 | a) Sketch different types of wyes, bends.                                     | 06 |
|     | b) Explain any one method of network analysis.                                | 07 |
| Q.5 | Write short notes on (any two)  | 14 |
|     | 1. ASME 31.1 and 31.3   |    |
|     | 2. EPC  |    |
|     | 3. Line sizing  |    |

## Section B

- |     |   |    |
|-----|---|----|
| Q.6 | a) Explain desirable properties of piping and piping equipment materials.   | 06 |
|     | b) Enlist different materials for low, normal and high temperature services pipelines and justify their use.  | 07 |
| Q.7 | a) "Process & Instrumentation Diagram (P & ID) shows all of piping including the physical sequence of branches, reducers, valves, equipment, instrumentation and control interlocks", justify the statement with example. | 06 |
|     | b) Draw different line and valve symbols used in piping.  | 07 |

- Q.8 a) Sketch a sample BFD and PFD for sample piping application. 06  
b) Discuss loads and supports in piping. 07
- Q.9 a) Explain the need and techniques of insulation. 06  
b) How will you estimate optimum and critical thickness of insulation? 07
- Q.10 Write short notes on (any two) 14  
1. Cryogenic material  
2. Equipment layout  
3. MTO

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-226**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Ele-II : Automotive Technology**  
**(Revised)**

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Q.1 & Q.6 are compulsory.
  2. Solve any two questions from remaining questions from each section.
  3. Assume suitable data if required.

## Section A

- Q.1 The coefficient of rolling resistance for a track having weight 5342 kg is 0.016 & coefficient of air resistance is 0.032 in the formula  $R = C_r \cdot W + K_a \cdot A \cdot V^2$ , N, where 'A' is frontal area in  $m^2$ , 'V' is vehicle speed in km/hr. the transmission efficiency in top gear of 6.8:1 is 87% & that in the first gear of 17% is 80%. The frontal area is  $6.4 m^2$ . If the truck has to have maximum speed of 90 km/hr in top gear calculate: 10
- a) The engine brake power required
  - b) The engine speed if driving wheel have an effective diameter of 0.9 m.
  - c) The slope of gradient is  $12^\circ$ , calculate total resistance in first gear at above engine speed
  - d) The maximum drawbar pull available on level at above engine speed in first gear.
- Q.2 a) Define motor vehicle? Explain the significance of front engine rear wheel drive vehicle layout. 08
- b) Explain air resistance of the vehicle. 07
- Q.3 a) What are the types of piston rings? Explain its function, material & manufacturing method. 08
- b) Explain direct systems of the vehicle with a neat sketch. 07
- Q.4 a) The weight of 4 –door sedan without passengers are 1050 kg on front axle & 600 kg on the rear axle. The wheel base 'L' is 109 inches. Determine the position of centre of gravity from front axle of vehicle. 03
- b) Derive the equation of maximum acceleration for front wheel drive vehicle. When it is negotiating a grade of angle ' $\theta$ '. 06
- c) Define:- 06
- i) Surplus power
  - ii) Slip angle
  - iii) Tractive effort
  - iv) Roll over

- Q.5 a) Why catalytic converter is called as after treatment device? Explain exhaust system of the naturally aspirated engine. 08
- b) What are the effects of resistance of vehicle on vehicle performance parameters? 07

Section B

- Q.6 What is child restraint system? Explain seat belt with coiler. 10
- Q.7 a) What is meant by integrated safety? How example zone protect passangers in a accidental condition? 08
- b) Explain Hydrolastic suspension system of the vehicle. 07
- Q.8 a) What is Automatic climate control technology? Explain heating system of the vehicle. 09
- b) Explain ignition system of the vehicle with a neat sketch. 06
- Q.9 a) Explain Antilock braking system with a neat sketch. 08
- b) Whether hybrid vehicle is called as zero pollution vehicle? Explain parallel hybrid vehicle. 07
- Q.10 a) Explain driverless car with all its technologies. 08
- b) Why the brake booster is provided in braking system of vehicle? Explain power windows. 07



