G. M. VEDAK INSTITUTE OF TECHNOLOGY, TALA
Department of Mechanical Engineering
Academic Year 2020-21 (Second Half 2020)

Year / Sem – BE / VII

Subject/ Course – Machine Design-II (MEC701)

List of Assignments

Assignment No.01

Date of issue: (B1) 28|09|20
(B2) 28|09|20

Date of Submission: (B1) 07|10/20
(B2) 07|10/20

Course Outcome:

CO 1- Students should be able to select and design gears for power transmission on the basis of given load and speed.

Q1. It is required to design two stage spur gear reduction unit with 20^0 full depth involute teeth. The input shaft is connected to 10KW,1440rpm motor through flexible coupling. A speed of output shaft shall be approximately 180 rpm the starting torque motor is 150% of the avg. torque. The gears are made of plane carbon steel and surface hardness 340BHN. Design the gear and specify the dimensions. Draw detailed assembly drawing.

Assignment No.02

Date of issue: (B1) 07 /10/20
(B2) 07|10|20

Date of Submission: (B1) 10/10/20
(B2) 19/10/20

Course Outcome:

CO 2- Students should be able to select appropriate rolling contact bearings for given application from manufacturer's catalogue.

Q1. SKF bearing no. 22216 is subjected to an axial load 2KN and radial load of 8KN. The outer race rotates at 700rpm. The service factor 1.2while operating temperature is 135^0C. Determine the equivalent load. Determine the expected life of bearing with POS of 94%

Q2. A DGBB SKF No. 6208 is subjected to be in following work cycle

Element no.	Radial load,N	Trust Load, N	Speed, r.pm.	% Time Engaged
1	3000	1000	600	15
2	3500	1000	800	20
3	5000	100	900	30
4	500	2000	1500	35

If the service factor is 1.2, determine the expected life of the bearing in hours with the probability of survival of 90%.

Course Outcome:

CO 3. Students should be able to design sliding contact bearings for given application.

Q1. A 360^0 hydrodyanamically lubricated journal bearing supports a load of 20KN when operating at 1000rpm for steam turbine. The bearing pressure is 1.6 N/mm² and clearance is average, assuming bearing is to be self-contained, determine:
  i) The diameter and length of bearing.
  ii) The clearance ratio.
  iii) The minimum oil film thickness.
  iv) The viscosity of oil.
  v) The coefficient of friction.
  vi) The friction power loss.
  vii) The oil flow rate.

Assignment No.04

Course Outcome:

CO 5- Students should be able to select and design belt drive as well as chain drive.

Q1. A V-belt drive is transmit a 15KW to a compressor, motor speed is 1100rpm and compressor pulley run at 400rpm. The coefficient of friction between belt and pulley is 0.25, the compressor operates for 10 to 12 hrs per day. Draw detailed assembly drawing.

Assignment No.05

Course Outcome:

CO 4- Students should be able to select and design belt drive as well as chain drive.

Q1.Design the chain drive to meet following specifications:
  i) Input power: 5.5KW.
  ii) Input speed: 300rpm.
  iii) Output speed: 100rpm.

Assignment No. 06

Course Outcome:

CO 5- Students should be able to design flywheel for given applications.

Q1. the area of the turning moment diagram for one revolution of a multi-cylinder engine with reference to the mean turning moment, below and above the line are, -32,+408,-67,+333,-310,+226,-374,+260 and-244 mm^2.

The scale for abscissa and ordinate are 1mm=4.2 and 1mm=850Nm respectively.

A rimmed flywheel is required to keep down fluctuations in speed from 200 to 220 rpm. The mean diameter of flywheel should not be exceeded 2m.it can be assumed that the rim contributes 90% of the required moment of inertia. Determine the dimensions of the rim.

Assignment No. 07

Course Outcome:

CO 6- Students should be able to design clutch and brakes.

Q1. A cone clutch is used to transmit 0KW at 1200rpm. The coefficient of friction of 0.1, while the permissible intensity of pressure is 0.1N/mm^2. The semi cone angle is 20^0, the larger diameter of friction surface 500mm. overload factor is 1.25. Design the clutch (shaft dia. Spline design, friction plate dimension, spring design.)

Assignment No. 08

Course Outcome:

CO 6- Students should be able to design clutch and brakes.

Q1. A rope drum of an elevator having 650mm dia. Is fitted with a brake drum is provided with four cast iron brake shoe each subtending an angle of 45^0. The mass of elevator when loaded is 2000kg and moves with a speed of 2.5 m/s. the brake has sufficient capacity to stop the elevator in 2.75m.

Assignment No.01

Course Outcome:

CO1- Student will be able to illustrate production planning functions and manage manufacturing functionsin a better way.

1. Define the term Production Planning and Control and list down its need. **May19 / May17 /May16**

2. What is the status of PPC department depending upon the company's manufacturing processes. **Dec18**

3. What are the functions of PPC? **May19 / May18 / Dec15**

4. What are the different types of production (manufacturing) methods? Give characteristics with one example of each. **Dec18 / May17 / May16 / Dec15**

5. Write short note on relationship of PPC department with other departments. **Dec18**

6. What are the components and types for a manufacturing system? **Dec17**

7. Write note on PPC as an integrated approach. **May16**

8. Discuss the prerequisites of PPC. Explain in the form of various types of data. **Dec19 / May 19 / May18 / Dec17 / May17 / Dec16**

Assignment No.02

Course Outcome:
CO2 - Student will be able to forecast the demand of the product and prepare an aggregate plan.

