



Swami Keshvanand Institute of Technology, Management & Gramothan

**Approved by AICTE, Ministry of HRD, Government of India
Recognized by UGC under Section 2(f) of the UGC Act, 1956
Affiliated to Rajasthan Technical University, Kota**

Assignment Sheets Sample

🏠: RAMNAGARIA (JAGATPURA), JAIPUR-302017 (RAJASTHAN), INDIA
☎: +91-141-3500300, 2752165, 2759609 | 📠: 0141-2759555
✉: info@skit.ac.in | 🌐: www.skit.ac.in



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

ASSIGNMENT-1 (2021-22)

B.Tech./ Semester – VIII

Branch: Mechanical Engineering

Subject: Supply & Operations Management

Subject Code: 8ME5-12

Instructions to Candidates: Attempt ALL questions.

	<u>PART A (Short Answer Questions, upto 25 words)</u>	CO	BL																																								
Q1	What do you understand by the term ‘mass customization’?	2	1																																								
Q2	Define the term ‘operations management’.	1	1																																								
Q3	Define the term ‘operation strategy’.	1	1																																								
Q4	Define the term ‘outsourcing’.	2	1																																								
Q5	Enlist three measures of well designed service.	2	1																																								
Q6	What is meant by competitiveness?	1	1																																								
Q7	Enlist various types of productivity.	1	1																																								
Q8	What do you understand by the term ‘order qualifier’ and ‘order winner’?	2	2																																								
Q9	What is globalization?	1	1																																								
Q10	What is forecasting?	1	1																																								
	<u>PART B (Analysis/Application/Problem Solving Questions)</u>																																										
	Amul Baking Company markets muffins through a chain of food stores. It has been experiencing overproduction and underproduction because of forecasting errors. The following data are its demand in dozens of muffins for the past four weeks. Muffins are made for the following day; for example, Sunday’s muffin production is for Monday’s sales, Monday’s production is for Tuesday’s sales, and so forth. The bakery is closed Saturday, so Friday’s production must satisfy demand for both Saturday and Sunday.																																										
	<table><tr><th></th><th>4 Weeks Ago</th><th>3 Weeks Ago</th><th>2 Weeks Ago</th><th>Last Week</th></tr><tr><td>Monday</td><td>2,200</td><td>2,400</td><td>2,300</td><td>2,400</td></tr><tr><td>Tuesday</td><td>2,000</td><td>2,100</td><td>2,200</td><td>2,200</td></tr><tr><td>Wednesday</td><td>2,300</td><td>2,400</td><td>2,300</td><td>2,500</td></tr><tr><td>Thursday</td><td>1,800</td><td>1,900</td><td>1,800</td><td>2,000</td></tr><tr><td>Friday</td><td>1,900</td><td>1,800</td><td>2,100</td><td>2,000</td></tr><tr><td>Saturday</td><td colspan="4">(closed on Saturday)</td></tr><tr><td>Sunday</td><td>2,800</td><td>2,700</td><td>3,000</td><td>2,900</td></tr></table>		4 Weeks Ago	3 Weeks Ago	2 Weeks Ago	Last Week	Monday	2,200	2,400	2,300	2,400	Tuesday	2,000	2,100	2,200	2,200	Wednesday	2,300	2,400	2,300	2,500	Thursday	1,800	1,900	1,800	2,000	Friday	1,900	1,800	2,100	2,000	Saturday	(closed on Saturday)				Sunday	2,800	2,700	3,000	2,900		
	4 Weeks Ago	3 Weeks Ago	2 Weeks Ago	Last Week																																							
Monday	2,200	2,400	2,300	2,400																																							
Tuesday	2,000	2,100	2,200	2,200																																							
Wednesday	2,300	2,400	2,300	2,500																																							
Thursday	1,800	1,900	1,800	2,000																																							
Friday	1,900	1,800	2,100	2,000																																							
Saturday	(closed on Saturday)																																										
Sunday	2,800	2,700	3,000	2,900																																							
	Based on above data answer Q11-Q15.																																										
Q11	Prepare a daily forecast, using a simple four-week moving average.	1	3																																								
Q12	Prepare a forecast using a weighted moving average with weights 0.35, 0.30, 0.25, & 0.10.	1	3																																								
Q13	Amul baker is also planning its purchases of ingredients for bread production. If bread demand had been forecast for last week at	1	3																																								