Total No. of Printed Pages:01

**SUBJECT CODE NO:- H-495**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Robotics and Industrial Automation (Elective –II)**  
**(Revised)**

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B 1) Answer any three questions from each Section.  
Section A
- Q.1 a) Explain the terms Precision, Accuracy and Repeatability. 07  
b) Write about merits and demerits of electric drive. 06
- Q.2 a) Explain the applications of robot in material handling. 07  
b) Enlist different robot programming methods. Explain any one in detail. 06
- Q.3 a) Explain Forward & Inverse Kinematics transformation. 07  
b) Explain different types of sensors used in robots. 06
- Q.4 a) Compare Hydraulic drive with Pneumatic drive. 07  
b) Explain machine vision. 06
- Q.5 Write short note on any two:- 14  
a) Work envelopes  
b) Trajectory Planning  
c) Types of end effectors
- Section B
- Q.6 a) What is Coordinate Measuring Machine? 07  
b) Explain non-contact inspection methods. 06
- Q.7 a) Write about Timer, Counter and Arithmetic Functions in PLC. 07  
b) Describe various Part Feeding Devices. 06
- Q.8 a) Explain Ladder Logic Diagrams. 07  
b) Compare Continuous and Discrete Control. 06
- Q.9 a) What is Automated Guided Vehicle ? 07  
b) Explain Flexible manufacturing system. 06
- Q.10 Write short note on any two:- 14  
a) Types of Automation  
b) Automated Material Handling and Storage Systems.  
c) Industrial Control Applications of PLC.

Total No. of Printed Pages: 02

**SUBJECT CODE NO:- H-114**  
**FACULTY OF SCIENCE & TECHNOLOGY**  
**B.E. (Mechanical)**  
**Automobile Engineering**  
**(Revised)**

**[Time: Three Hours]****[Max. Marks: 80]**

N. B Please check whether you have got the right question paper.

- N. B
- i) Solve any three questions from each section.
  - ii) Draw neat sketches wherever necessary.
  - iii) Assume suitable data, if required.
  - iv) Figure to right indicate full marks.

## Section – A

- Q. 1
- a) Enlist the layouts of an Automobile with different engine position and drive arrangement. 07  
Explain the four wheel drive arrangement with neat sketch.
  - b) Draw neat layout of a vehicle with front cross mounted engine and front wheel drive. 06  
Briefly state the function of the main components on the vehicle.
- Q. 2
- a) With a neat sketch explain the construction and working of a diaphragm spring, single plate 07  
clutch used in the vehicles.
  - b) What types of clutches are used for automatic transmission system? Explain the working of 06  
any one of them.
- Q. 3
- a) Explain the construction and working of differential with a neat sketch. 07
  - b) What is a synchromesh gear box? Explain with sketch the synchromesh arrangement used in 06  
an automobile gear box.
- Q. 4
- a) What is the function of an automobile suspension? Give the classification of the automobile 07  
suspension.
  - b) Write short note on torque converter. How it differ from fluid flywheel? 06
- Q. 5 Write short notes on (any two) 14
- a) Anti – roll bar used in a vehicle.
  - b) Differential
  - c) Performance curves
  - d) Overdrive

## Section – B

- Q. 6
- a) With neat diagram. Explain steering geometry – tursing circle caster, camber, toe-in-toe 07  
out. K.P.I, included angle, scrub radius and state their effects.
  - b) With neat sketch explain the construction and working of racks and pinion steering gear. 06

- Q. 7 a) Enlist the types of steering gearboxes. Describe in detail the rack and pinion type manual steering gearbox by mean of simple sketch. 07  
 b) Explain with neat diagram Hotchkiss drive. 06
- Q. 8 a) Give the comparison between battery and magneto ignition system. 07  
 b) What is the purpose of brake? Briefly describe construction and working of disc brake. Compare them with the conventional drum type brake. 06
- Q. 9 a) Explain with neat sketch Automobile Air – conditioning system. 07  
 b) With a block diagram explain the air conditioning system used in cars. How does it differ from the domestic air conditioning systems? 06
- Q. 10 Write short notes on (Any two) 14  
 a) Safety system in automobile  
 b) Battery used in automobiles.  
 c) Wheel alignment and wheel balancing.  
 d) Charging system

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-290**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Prod)**  
**Theory of Metal Forming**  
**(Old)**

[Time: Three Hours]

[Max.Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i. Q.5 and Q.10 are compulsory
  - ii. Solve any three questions from each section.
  - iii. Draw suitable diagrams wherever necessary.