1. **May14/08m**
   Find the trend by least square method for the data as follows. Also find the demand for 2016.

Year	2007	2008	2009	2010	2011	2012	2013
Demand in 1000 units	85	75	80	72	65	60	55

2. **Dec13 / 10m**
   The sales of a company are given below. Fit a straight line to the data and find
   - i) Forecast for the year 2013
   - ii) Coefficient of correlation
   - iii) Standard error of estimate
   - iv) Limits of forecast

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sales	240	280	300	330	380	410	490	560	680	800

3. **May13/ 10m**
   A firm believes that its annual profit depends on its expenditures for research. The information for the preceding years is given below. Estimate the profit when expenditure is 6 units.

Year	Expenditure for Research (X)	Annual Profit (Y)
1989	2	20
1990	3	25
1991	5	34
1992	4	30
1993	11	40
1994	5	31
1995	6	-

4. **Dec 12 / 10m**
   The following data gives sales of the company for previous years. Fit the straight line and Forecast the sales for year 1998 and 1999.

Years	1989	1990	1991	1992	1993	1994	1995	1996	1997
Sales Rs (000)	13	20	20	28	30	32	33	38	43

5. **May12/ 10m**
   Estimate the sales forecast for the year 2000, using exponential smoothing forecaster. Take constant 0.5 and the forecast for the year 1995 as 160×10^5 units. Compare the forecast with least square method.

Year	1995	1996	1997	1998	1999
Sales (x 10^5)	180	168	159	170	188

   Dec19 / 05m
6. What is aggregate planning? Explain different strategies of aggregate planning.

Assignment No.03

Course Outcome:
CO3- Student will be able to develop the skills of Inventory Management and cost effectiveness.

1. **May14/10m**
   A textile mill buys its raw material from a vendor. The annual demand of the raw material is 9000 units. The ordering cost is Rs 100 per order and the carrying cost is 20% of the purchases price per month, where the purchase price per unit is Rs1.Find the following.
   - a) Economic Order Quantity (EOQ)
   - b) Total cost wrt EOQ
   - c) Number of orders per year
   - d) Time between consecutive two orders.

2. **Dec13/ 10m**
   The purchase manager currently follows EOQ policy of ordering for an item in the stores of his company. The annual demand of the item is 1600 units. Its carrying cost is 40% of the unit cost where the unit cost is Rs 400. The ordering cost is Rs 500 per order. Recently, the vendor supplying that item has given a discount of 10% in its unit cost if the order size is a minimum of 500 units.
   (i) Find EOQ and the corresponding total cost per year.
   (ii) Check whether the discount offer given by the vendor can be considered by the purchase manager.

3. **Dec12/ 08m**
   The annual demand for a machine component is 24,000 units. The carrying cost is Rs 0.40 unit/year, the ordering cost is Rs 20.00 per order and the shortage cost is Rs 1/unit/year. Find the values of the following:
   (i) Economic order quantity
   - (ii) Maximum inventory
   - (iii) Maximum shortage quantity
   - (iv) Cycle time
   - (v) Inventory period
   - (vi) Shortage period

4. **May12/ 10m**
   A manufacturer has to supply his customers 3600 units of his product per year. Shortages are not permitted .Inventory carrying cost amounts Rs1.2 per annum. The setup cost per run is Rs 80.
   Find:
   - (i) Economic order quantity
   - (ii) Optimum numbers of orders per annum
   - (iii) Average annual inventory cost (Minimum)
   - (iv) Optimum period of supply per optimum order.

Assignment No.04

Course Outcome:

CO4- Student will be able to understand process planning and create a logical approach to line balancing in various production systems.

1. What is the importance of process sheet? What details does a process sheet contain?**May19 / 05m   Dec18 / 05m   May16 / 10m**

2. Explain Computer Aided Process Planning and its various types. **May18 / 05mDec17 / 05m Dec16 / 05m   May16 / 05m**

3. Why process planning is needed? **Dec17 / 05m**

4. Discuss the importance of process planning. Also discuss in brief the types of process planning.**Dec17 / 10m**

5. Compare manual process planning with Computer Aided Process Planning. **May17 / 05m**

6. Write short note on assembly line balancing. **Dec16 / 05m**

Assignment No.05

Course Outcome:
CO5- Student will be able to develop competency in scheduling and sequencing of manufacturing operations.

1. **Dec13/ 10m**
   Find the optimal sequence for processing nine jobs through the machines A, B and C in the order ABC.Processing times are given below in hours. Find the total elapsed time for the optimal sequence and idle time for each machine.

Job	1	2	3	4	5	6	7	8	9
Machine A	4	9	5	10	6	12	8	3	8
Machine B	6	4	8	9	4	6	2	6	4
Machine C	10	12	9	11	14	15	10	14	12

2. **May13/ 12m**
   Two machines and six jobs flow shop scheduling is shown below. Using Johnson's Algorithm obtain the optimal sequence which will minimize the makespan. Also determine the corresponding makespan.

Job, i	Machine 1	Machine 2
1	4	6
2	10	12
3	14	10
4	8	12
5	18	6
6	16	8

3. **Dec12/ 10m**
   Given the following data

Job	1	2	3	4	5	6
Machine A	12	10	9	14	7	9
Machine B	7	6	6	5	4	4
Machine C	6	5	6	4	2	4

   1) Order of processing job: ACB
   2) Sequence suggested: Jobs 5, 3, 6,2,1,4
      i) Determine the total elapsed time for the sequence suggested.
   ii) Is the given sequence optimal?
      iii) If your answer to i) is no, determine the optimal sequence and the total elapsed time associated with it.
      iv) Also determine idle time for each machine for the sequence obtained in iii.