	21,500 loaves and only 21,000 loaves were actually demanded, what would Amul baker's forecast be for this week using exponential smoothing using $\alpha = 0.20$.		
Q14	Suppose, with the forecast made in Q13, this week's demand actually turns out to be 22,500. What would the new forecast be for the next week?	1	3
Q15	What will be the effect on forecast value in Q13, on using $\alpha = 0.20$ instead of 0.10?	1	3
	<u>PART C (Descriptive / Design questions)</u>		
Q16	Write short notes on (i) Competitiveness and Productivity (ii) Forecasting errors.	1	2
Q17	Explain any two operations strategies adopted by a manufacturing organization.	1	2
Q18	Distinguish between Product and Services.	2	2
Q19	Briefly discuss the scope of operations management.	1	2



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

ASSIGNMENT-1

B.Tech./ Semester – VIII
Subject: Supply & Operations Management

Branch: Mechanical Engineering
Subject Code: 8ME5-12

Instructions to Candidates: Attempt ALL questions.

PART A (Short Answer Questions, upto 25 words)

- Q1.What do you understand by the term ‘mass customization’?
- Q2.Define the term ‘operations management’.
- Q3.Define the term ‘operation strategy’.
- Q4.Define the term ‘outsourcing’.
- Q5.Enlist three measures of well designed service.
- Q6.What is meant by competitiveness?
- Q7.Enlist various types of productivity.
- Q8.What do you understand by the term ‘order qualifier’ and ‘order winner’?
- Q9.What is globalization?
- Q10.What is forecasting?

PART B (Analysis/Application/Problem Solving Questions)

Amul Baking Company markets muffins through a chain of food stores. It has been experiencing overproduction and underproduction because of forecasting errors. The following data are its demand in dozens of muffins for the past four weeks. Muffins are made for the following day; for example, Sunday’s muffin production is for Monday’s sales, Monday’s production is for Tuesday’s sales, and so forth. The bakery is closed Saturday, so Friday’s production must satisfy demand for both Saturday and Sunday.

	4 Weeks Ago	3 Weeks Ago	2 Weeks Ago	Last Week
Monday	2,200	2,400	2,300	2,400
Tuesday	2,000	2,100	2,200	2,200
Wednesday	2,300	2,400	2,300	2,500
Thursday	1,800	1,900	1,800	2,000
Friday	1,900	1,800	2,100	2,000
Saturday	(closed on Saturday)			
Sunday	2,800	2,700	3,000	2,900

Based on above data answer Q11-Q15.

- Q11. Prepare a daily forecast, using a simple four-week moving average.
- Q12. Prepare a forecast using a weighted moving average with weights 0.35, 0.30, 0.25, & 0.10.
- Q13 Amul baker is also planning its purchases of ingredients for bread production. If bread demand had been forecast for last week at 21,500 loaves and only 21,000 loaves were actually demanded, what would Amul baker’s forecast be for this week using exponential smoothing with $\alpha = 0.10$?
- Q14 Suppose, with the forecast made in Q13, this week’s demand actually turns out to be 22,500. What would the new forecast be for the next week?
- Q15 What will be the effect on forecast value in Q13, on using $\alpha = 0.20$ instead of 0.10?

PART C (Descriptive / Design questions)

- Q16. Write short notes on (i) Competitiveness and Productivity (ii) Forecasting errors.
- Q17. Explain any two operations strategies adopted by a manufacturing organization.
- Q18. Distinguish between Product and Services.
- Q19. Briefly discuss the scope of operations management.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

ASSIGNMENT-1

B.Tech./ Semester – VIII
Subject: Supply & Operations Management

Branch: Mechanical Engineering
Subject Code: 8ME5-12

Instructions to Candidates: Attempt ALL questions.