## Section A

- |     |   |    |
|-----|---|----|
| Q.1 | a) Explain stress-strain curve in details.                                  | 08 |
|     | b) What is Yield Criteria?  | 08 |
| Q.2 | a) What Structural changes take place during the plastic working of metals? | 08 |
|     | b) What is spring back movement of metal?                                   | 08 |
| Q.3 | a) What are the different defects in Deep drawing?                          | 08 |
|     | b) What is Reverse drawing?   | 08 |
| Q.4 | a) Explain the upper bound and lower bound approach?                        | 08 |
|     | b) Explain Wall thinning and thickening?                                    | 08 |
| Q.5 | Write short notes on (any two)  | 18 |
|     | a) Classification of Forming processes                                      |    |
|     | b) Selection of Forging metals  |    |
|     | c) Recent developments in forging   |    |

## Section B

- |     |  |    |
|-----|--|----|
| Q.6 | a) How does the deformation in extrusion takes place?                        | 08 |
|     | b) What are the different defects in Extrusion? Also discuss their remedies. | 08 |
| Q.7 | a) How does the deformation in Rolling takes place?                          | 08 |
|     | b) Compare hot rolling and Cold rolling processes.                           | 08 |
| Q.8 | a) What are the roll pass design considerations? Explain in details.         | 08 |
|     | b) What are the principles involved in the drawing of Rod and Wire?          | 08 |
| Q.9 | a) How the coefficient of friction is measured in Metal working?             | 08 |
|     | b) What are the principles of lubrication in metal working?                  | 08 |

- Q.10 Write short notes on (any two)
- a) Hydrostatic extrusion
  - b) Defects in rolled product
  - c) Lubricants used in industrial metal working

Total No. of Printed Pages:02

**SUBJECT CODE NO:- H-407**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Turbo Machines**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

- N.B Please check whether you have got the right question paper.
- 1) Solve any three questions from each Section.
  - 2) Assume suitable data if necessary and mention it clearly.
  - 3) Figure to right indicate full marks.
  - 4) Use of non-programmable calculator is allowed.
- Section A
- Q.1 a) Explain how the principle of dimensional analysis is applied to the turbo-machines and explain their significance. 06
- b) Define a turbo machine. Differentiate between a turbo machine and a positive displacement machine. 07
- Q.2 a) Show that the angle of swing of a vertical hinged plate is given by  $\sin\theta = \rho av^2/w$  06  
 Where a= area of jet, v=velocity of jet,  $\theta$ = inclination of the plate with the jet and w=weight of the plate
- b) A stationary vane having an inlet angle of zero degree and an outlet angle of  $25^\circ$  receives water at a velocity of 50 m/s. Determine the components of force acting on it in the direction of the jet velocity and normal to it. Also find the resultant force in magnitude and direction per unit weight of the flow. 07
- Q.3 a) Derive the expression for the work done per second per unit weight for unsymmetrical moving curved plate striking tangentially at one of the tip. 06
- b) A jet of water moving at 12 m/s impinges on a vane shaped to deflect the jet through  $120^\circ$  when stationary. If the vane is moving at 5 m/s, Find the angle of the jet so that there is no shock at inlet. What is the absolute velocity of the jet at exit in magnitude and direction and the work done per second per unit weight of the water striking per second? Assume that the vane is smooth. 07
- Q.4 a) Define and explain hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine. 06
- b) Differentiate between i) radial and axial flow turbine 07  
 ii) impulse and reaction turbine

- Q.5 An inward flow reaction turbine has external and internal diameters as 1.0 m and 0.6 m respectively. The hydraulic efficiency of the turbine is 90 percent when the head on the turbine is 36 m. The velocity of flow at outlet is 2.5 m/s and discharge at outlet is radial. If the vane angle at outlet is  $15^\circ$  and width of the wheel is 100 mm at inlet and outlet. Determine
- 1) The guide blade angle,
  - 2) Speed of the turbine
  - 3) Vane angle of the runner at inlet
  - 4) Volume flow rate of turbine and
  - 5) power developed.