4. **May12/ 10m**
   Five jobs 1, 2 ... .5 are to be processed on four machines A, B, C and D. Their processing times are given in the table.Determine the optimal sequence, minimum elapsed time & idle time for each machine.

Job	Processing times in hours			
	A	B	C	D
1	7	15	14	21
2	11	18	18	6
3	2	13	11	16
4	14	4	27	14
5	18	11	32	16
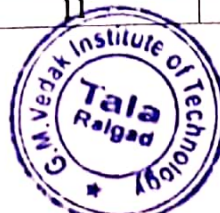
Assignment No.06

Course Outcome:
CO6- Student will be able to understand modern techniques of production planning and control.

1. Write short note on MRP I.   Dec18 / 05m   May18 / 05m

2. Write short note on MRP II.   May17 / 05m

3. Write short note on ERP. Why ERP system is required.   May17 / 05m   May16 / 05m   May14 / 05m

4. State the objectives and inputs of an MRP system.   Dec16 / 05m

5. Explain evolution of ERP.   Dec15 / 05m   Dec13 / 05m

6. Discuss the implementation of ERP.   May15 / 10m   Dec14 /10m

7. Comments on modules in ERP.   Dec14 / 05m   May14 / 10m   Dec13 / 10m

G. M. VEDAK INSTITUTE OF TECHNOLOGY, TALA
Department of Mechanical Engineering
Academic Year 2019-20 (Second Half 2019)

Year / Sem – BE / VII

Subject/ Course – Machine Design-II (MEC701)

List of Assignments

Assignment No.01

Date of issue: (B1) 23/07/2019   Date of Submission: (B1) 30/07/2019
           (B2) 25/07/2019   (B2) 01/08/2019
           (B3) 24/07/2019   (B3) 31/07/2019

Course Outcome:

CO 2- Students should be able to select appropriate rolling contact bearings for given application from manufacturer's catalogue.

Q1. SKF bearing no. 22216 is subjected to an axial load 2KN and radial load of 8KN. The outer race rotates at 700rpm. The service factor 1.2while operating temperature is 135^0C. Determine the equivalent load. Determine the expected life of bearing with POS of 94%

Q2. Select a suitable spherical roller bearing to be subjected to a radial load of 4KN, axial load of 1.2KN and running at 900rpm. The bearing is expected to operate at 125^0C for a life of 6000 hours with probability of survival of 93%.

Q3. A DGBB SKF No. 6208 is subjected to be in following work cycle

Element no.	Radial load,N	Trust Load, N	Speed, r.pm.	% Time Engaged
1	3000	1000	600	15
2	3500	1000	800	20
3	5000	100	900	30
4	500	2000	1500	35

If the service factor is 1.2, determine the expected life of the bearing in hours with the probability of survival of 90%.

Q4. A single deep-groove ball bearing, mounted on a shaft of 90mm diameter, operates with the following work cycle:

Element no.	Radial load, KN	Speed, r.pm.	Duration, Sec.
1	3	720	3
2	7	1440	4
3	5	900	3

Determine the equivalent load. If the expected life of bearing is 10,000 hours with a reliability of 93%, select suitable bearing.

Assignment No.02

Course Outcome:

CO 3. Students should be able to design sliding contact bearings for given application.

Q1. A 360^0 hydrodyanamically lubricated journal bearing supports a load of 20KN when operating at 1000rpm for steam turbine. The bearing pressure is 1.6 N/mm² and clearance is average, assuming bearing is to be self-contained, determine:
- i) The diameter and length of bearing.
- ii) The clearance ratio.
- iii) The minimum oil film thickness.
- iv) The viscosity of oil.
- v) The coefficient of friction.
- vi) The friction power loss.
- vii) The oil flow rate.

Q2. The radial load on 360^0 hydrodyanamically lubricated self-contained journal bearing is 18KN. The journal speed is 960rpm while surface area of bearing is 10LD.The allowable bearing pressure is 1.5N/mm² while combined heat transfer coefficient for convection and radiation is 220W/m²c. the bearing is placed in an oil bath and cooled by moving air. Assuming the suitable fit and average clearance, determine:
- i) The viscosity of oil.
- ii) The coefficient of friction.
- iii) The temperature of lubricating oil.
- iv) The oil flow rate.
- v) The temperature rise.

Select suitable grade oil.

Q3. The following data is given for 360^0 hydrodyanamically bearing:
Journal dia:100mm, Bearing length:50mm, Journal speed:1500rpm, Minimum oil film thickness:15micron, Viscosity of lubricant:30cp, Specific gravity of lubricant:0.86, Specific heat of lubricant:2.09 KJ/kg⁰c. fit between the journal and bearing is normal running fit.Calculate:
- i) The load carrying capacity of bearing.
- ii) The coefficient of friction.
- iii) The friction power loss.
- iv) The oil flow rate.
- v) The side leakage and the temperature rise.

Assignment No.03

Course Outcome:

CO 1- Students should be able to select and design gears for power transmission on the basis of given load and speed.

Q1. It is required to design two stage spur gear reduction unit with 20^0 full depth involute teeth. The input shaft is connected to 10KW,1440rpm motor through flexible coupling. A speed of output shaft shall be approximately 180 rpm the starting torque motor is 150% of the avg. torque. The gears are made of plane carbon steel and surface hardness 340BHN. Design the gear and specify the dimensions. Draw detailed assembly drawing.