PART A (Short Answer Questions, upto 25 words)

- Q1.What do you understand by the term ‘mass customization’?
- Q2.Define the term ‘operations management’.
- Q3.Define the term ‘operation strategy’.
- Q4.Define the term ‘outsourcing’.
- Q5.Enlist three measures of well designed service.
- Q6.What is meant by competitiveness?
- Q7.Enlist various types of productivity.
- Q8.What do you understand by the term ‘order qualifier’ and ‘order winner’?
- Q9.What is globalization?
- Q10.What is forecasting?

PART B (Analysis/Application/Problem Solving Questions)

Amul Baking Company markets muffins through a chain of food stores. It has been experiencing overproduction and underproduction because of forecasting errors. The following data are its demand in dozens of muffins for the past four weeks. Muffins are made for the following day; for example, Sunday’s muffin production is for Monday’s sales, Monday’s production is for Tuesday’s sales, and so forth. The bakery is closed Saturday, so Friday’s production must satisfy demand for both Saturday and Sunday.

	4 Weeks Ago	3 Weeks Ago	2 Weeks Ago	Last Week
Monday	2,200	2,400	2,300	2,400
Tuesday	2,000	2,100	2,200	2,200
Wednesday	2,300	2,400	2,300	2,500
Thursday	1,800	1,900	1,800	2,000
Friday	1,900	1,800	2,100	2,000
Saturday	(closed on Saturday)			
Sunday	2,800	2,700	3,000	2,900

Based on above data answer Q11-Q15.

- Q11. Prepare a daily forecast, using a simple four-week moving average.
- Q12. Prepare a forecast using a weighted moving average with weights 0.35, 0.30, 0.25, & 0.10.
- Q13 Amul baker is also planning its purchases of ingredients for bread production. If bread demand had been forecast for last week at 21,500 loaves and only 21,000 loaves were actually demanded, what would Amul baker’s forecast be for this week using exponential smoothing with $\alpha = 0.10$?
- Q14 Suppose, with the forecast made in Q13, this week’s demand actually turns out to be 22,500. What would the new forecast be for the next week?
- Q15 What will be the effect on forecast value in Q13, on using $\alpha = 0.20$ instead of 0.10?

PART C (Descriptive / Design questions)

- Q16. Write short notes on (i) Competitiveness and Productivity (ii) Forecasting errors.
- Q17. Explain any two operations strategies adopted by a manufacturing organization.
- Q18. Distinguish between Product and Services.
- Q19. Briefly discuss the scope of operations management.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

ASSIGNMENT-2 (2021-22)

B.Tech./ Semester – VIII

Branch: Mechanical Engineering

Subject: Supply & Operations Management

Subject Code: 8ME5-12

Instructions to Candidates: Attempt ALL questions.

PART A (Short Answer Questions, upto 25 words)

- Q1. What is line balancing?
- Q2. What is Scheduling?
- Q3. What is Sequencing?
- Q4. Define the term 'MRP'.
- Q5. Define the term 'MPS'.
- Q6. What is Product Structure Tree?
- Q7. What is meant by MRP-II?
- Q8. What is ERP?
- Q9. Define the term 'Supply Chain Management'.
- Q10. What is Aggregate Planning?

PART B (Analysis/Application/Problem Solving Questions)

A manufacturing plant manager has the option of purchasing 1, 2, or 3 machines. Fixed costs & range of outputs are as follows:

No. of Machines	Annual Fixed Cost (in Rs.)	Range of Output
1	20000	0-600
2	35000	601-1200
3	45000	1201-1800

Variable Cost is Rs. 20/unit and Revenue is Rs. 50/unit

Based on above data answer Q11-Q14.

- Q11. Determine the break-even point for range 0-600.
- Q12. Determine the break-even point for range 601-1200.
- Q13. Determine the break-even point for range 1201-1800.
- Q14. If projected annual demand is between 1050 and 1425 units, how many machines should the manager purchase? Justify your result.
- Q15. A clothing manufacturer produces women's clothes at four locations in Jaipur. Relative locations have been determined, as shown in the table below. The location of a central shipping point for bolts of cloth must now be determined. Weekly quantities to be shipped to each location is also shown in the table. Determine the coordinates of the location that will minimize distribution costs.?