Section B

- Q.6 a) What is the difference between single-stage and multistage pump? Describe multistage pump with 1) impellers in series and 2) impellers in parallel.
- b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1200 rpm works against a total head of 75m. The velocity of flow through the impeller is constant and equal to 3 m/s. the vanes are set back at an angle of  $30^\circ$  at outlet. If the outer diameter of the impeller is 600 mm and width at outlet is 50 mm, determine : 1) Vane angle at inlet, 2) Work done per second by impeller, 3) Manometric efficiency.

- Q.7 In a single stage impulse turbine the mean diameter of the blade ring is 1 meter & rotational speed is 3000 rpm. The steam is issued from the nozzle at 300 m/s & nozzle angle is  $20^\circ$ . The blades are equiangular. If the friction loss in the blade channel is 19% of the K.E. corresponding to the relative velocity at the inlet to the blades, what is the power developed, when axial thrust on blade is 98 N. Also determine blading efficiency & resultant thrust on the blade.

- Q.8 a) Sketch Brayton cycle on P-V and T-S plot and derive a relation for its thermal efficiency in terms of pressure rating.
- b) What is bleeding in steam turbine? Describe energy losses in steam turbine.

- Q.9 The pressure ratio of an open-cycle gas turbine power plant is 5.6. Air is taken at  $30^\circ\text{C}$  & 1 bar. The compression is carried out in two stages with perfect intercooling in between. The maximum temperature of the cycle is limited to  $700^\circ\text{C}$  assuming the isentropic efficiency of each compressor stage as 85% and that of turbine as 90%, determine the power developed & efficiency of the power plant, if the air-flow is 1.2 kg/s. The mass of fuel may be neglected & it may be assumed that  $C_{pa} = C_{pg} = 1.02 \text{ KJ/Kg.K}$  &  $\gamma = 1.41$ .

- Q.10 Write short note on any three of the followings:-
- 1) Pressure Compounding of steam turbine
  - 2) Pump Characteristics
  - 3) Draft tube
  - 4) Open cycle gas turbine
  - 5) Reaction turbine

Total No. of Printed Pages: 02

**SUBJECT CODE NO:- H-227**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Elective – II : Advanced Vibration and Noise control**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

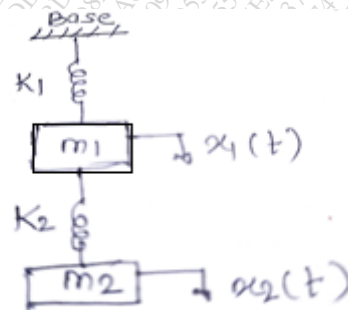
Please check whether you have got the right question paper.

N. B

1. Assume suitable data wherever necessary.
2. Draw neat diagrams wherever necessary.
3. Solve any three questions from each section.

Section A

- Q. 1      a. What is logarithmic decrement? Drive the relation for the same. 08  
           b. Discuss the effect of damping on vibrators System. What is meant by under damping, over 05  
           damping & critical damping?
- Q. 2      a. Compare Rayleigh's energy method and Dunkerleys method in determining the frequency 05  
           of vibrating system.  
           b. Find the natural frequencies of the system shown in fig. with  $m_1=m$ ,  $m_2=2m$ ,  $k_1=k$  and  $k_2=2k$ . Determine the response of the system when  $K=1000$  N/m,  $m=20$  kg and the initial value of the displacement of the masses  $m_1$  and  $m_2$  are 1 and -1 respectively. 08



- Q. 3      a. What is basic principle used in Rayleigh's method? 06  
           b. Explain two degree of freedom of system with suitable example. 07
- Q. 4      A uniform beam fixed at one end and simply supported at other end is having transverse vibration. Drive suitable expression for frequency. 14
- Q. 5      Write a short note on any three. 13  
           a. Half power method  
           b. Holzer's method  
           c. Longitudinal vibration of rods.  
           d. Coordinate coupling  
           e. Dunkerley's method.