Assignment No.04

Course Outcome:

CO 5- Students should be able to select and design belt drive as well as chain drive.

Q1. A V-belt drive is transmit a 15KW to a compressor, motor speed is 1100rpm and compressor pulley run at 400rpm. The coefficient of friction between belt and pulley is 0.25, the compressor operates for 10 to 12 hrs per day. Draw detailed assembly drawing.

Assignment No.05

Course Outcome:

CO 4- Students should be able to select and design belt drive as well as chain drive.

Q1.Design the chain drive to meet folloeing specifications:
   i) Input power: 5.5KW.
   ii) Input speed: 300rpm.
   iii) Output speed: 100rpm.

Assignment No. 06

Course Outcome:

CO 5- Students should be able to design flywheel for given applications.

Q1.the area of the turning moment diagram for one revolution of a multi-cylinder engine with reference to the mean turning moment, below and above the line are, -32,+408,-67,+333,-310,+226,-374,+260 and-244 mm^2.

The scale for abscissa and ordinate are 1mm=4.2 and 1mm=850Nm respectively.

A rimmed flywheel is required to keep down fluctuations in speed from 200 to 220 rpm. The mean diameter of flywheel should not be exceeded 2m.it can be assumed that the rim contributes 90% of the required moment of inertia. Determine the dimensions of the rim.

Assignment No. 07

Course Outcome:

CO 6- Students should be able to design clutch and brakes.

Q1.a cone clutch is used to transmit 0KW at 1200rpm. The coefficient of friction of 0.1, while the permissible intensity of pressure is 0.1N/mm^2. The semi cone angle is 20^0, the larger diameter of friction surface 500mm. overload factor is 1.25. Design the clutch (shaft dia. Spline design, friction plate dimension, spring design.)

Assignment No. 08

Course Outcome:

CO 6- Students should be able to design clutch and brakes.

Q1.A rope drum of an elevator having 650mm dia. Is fitted with a brake drum is provided with four cast iron brake shoe each subtending an angle of 45^0. The mass of elevator when loaded is 2000kg and moves with a speed of 2.5 m/s. the brake has sufficient capacity to stop the elevator in 2.75m.

G. M. VEDAK INSTITUTE OF TECHNOLOGY, TALA
Department of Civil Engineering
Academic Year 2019-20 (First Half 2021)

Year / Sem – BE / VIII

Subject/ Course – Construction Management (CEC 802)

List of Assignments

Assignment No.01

Date of Issue: 04/02/2021   **Date of Submission:** 15/02/2021

Course Outcome:

CO 1- To understand the basic functions and construction management.

1. Define construction management. Explain in detail the functions of construction management.

2. Explain in brief the 14 principles of Henry Fayol.

3. Wht are the management principles defined by F. Taylor?

4. What are the objectives of construction management?

Assignment No.02

Date of Issue: 15/02/2021   **Date of Submission:** 25/02/2021

CO 1- To understand the basic functions and construction management.

1. Describe the role of construction industry in economic development of the country.

2. Explain in detail the unique features of construction industry.

3. Write a short note on Classification of construction projects.

4. What are the different characteristics of construction projects? Explain.

Assignment No.03

Date of Issue: 26/02/2021   **Date of Submission:** 08/03/2021

CO 2- To apply scheduling techniques such as CPM & PERT.

1. Activity data for a small project is given in the following table:

Activity	A	B	C	D	E	F	G	H	I
Preceding Activity	-	-	-	A	B	C	D, E	B	H, F
Duration (Days)	3	5	4	2	3	9	8	7	9

(i) Draw A-O-A network.

(ii) Workout activity times and floats.

(iii) Determine project duration and critical path.

2. Activity data for a small project is given in the following table, determine project duration, critical path and floats. Draw project network and workout activity times.

Activity	1-2	1-3	1-4	2-7	3-4	4-5	4-7	5-6	5-7	5-8	6-8	7-8
Duration (Days)	8	10	5	6	3	7	0	4	3	6	5	5

3. State Fulkerson's rules for drawing network.

4. What is WBS? Explain with an example.

Assignment No.04

Date of Issue: 15/03/2021   **Date of Submission:** 25/03/2021

CO 1 - To understand the basic functions and construction management.

1. Describe the roles and responsibilities of various agencies associated with a construction project.

2. Explain Project Life Cycle of a construction project.

3. Write a short note on : a) Site mobilization b) Site organizing

4. Describe Pre-requisites of commencing a construction project.

Assignment No.05

Date of Issue: 25/03/2021   **Date of Submission:05 04 /2021**

CO 2 - To apply scheduling techniques such as CPM & PERT.

1. Distinguish between CPM & PERT.

2. Explain the stages of planning in the view of owner and contractor. 3. Explain the time estimates considered in PERT analysis?

4. A small project is composed of seven activities as given below:

Activity	A	B	C	D	E	F	G
Preceding Activity	----	----	A	A,B	C,D	E	C,D
t_o(days)	2	3	5	4	5	2	3
t_m(days)	4	5	7	7	9	4	6
t_p(days)	6	7	9	10	14	6	9

Z	-3.0	-2.0	-1.0 0	0	+1.0	+2.0	+3.0
P (%)	0.13	2.28	15.87	50	84.13	97.72	99.87

a. Draw project network
b. Find expected duration, standard deviation and variance of all activities. c. Calculate the project duration corresponding to 75% probability? d. What is the probability that the project will be completed 3 weeks earlier than the expected date?