Location	(x,y)	Weekly Quantity
A	5,7	15
B	6,9	20
C	3,9	25
D	9,4	30

PART C (Descriptive / Design questions)

- Q16. Briefly discuss the factors affecting plant location.
- Q17. Write short notes on (i) Line Balancing (ii) Bullwhip effect.
- Q18. Distinguish between Product and Process Layout.
- Q19. Explain the importance of capacity planning.



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

ASSIGNMENT-2 (2021-22)

B.Tech./ Semester – VIII

Branch: Mechanical Engineering

Subject: Supply & Operations Management

Subject Code: 8ME5-12

Instructions to Candidates: Attempt ALL questions.

<u>PART A (Short Answer Questions. upto 25 words)</u>	CO	BL															
Q1. What is line balancing?	3	1															
Q2. What is Scheduling?	4	1															
Q3. What is Sequencing?	4	1															
Q4. Define the term 'MRP'.	3	1															
Q5. Define the term 'MPS'.	3	1															
Q6. What is Product Structure Tree?	3	1															
Q7. What is meant by MRP-II?	3	1															
Q8. What is ERP?	3	1															
Q9. Define the term 'Supply Chain Management'.	5	1															
Q10. What is Aggregate Planning?	3	1															
<u>PART B (Analysis/Application/Problem Solving Questions)</u>																	
A manufacturing plant manager has the option of purchasing 1, 2, or 3 machines. Fixed costs & range of outputs are as follows:																	
<table border="1"> <thead> <tr> <th>No. of Machines</th><th>Annual Fixed Cost (in Rs.)</th><th>Range of Output</th></tr> </thead> <tbody> <tr> <td>1</td><td>20000</td><td>0-600</td></tr> <tr> <td>2</td><td>35000</td><td>601-1200</td></tr> <tr> <td>3</td><td>45000</td><td>1201-1800</td></tr> </tbody> </table>			No. of Machines	Annual Fixed Cost (in Rs.)	Range of Output	1	20000	0-600	2	35000	601-1200	3	45000	1201-1800			
No. of Machines	Annual Fixed Cost (in Rs.)	Range of Output															
1	20000	0-600															
2	35000	601-1200															
3	45000	1201-1800															
Variable Cost is Rs. 20/unit and Revenue is Rs. 50/unit.																	
Based on above data answer Q11-Q14.																	
Q11. Determine the break-even point for range 0-600.	2	3															
Q12. Determine the break-even point for range 601-1200.	2	3															
Q13. Determine the break-even point for range 1201-1800.	2	3															
Q14 If projected annual demand is between 1050 and 1425 units, how many machines should the manager purchase? Justify your result.	2	4															
Q15 A clothing manufacturer produces women's clothes at four locations in Jaipur. Relative locations have been determined, as shown in the table below. The location of a central shipping point for bolts of cloth must now be determined. Weekly quantities to be shipped to each location is also shown in the table. Determine the coordinates of the location that will minimize distribution costs.?	3	3															
<table border="1"> <thead> <tr> <th>Location</th><th>(x,y)</th><th>Weekly Quantity</th></tr> </thead> <tbody> <tr> <td>A</td><td>5,7</td><td>15</td></tr> <tr> <td>B</td><td>6,9</td><td>20</td></tr> <tr> <td>C</td><td>3,9</td><td>25</td></tr> <tr> <td>D</td><td>9,4</td><td>30</td></tr> </tbody> </table>			Location	(x,y)	Weekly Quantity	A	5,7	15	B	6,9	20	C	3,9	25	D	9,4	30
Location	(x,y)	Weekly Quantity															
A	5,7	15															
B	6,9	20															
C	3,9	25															
D	9,4	30															