Section B

- Q. 6 a. What is FFT? With the help of block diagram, explain the working of FFT analyzer. State the application of FFT analyzer. 08
- b. Explain the working principle of vibrometer and accelerometer. 05
- Q. 7 a. What do you mean by condition monitoring of machines? What are various condition monitoring techniques? 08
- b. Explain the importance of vibration isolation. 05
- Q. 8 a. Explain the methods of noise control. 06
- i) At the source
- ii) Along the path
- iii) At the receiver
- b. Six machines operating individually make sound levels of 78, 81, 81, 79, 72 & 65 dB respectively. Determine the total sound pressure level when all of them operate simultaneously. 07
- Q. 9 a. What is the basic idea behind the finite element method? What is the role of transformation matrices in the FEM. 08
- b. Explain the following terms of noise control. 06
- i) Sound pressure level
- ii) Sound power level
- iii) Loudness
- Q. 10 Write a short note on any three 13
- a) LDV
- b) MATLAB
- c) Noise measuring instrument
- d) Noise standard & limit
- e) Frequency measuring Instruments.

Total No. of Printed Pages: 02

**SUBJECT CODE NO:- H-503**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Prod)**  
**Elective-I: Manufacturing Systems**  
**(Old)**

[Time: Three Hours]

[Max. Marks: 100]

Please check whether you have got the right question paper.

- N. B
1. Solve any three questions from each section A and B.
  2. Assume suitable data, if required.
  3. Figure to the right indicates full marks.

Section A

- |      |  |    |
|------|--|----|
| Q. 1 | a) Write down the fundamentals of manufacturing system?                                | 08 |
|      | b) Distinguish between job order production and mass production.                       | 08 |
| Q. 2 | a) Draw and explain framework of Integrated Manufacturing & Management Systems (IMMS)? | 08 |
|      | b) What are the different types of manufacturing systems?                              | 08 |
| Q. 3 | a) Explain the working of Transfer line.   | 08 |
|      | b) Discuss the automated flow lines with storage buffer.                               | 08 |
| Q. 4 | a) How Detroit type automation works?  | 08 |
|      | b) Brief about computer simulation of automated flow lines?                            | 08 |
| Q. 5 | Answer the following:  | 18 |
|      | a) Computer applications in manufacturing  |    |
|      | b) Input and output of manufacturing system.   |    |
|      | c) Computer integral production inventory systems.                                     |    |

Section B

- |      |  |    |
|------|--|----|
| Q. 6 | a) Discuss Group Technology in details.                          | 08 |
|      | b) Elaborate on Production flow analysis.                        | 08 |
| Q. 7 | a) Explain in detail the types of cellular manufacturing layout? | 08 |
|      | b) Mention typical application of Flexible Manufacturing system. | 08 |
| Q. 8 | a) Discuss about automated factory remote control.               | 08 |
|      | b) What are the important factors in FMS planning?               | 08 |
| Q. 9 | a) Workplace control through the Kanban.                         | 08 |
|      | b) Formulate the components of lean.                             | 08 |

- Q. 10 Answer the following
- a) Concept of Zero Inventory.
  - b) Man-Machine System
  - c) Toyota Production System.

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-502**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Prod)**  
**Elective-II: Non-Conventional Machining Processes**  
**(Old)**

[Time: Three Hours]

[Max.Marks:100]

N.B Please check whether you have got the right question paper.

1. Solve any three questions from each section A and B.
2. Assume suitable data, if required.
3. Figure to the right indicates full marks.