Assignment No.06

Date of Issue: 05/04/2021 **Date of Submission: 15/04/2021**

CO 4 - To effective utilization of resources on construction sites.

1. Table below shows activities, their durations and labour requirements:

Activity	Duration	Labours
A(10-20)	4	3
B(10-30)	5	4
C(20-50)	7	2
D(30-40)	5	5
E(30-50)	4	3
F(40-50)	6	3

Draw Time scaled version network. Workout daily requirement of labours for all activities. Prepare histograms of EST &LST schedule. Which schedule you will prefer & why?

2. Explain functions of human resource management in detail.

3. Write a short note on : (i) A-B-C analysis (ii) EOQ
4. Explain objectives and functions of material management.

Assignment No.07

Date of Issue: 15/04/2021 **Date of Submission: 22/04/2021**

CO 5 - To understand allocating the resources and project monitoring

1. Write a short note on inventory control.

2. Explain performance evaluation of worker.

3. Write a short note on :

   (I) Resource Allocation

(ii) Resource leveling

(iii) Resource Smoothening

Assignment No.08

Date of Issue: 22/04/2021   **Date of Submission:** 30/04/2021

CO 3 - To gain knowledge of time-cost optimization.

1. The following table shows the details of activities of a small project. Calculate the optimum project cost & project duration. Indirect cost = Rs. 1500 / per day.

Activity	Predecessor	Normal		Crash	
		Time (days)	Cost (Rs)	Time (days)	Cost (Rs)
A	------	9	8000	6	9500
B	------	5	5000	3	5500
C	B	7	6500	4	10500
D	A	6	7000	4	10000
E	A	5	4500	3	7500
F	D	9	5500	5	9000

2. What do you understand by project updating? What information is required while updating a project?

3. Explain the stepwise procedure for project updating.

4. What are the common causes of time over run & cost overrun? Explain corrective measures for the same.

Assignment No.09

Date of Issue: 28/04/2021   **Date of Submission: 05/05/2021**

CO 6 - To know about safety and quality aspect of construction works.

1. Explain quality control along with its significance in a construction project.

2. Write a short note on :
   a. Safety Campaign
   b. ISO 14000
   c. Occupational health hazards in construction industry.

3. What is the role of inspection in quality control?
4. What are the common causes of accidents on construction sites? Explain the precautionary measures to avoid accidents.

Assignment No.10

Date of Issue: 05/05/2021   **Date of Submission: 12/05/2021**

CO 6 - To know about safety and quality aspect of construction works.

1. Distinguish between quality control and quality assurance.
2. What is Payment of Wages Act? Explain in detail.
3. Write a short note on:

   a. Minimum Wages Act
   b. Workmen Compensation Act
   c. Factories Act
4. Explain the need for labour legislation

Assignment No - 1

Date of issue:- 22/08/20

Date of submission:- 14/09/20

COI	Students should be able to study various types of static characteristics and types of errors occurring in the system.

1. Explain the following term with reference to static characteristics of measuring instrument.

   a. Hysteresis   b. drift   c. threshold   d. Range & Span

2. Draw a labeled stethoscope used in medical doctor. Identify represent its mechanical measurement system element in block diagram form with respect to generalized measurement system. Enlist its varied application in modern use

3. Define a. Resolution b. precision & Accuracy of a measuring instrument.

4. A moving coil voltmeter as uniform scale with 100 divisions. The full scales reading is 200v & 1/10th of scale division can be estimated with pair degree of certainty determine resolution of instrument in resonant volt.

5. Expalin the generalized measurement system with block diagram.

6. What are desired, interfering & modifying inputs with respect to measurement of system?

Assignment No - 2

| CO2	Students should be able to study and select proper measuring instrument for linear and angular displacement

1. Explain the construction and working of de tacho generator. Explain its advantages and disadvantages.

2. What are different temperature compensation techniques used in measurement of strain using stain gauge explain any two methods in detail.

3. What are encoders? With neat sketch explain working of incremental & absolute optical encoders give examples of their use.

4. What is stroboscope? a stroboscope projected 6000 flashes per min. on disc with 10 patterns mounted on shaft of machine. Find speed of machine if the disc appears stationary & has the single point image. What will be the two possible shaft speed if 10 point appears to revolving once in 15 sec? Draw your solution.

5. Illustrate working principle of LVDT for displacement measurement.

6. Illustrate working principle of Nozzle Flapper for displacement measurement.

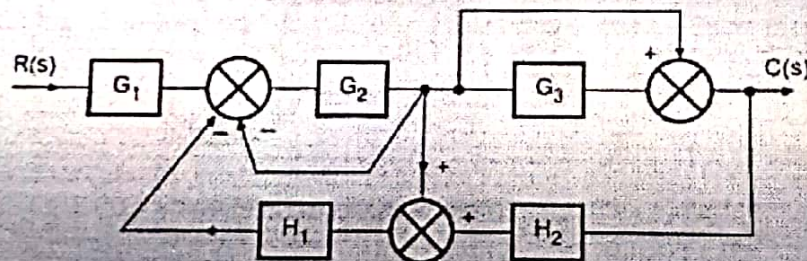7. Write working principle of piezoelectric accelerometer.