<u>PART C (Descriptive / Design questions)</u>		
Q16. Briefly discuss the factors affecting plant location.	3	2
Q17. Write short notes on (i) Line Balancing (ii) Bullwhip effect.	3, 5	2
Q18. Distinguish between Product and Process Layout.	3	2
Q19. Explain the importance of capacity planning.	3	2



Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur

Assignment #1

4ME4-05 Fluid Mechanics and Fluid Machines
2nd Year–IV Semester: B.Tech.: Mechanical Engineering
Session 2021-22

Topics covered:

MM:10

- Fluid Properties.
- Fluid Statics, Manometers, Hydrostatic forces on submerged surfaces, Buoyancy and floatation
- Dimensional Analysis

Part A: Short answer questions (10 questions- Attempt All).

1. Define the term vapour pressure and compressibility.
2. Define the term 'Pressure' also state 'Pascal's Law'.
3. What is "Manometer? Define and Enlist various types of manometers.
4. Define the terms 'Centre of Buoyancy, 'Centre of Pressure' and "Metacenter".
5. Define the following terms: mass density, weight density, specific volume, and specific gravity.
6. Define 'Viscosity' and also state 'Newton's law of viscosity'?
7. Define capillarity and show the cases for capillary rise and fall?
8. Define Similitude. Also enlist types of similitude.
9. What is the need and benefits of dimensional analysis?
10. State Buckingham π -theorem.

Part B: Analysis/ Application/ Problem solving questions (5questions – Attempt ANY THREE)

11. A vertical cylinder of diameter 180mm rotates concentrically inside another cylinder of diameter 181.2 mm. Both the cylinders are 300 mm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. Determine the viscosity of the fluid if a torque of 20 N-m is required to rotate the inner cylinder at 120 rpm.
12. A U-tube manometer is used to measure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to the atmosphere. The contact between water and mercury occur in the left limb. Determine the pressure of water in the pipe line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury in the right limb is in the level with center of the

pipe. If the pressure of water in pipe line is reduced to 9810 N/m^2 , calculate the new difference in the level of mercury. Sketch the arrangements in both the cases.

13. A hollow cylinder at both ends has an outside diameter of 1.25m, length 3.5 m and specific weight 75 kN/m^3 . If the cylinder is to float vertically just in stable equilibrium in sea water (specific weight 10 kN/m^3), find its minimum permissible thickness.
14. Using Buckingham's π -theorem, show that the velocity through a circular orifice is given by

$$V = \sqrt{2gh} \Phi \left[\frac{D}{h}, \frac{\mu}{\rho V h} \right]$$

Where h is the head causing flow, D is the diameter of the orifice, μ is the co-efficient of viscosity, ρ is the mass density and g is the acceleration due to gravity.

15. A vertical sluice gate is used to cover an opening in a dam. The opening is 2m wide and 1.2m high. On the upstream of the gate, the liquid of sp. gr. 1.45 lies upto a height of 1.5 m above the top of the gate, whereas on the downstream side the water is available upto a height touching the top of the gate. Find the resultant force acting on the gate and the position of the center of pressure. Find also the force acting horizontally at the top of the gate which is capable of opening it. Assume that the gate is hinged at the bottom.

Part C: Descriptive/ Design questions (4 questions: Attempt ANY TWO)

16. Derive the following expression for a U-tube manometer (ρ_m) connected to the pipe lines at same level and same fluid (ρ) is flowing through these pipe lines.

$$\Delta H = h \left(\frac{\rho_m}{\rho} - 1 \right)$$

where h is the manometer reading.

Which type of manometer is used if $\rho > \rho_m$? Derive and compare the above expression of ΔH for this type of manometer

17. Explain analytical and experimental method to determine Metacentric Height.
18. Derive expressions for total pressure and centre of pressure for inclined plane surface and curved surface submerged in liquid.
19. Define the following dimensionless numbers and state their significance for fluid flow problems: Reynolds Number, Froude's Number, Mach's number, Euler's Number.