Section A

- |     |  |    |
|-----|--|----|
| Q.1 | a) Explain in detail the various tool failure criterion.   | 08 |
|     | b) What is the likely future of unconventional machining processes? Explain.   | 08 |
| Q.2 | a) Is Ultrasonic machining really a chipless process? Explain.   | 08 |
|     | b) Compare AJM and USM in terms of Material removal rate, machining action obtained and the capital cost.                  | 08 |
| Q.3 | a) What are the desirable properties of abrasives used in AJM? And list the factors governing the material removal in AJM. | 08 |
|     | b) What is the principle of operation of the EDM process?  | 08 |
| Q.4 | a) Compare the various types of power supply circuits used for EDM.  | 08 |
|     | b) Describe the Operating Parameters and their effects on the performance of R-C Circuit type EDM process?                 | 08 |
| Q.5 | Solve any three  | 18 |
|     | a) Mechanism of tool wear.   |    |
|     | b) Write down the advantages and disadvantages of USM.   |    |
|     | c) Briefly explain the function and properties of the dielectric in EDM  |    |
|     | d) Critical Resistance parameters in RO Circuit  |    |

Section B

- |     |   |    |
|-----|---|----|
| Q.6 | Write short notes on (any three)              | 18 |
|     | a) Classification of ECM process.             |    |
|     | b) Equipment for production of Electron beam. |    |
|     | c) EBM process Characteristics.               |    |
|     | d) Types of torches used in PAM.              |    |

- Q.7 a) Explain the electrochemical Honning Process in detail. 08  
 b) On what factors does the metal removal rate and surface finish produced depend in ECM? 08
- Q.8 a) What is laser? What are the common types of laser for material processing? 08  
 b) Justify the role of maskants and etchants in Chemical Machining. 08
- Q.9 a) Explain the electroplating process in detail. 08  
 b) Draw and explain the Mechanism of metal removal in PAM. 08
- Q.10 a) Explain IBM along with process characteristics and applications. 10  
 b) Electrochemical Honning. 06

Total No. of Printed Pages:2

**SUBJECT CODE NO:- H-373**  
**FACULTY OF SCIENCE AND TECHNOLOGY**  
**B.E. (Mechanical)**  
**Metrology and Quality Control**  
**(Revised)**

[Time: Three Hours]

[Max. Marks:80]

N.B Please check whether you have got the right question paper.

- N.B
- i) Solve any three questions from each section.
  - ii) Figure to the right indicates full marks.
  - iii) Assume suitable data if required.
  - iv) Use of non-programmable calculator is allowed.

## Section – A

- |     |  |    |
|-----|--|----|
| Q.1 | a) Explain measurement standards with the help of suitable example                               | 06 |
|     | b) Explain autocollimator with neat sketch.  | 07 |
| Q.2 | a) Explain the construction and working of LVDT.   | 06 |
|     | b) Explain the surface finish measurement and draw the symbols used with their respective range. | 07 |
| Q.3 | a) Discuss the advantages in metrology in detail.  | 06 |
|     | b) Explain Parkinson's gear tester for measuring gear error.                                     | 07 |
| Q.4 | a) Enlist and explain the different types of gauges used with the help of neat diagram.          | 07 |
|     | b) Differentiate between CMM and UMM.  | 06 |
| Q.5 | Write short notes:(Any three)  | 14 |
|     | 1) Co-ordinate measuring machine   |    |
|     | 2) Profile projector   |    |
|     | 3) Need and importance of calibration  |    |
|     | 4) Limits and Fits   |    |

Section B

- Q.6 a) Explain quality of design and quality of performance. 07  
 b) Explain importance and use of quality circles in quality control. 06
- Q.7 a) Explain the QFD with the help of suitable example. 07  
 b) Explain quality of design and quality of performance. 06
- Q.8 a) Explain the Kanban system of production control. 07  
 b) Explain the characteristics of OC curve. 06
- Q.9 a) Define the term quality of product and differentiate between cost of quality and value of quality. 07  
 b) Explain the need and importance of total productive maintenance. 06
- Q.10 Write short notes on – Any three. 14  
 a) Just in Time  
 b) Pareto Analysis  
 c) Brain Storming  
 d) Sampling methods