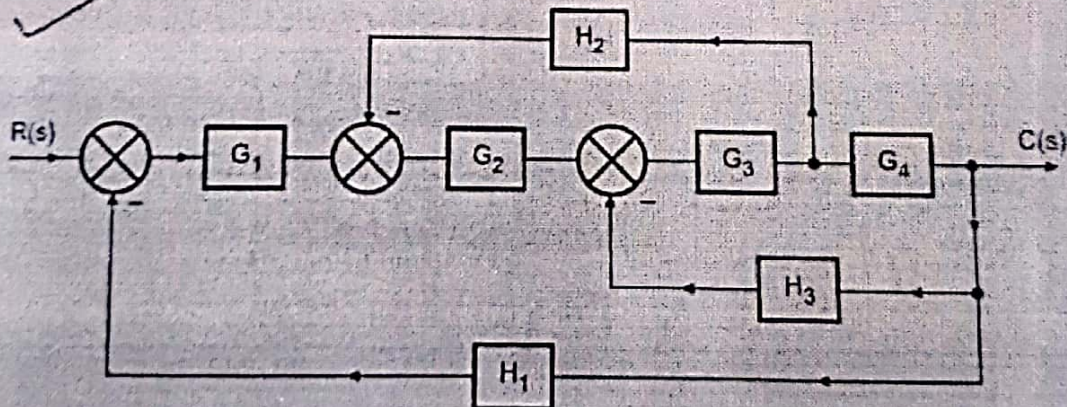| CO3	Students should be able to Study and select proper measuring instrument for pressure and temperature measurement

➤ **Example 4.5 :** Reduce the block diagram to its simple form and hence obtain C(s)/R(s).
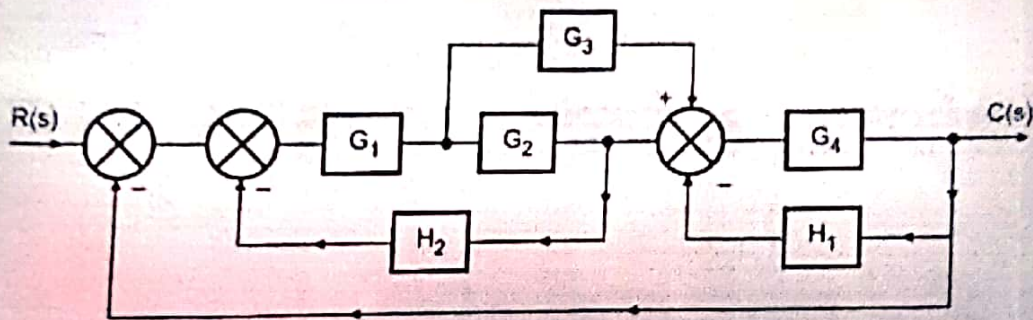
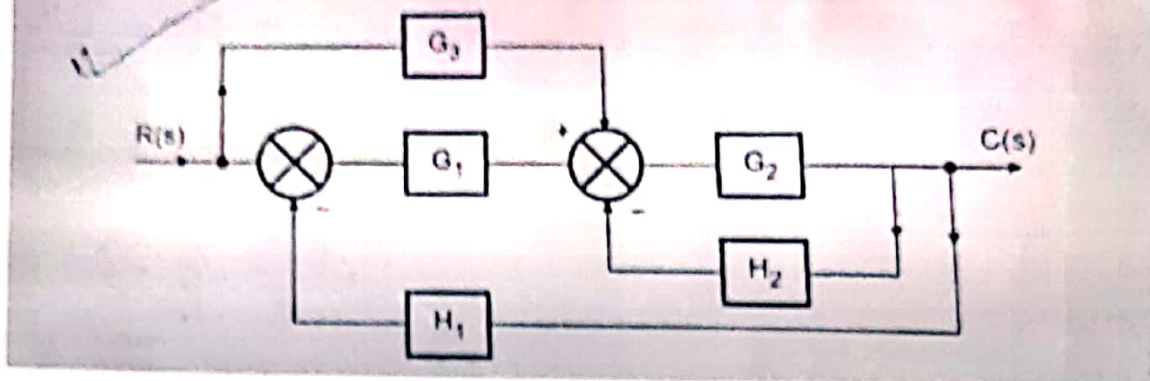➤ **Example 4.6 :** Reduce the block diagram using reduction rules and obtain C(s)/R(s).