Assignment #2

4ME4-05 Fluid Mechanics and Fluid Machines

II Year – IV Semester: B.Tech. : Mechanical Engineering

Session 2021-22

Date of Submission: 31/05/2022

Topic covered:

MM: 10

- Applications of continuity equation, energy equation and momentum equation
- Flow through circular conduits, Boundary layer theory
- Turbines and Pumps

Part A: Short answer questions (10 questions- Attempt All).

1. Write continuity equation for one dimensional steady flow.
2. Define boundary layer thickness through neat sketch.
3. Classify pumps on the basis of different criterion.
4. What are the energy losses in flow through pipe and how are they classified?
5. Define Hydraulic Gradient Line and Total Energy Line/ Energy Gradient Line.
6. Draw a neat sketch of a hydraulic power plant showing dam, head race, tail race, gross head, net head, nozzle, turbine etc.
7. What is Net Positive Suction Head (NPSH) and what is its importance?
8. Differentiate between pump and turbine.
9. What is Draft Tube and what is its function? Why it is not used for Pelton Turbine?
10. Differentiate between Impulse and Reaction turbine.

Part B: Analysis/ Application/ Problem solving questions (5 questions – Attempt ANY THREE)

1. A conical draft tube having inlet and outlet diameters 1.1 m and 1.7 m discharges water at outlet with a velocity of 2.8 m/s. The total length of the draft tube is 7.0 m and 1.4 m of the length of draft tube is immersed in water. If the atmospheric pressure head is 10.3 m of water and loss of head due to friction in the draft tube is equal to $0.18 \times$ velocity head at outlet of the tube. Determine:
 - (i) Pressure head at inlet, and
 - (ii) Efficiency of the draft tube.
2. A centrifugal impeller runs at 90 r.p.m. and has outlet vane angle of 62° . The velocity of flow is 2.7 m/s throughout and diameter of the impeller at exit is twice that at inlet. If the manometric head is 18 m and manometric efficiency is 74 %, determine: (i) Diameter of the impeller at the exit (ii) Inlet vane angle.
3. The following data relates to a Pelton wheel: Head = 80 m; Speed of wheel = 380 r.p.m.; Shaft power of wheel = 130 kW; Speed ratio = 0.48; Co-efficient of velocity = 0.97; Overall efficiency

= 82%. Design the Pelton Wheel.

4. Using Bernoulli's equation, derive expressions for the following:

i) Discharge through Venturimeter

ii) Velocity through Pitot tube

5. What are the ranges of the specific speeds for Pelton, Francis and Kaplan turbines? A turbine is to operate under a head of 25 m at 200 rpm. The discharge is $9 \text{ m}^3/\text{s}$. If the turbine efficiency is 90%, determine a) specific speed of the turbine. b) Power generated. c) Performance under a head of 20 meters. d) Also state the type of turbine.

Part C: Descriptive/ Design questions (4 questions: Attempt ANY TWO)

1. Derive Hagen Poiseuille equation. Also derive and draw shear stress and velocity distribution for flow through a circular pipe.
2. A horizontal pipe line 40 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25 m of its length from the tank, the pipe is 150 mm diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of the pipe. Considering all losses of head which occur, determine the rate of flow. Take $f = 0.01$ for both sections of the pipe. Also draw the hydraulic gradient and total energy line.
3. An inward flow reaction turbine has external and internal diameters as 1 m and The hydraulic efficiency of the turbine is 90% 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 the outlet is 15° and width of the wheel is 100 mm at inlet and outlet, determine:

(i) the guide blade angle, (ii) speed of the turbine, (iii) vane angle of the runner at inlet,

(iv) volume flow rate of turbine and (v) power developed.
4. Derive expressions for the following in context to Boundary layer theory
 - i) Displacement thickness
 - ii) Momentum thickness
 - iii) Energy thickness

Department of Mechanical Engineering

Mechanical Vibrations (6ME4-03)

Assignment: 1 (VI ME)

Date of Issue: 29th March, 2022

Due Date of Submission: 9th April, 2022

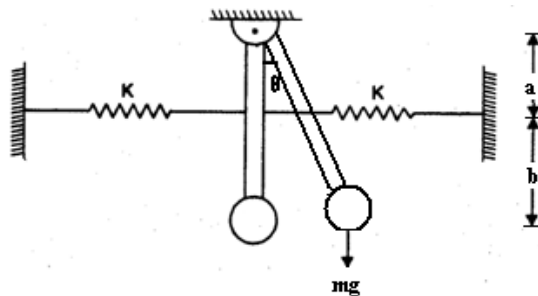
- All students are required to submit the assignment on or before the due date.
- Assignment submitted after due date would not be considered for Internal marks assessment.

PART-A (Short Answer Type Questions: up to 25 Words)

- Derive the differential equation of SHM using the rotating vector diagram.
- Differentiate between periodic motion, oscillatory motion and vibratory motion.
- Derive equation of time period of a simple pendulum using energy method.
- What is compound pendulum? Explain center of percussion and its significance.
- With the help of a diagram, explain how two SHMs can be added vectorially.
- Define resonance. Why is it undesirable?
- Assuming that the amplitudes of successive cycles in a damped system are given. How would you ascertain whether the damping is viscous damping or coulomb damping?
- Differentiate between Coulomb damping and viscous damping.
- Explain the salient characteristics of a Hysteresis damping.
- Prove that a complex number essentially represents simple harmonic motion.

PART-B (Medium Answer Type Questions: 80-90 Words)

- With the help of proper diagram, derive the equation of time period of a Bifilar suspension.
- The amplitude of vibration for a spring-mass-dashpot system is observed to decrease to 25% of the initial value after 5 consecutive cycles of motion. Find the damping coefficient (c) if $k = 35 \text{ N/cm}$ and the mass weighs 45 N. [Ans. = 11.15 N.s/m]
- Derive the expression of logarithmic decrement as a function of damping factor.
- Derive the expression for loss of amplitude per cycle in case of Coulomb damping.
- Determine the natural frequency of vibration for the spring connected pendulum if a small initial displacement θ is given to the pendulum as shown in figure. The rod is massless.



Ans. =

$$\omega_n = \sqrt{\frac{mg(a+b) + 2Ka^2}{m(a+b)^2}}$$

PART-C (Long Answer Type Questions: 120-150 Words)

1.) A spring-mass-dashpot system consists of a mass of 55 kg, and a spring of 35 kN/m stiffness. The damper provides viscous damping of magnitude equal to 22% of the critical damping coefficient. Find:

- (i) The damping factor (0.22)
- (ii) The critical damping coefficient (2774.89 N.s/m)
- (iii) Natural frequency of damped vibrations (24.61 rad/s)
- (iv) Logarithmic decrement (1.42)
- (v) Ratio of any two consecutive amplitudes (4.14)

2.) What condition must be satisfied for the sum of two simple harmonic motions also to be simple harmonic? If two simple harmonic motions are given by: $x_1 = 3 \sin (wt + 30^\circ)$ and $x_2 = 4 \cos (wt + 10^\circ)$, find the equation of the resulting harmonic motion if these motions are superimposed (added) one over the other. [5.76 sin (wt + 70.75°)]

3.) Derive an expression for equivalent viscous damping coefficient in the case of a system having hysteretic damping.

4.) Derive the following expression for displacement in case of critically-damped system with viscous damping:

$$x = x_0[1 + \omega_n t]e^{-\omega_n t}$$

Where:

x = Displacement

x_0 = Initial displacement

ω_n = Natural angular velocity

t = Time



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

ASSIGNMENT-1

B.Tech./ Semester – V
Subject: Manufacturing Technology

Branch: Mechanical Engineering
Subject Code: 5ME4-03

Instructions to Candidates:

- Attempt ALL questions.
- Write your Name with Signature, RTU Roll No., Semester, Institute name, Subject name & code, Subject teacher name, Date of Submission on top of the Assignment Answer Sheet and Upload Assignment Answer Sheet as a single Pdf file.