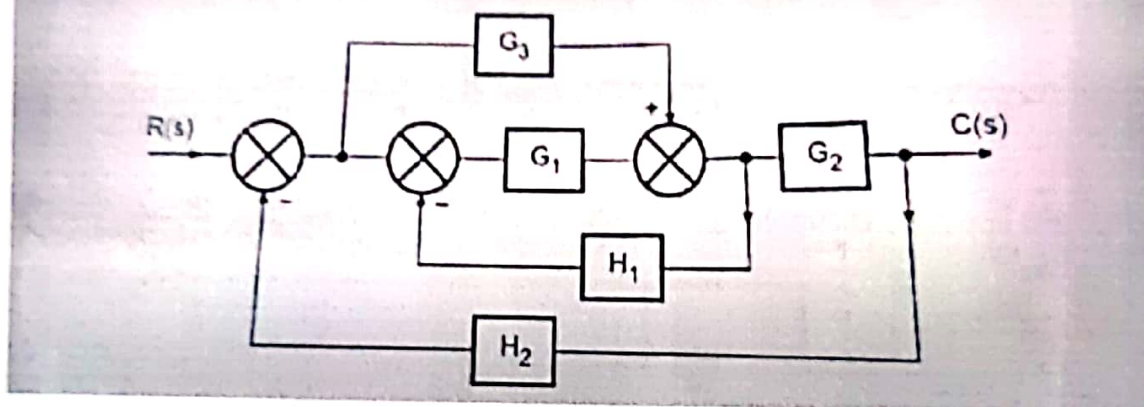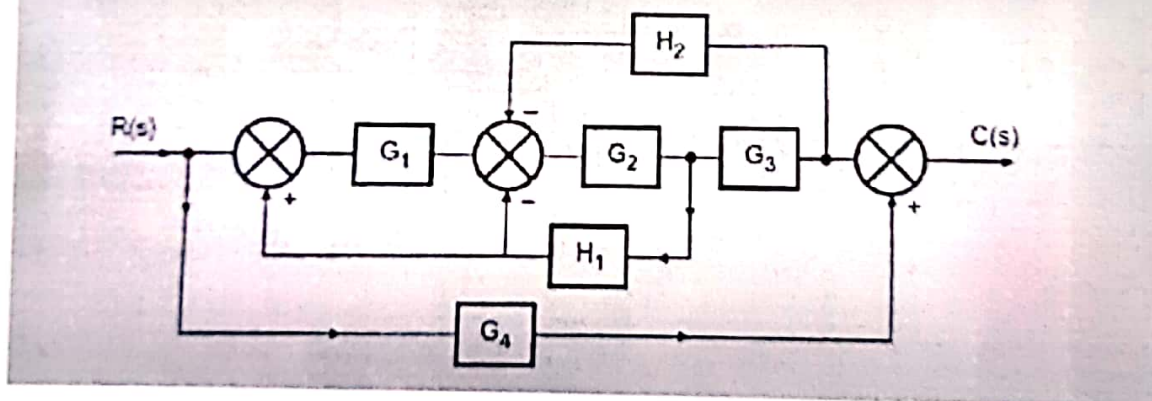➤ **Example 4.29 :** Obtain C(s)/R(s) by block diagram reduction.

Example 4.8 : Obtain the T.F. by block diagram reduction rules.

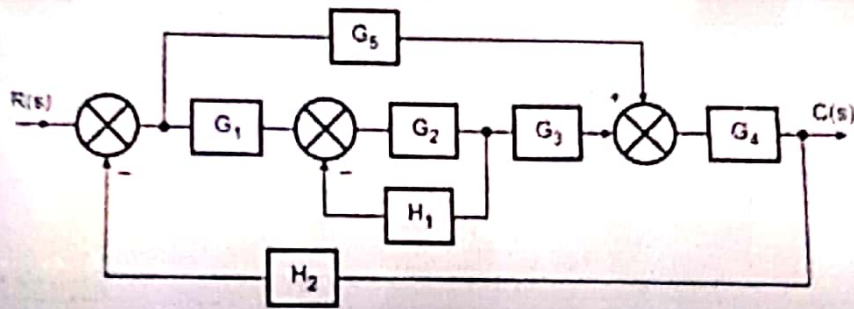

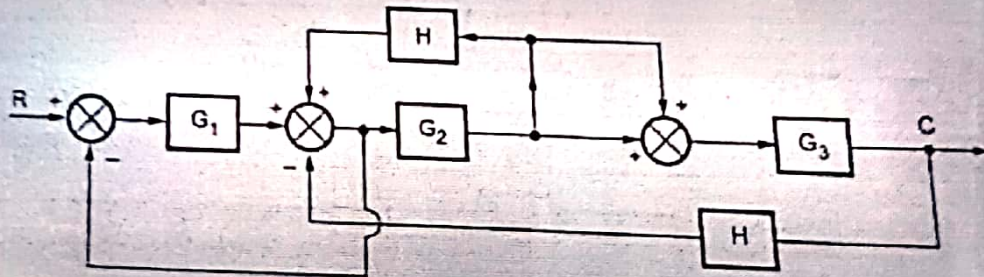**Example 4.9 :** Reduce the block diagram and obtain its transfer function.
(MU : Dec.-2?)

Example 4.10 : Obtain $C(s)/R(s)$ using block diagram reduction rules. (MU : May-2003)

Example 4.12 : Obtain C(s)/R(s) using block diagram reduction technique.

Example 4.14 : Find the transfer function for the block diagram given below using block diagram reduction technique.

CO4	Students should be able to study the Design mathematical model of system/process for standard input responses

module No- 4

① what is mathematical modelling? explain the importance of mathematical modelling in control system.

② Construct the block diagram that combine the following set of operation equations expressed in the &S notation (laplace notation)

ⅰ $w = x - y$, ⅱ $v = w - z$, ⅲ $z(s+6) = v \cdot (s+2)$, ⅳ $y(s^2 + 6s + 8) = z$, given X is the input to the system & Y is o/p from block diagram. find the transfer function.

③

Assignment No-5

CO5	Students should be able to Analyse error and differentiate various types of control systems and time domain specifications

Module:- 5

① derive on expression for steady state error when a step & ramp input given to the system.

② write a short note on transient responce specification. (Td, Tr, Tp, Mp, Ts)

Example 7.11 : The block diagram shown in the Fig. 7.49 represents a heat treating or The set point (desired temperature) is 1000 °C. What is steady state temperature ?

[MU : Nov.]

R = 1000   +
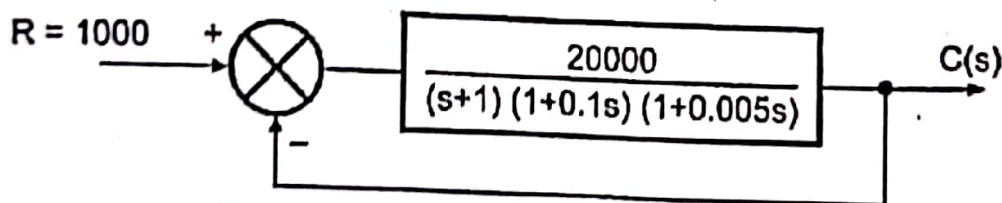$$\frac{20000}{(s+1)(1+0.1s)(1+0.005s)}$$ C(s)

−

Fig. 7.49

Scanned with CamScanner

Example 7.29 : The open loop T.F. of unity feedback system is $G(s) = \dfrac{k}{s(1+Ts)}$. If its system overshoot reduces from 0.6 to 0.2 due to change in 'K'. Show that $\dfrac{1K_1 - 1}{1K_2 - 1} = 43.33$ where K_1 and K_2 are values of K for 0.6 and 0.2 overshoot respectively.

A system is given by the differential equation $\dfrac{d^2y(t)}{dt^2} + 4\dfrac{dy}{dt} + 8y = 8x$. Determine all time response specifications for a unit step input. Also write down the response equation c(t).

Example 7.13 : A unity F.B. system has $G(s) = \dfrac{K}{s(s+1)(1+0.4s)}$.

i) If $r(t) = 4t$ and $K = 2$ find steady state error.

ii) If it is desired to have steady state error to be 0.2, find corresponding value of 'K'.

iii) Find the steady state error if input is changed to $2 + 6t$ and value of K to be 10.

Example 7.19 : A second order system is given by $\dfrac{C(s)}{R(s)} = \dfrac{25}{s^2 + 6s + 25}$. Find its rise time, peak time, peak overshoot and settling time if subjected to unit step input. Also calculate expression for its output response.

Example 7.30 : A certain control system is described by the differential equation. $\dfrac{d^2 y(t)}{dt^2} + 7\dfrac{dy(t)}{dt} + 12\,y(t) = 12x(t)$. Find its output response for unit step input. $y(t) = $ output, $x(t) = $ input

Laboratory Exercise No.01

Date of Issue:24/10/2020   Date of Submission:27/10/2020

Lab Outcome:

LO1- Student will be able to perform ABC analysis of a given problem.

Classify the following items into ABC and draw the ABC curve.   **May19 / 10m**

Item No.	501	502	503	504	505	506	507	508	509	510
Annual Consumption	300	2800	30	1100	40	2200	150	800	600	80
Unit Price (Rs)	10	15	10	5	5	10	5	5	15	10

Laboratory Exercise No.02

Date of Issue:22/12/2020   **Date of Submission:**24/12/2020

LO2- Student will be able to carry line balancing to reduce balance delay and improve the efficiency.

A company is setting an assembly line to produce 192 units per eight hour shift. The information regarding work elements in terms of times and immediate predecessors are given.

Work element	Time (sec)	Immediate Predecessors
A	40	None
B	80	A
C	30	D,E,F
D	25	B
E	20	B
F	15	B
G	120	A
H	145	G
I	130	H
J	115	C,I
Total	720	

i. What is the desired cycle time?
ii. What is the theoretical number of stations?
iii. Use largest work element time rule to work out a solution on precedence diagram.
iv. What are the efficiency and balance delay of the solution obtained?

Laboratory Exercise No.03

Date of Issue:29/12/2020   **Date of Submission:**31/12/2020

Six jobs are to be processed on three machines. The processing time is as follows. Find the optimal schedule so that the total elapsed time is minimized. Represent it on Gantt chart.

Job Machine	J1	J2	J3	J4	J5	J6
M1	10	3	5	4	2	1
M2	2	4	6	3	1	2
M3	8	6	7	9	7	7

Laboratory Exercise No.04

LO4- Student will be able to perform network crashing of given example.

The utility data for a network is given below. Crash the network to minimum project duration and determine the project cost for that duration. Indirect costs are Rs 500 per day.

May18 / 10m

Activity	Normal		Crash	
	Duration (weeks)	Cost (Rs)	Duration (weeks)	Cost (Rs)
0-1	1	5000	1	5000
1-2	3	5000	2	12000
1-3	7	11000	4	17000
2-3	5	10000	3	12000
2-4	8	8500	6	12500
3-4	4	8500	2	16500
4-5	1	5000	1	5000

Laboratory Exercise No.05

Date of Issue:31/12/2020   Date of Submission:02/01/2021

A machine operator has to perform three operations: turning, threading and knurling on a number of different jobs. The time required to perform these operations (in minutes) for each job is known. Determine the order in which the job should be processed in order to minimize the total time required to turn out all the jobs. Also find the idle times for the three operations.

Job	Time for turning (minutes)	Time for threading (minutes)	Time for knurling (minutes)
1	3	8	13
2	12	6	14
3	5	4	9
4	2	6	12
5	9	3	8
6	11	1	13

Laboratory Exercise No.06

Date of Issue:24/12/2020   Date of Submission:28/12/2020

Complete the MRP records for parts A, B and C. Part A is made of part C (1unit) and part B (2 unit). Part C is also required for making of part B.

Part A		1	2	3	4	5	6
Projected requirements		5	15	18	8	12	22
Scheduled receipts							
Projected available balance	21						
Planned order release							

Q=20 ; LT=1 ; SS =0

Part B		1	2	3	4	5	6
Projected requirements							
Scheduled receipts		32					
Projected available balance	20						
Planned order release							

Q=40; LT=2; SS =0

Part C		1	2	3	4	5	6
Projected requirements							
Scheduled receipts							
Projected available balance	50						
Planned order release							

Q= lot for lot; LT=1; SS = 10