PART A (Short Answer Questions, upto 25 words)

- Q1. Why metal removal process is most expensive among other manufacturing processes?
Q2. What is tool signature? List down the different systems of tool signature.
Q3. What is cutting angle? Mention its types.
Q4. Explain the term “Machine Tool” and how it is different from machine.
Q5. Define cutting tool.
Q6. What is shear plane?
Q7. What is built up edge?
Q8. Define chip and mention its different types.
Q9. List down the methods available for measuring the cutting tool temperature.
Q10. What is clearance angle? Mention its types.

PART B (Analysis/Application/Problem Solving Questions)

- Q11. How is metal removed in metal cutting? Explain the process by giving any simple model to explain the metal removal process.
Q12. Derive the expression for shear angle in orthogonal cutting in terms of rake angle and chip thickness ratio.
Q13. What is rake angle? Explain the significance of rake angles.
Q14. Explain the classification of metal removal process with a neat sketch.
Q15. What are the conditions that would allow a continuous chip with built up edge to be formed in metal cutting?

PART C (Descriptive / Design questions)

- Q16. During machining Aluminium workpiece with a 12° rake angle tool, the following data is recorded: Cutting Speed: 130 m/min, Chip thickness: 0.35 mm, Uncut thickness: 0.14 mm. Determine: (i) Cutting ratio (ii) Shear strain.
Q17. An orthogonal turning operation is being carried out under the following conditions: depth of cut = 1.5 mm, feed rate 0.25 mm/rev, chip thickness = 0.70 mm, cutting speed = 250m/min and rake angle = 0° . Determine the shear velocity and chip velocity.
Q18. Sketch the Merchant circle diagram, state the assumptions made and prove the Merchant's solution: $2\Phi + \beta - \alpha = \pi/2$ where Φ is shear angle, β is friction angle and α is rake angle.
Q19. Determine the shear plane angle, cutting force component and resultant force on the tool for orthogonal cutting of material with yield stress of 250N/mm^2 . Following are the machining parameters: Tool rake angle = 15° , Uncut chip thickness = 0.25, Chip width = 2 mm, Chip thickness ratio = 0.46 and the Angle of friction = 40° .



Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

ASSIGNMENT-2

B.Tech./ Semester – V

Branch: Mechanical Engineering

Subject: Manufacturing Technology

Subject Code: 5ME4-03

Instructions to Candidates:

Attempt ALL questions.

- Write your Name with Signature, RTU Roll No., Semester, Institute name, Subject name & code, Subject teacher name, Date of Submission on top of the Assignment Answer Sheet and Upload Assignment Answer Sheet as a single Pdf file.

PART A (Short Answer Questions, upto 25 words)

- Q1. What is shaper? What is difference between shaper and planer?
Q2. What are the various types of milling cutters that are used in milling?
Q3. Which materials are used in manufacturing of grinding wheels? [RTU 2019]
Q4. What is a lathe? How is it specified?
Q5. What type of work holding devices are generally used in a lathe?
Q6. Why truing and dressing are necessary in grinding wheels? [RTU 2019]
Q7. What are the types of lathes you are familiar with and give their applications?
Q8. What is a semi-automatic lathe?
Q9. What is magnetic pulse forming? [RTU, March 2021]
Q10. Enlist the factors affecting machinability. [RTU, March 2021]

PART B (Analysis/Application/Problem Solving Questions)

- Q11. What is the difference between capstan and turret lathe? Explain with the help of neat sketches. [RTU 2019]
Q12. Compare grinding, honing and lapping operations. [RTU 2019, 2021]
Q13. Write a short note on ceramic cutting tool material. [RTU 2021]
Q14. A block of length 200 mm is machined by slab milling cutter 34mm in diameter. The depth of cut and table feed are set at 2 mm and 18 mm/min, respectively. Considering the approach and overtravel of the cutter are same, determine the minimum estimated machining time per pass in minutes. [GATE 2017]
Q15. Explain up and down milling. [RTU 2017]

PART C (Descriptive / Design questions)

- Q16. Describe step by step process of gear cutting by gear hobbing process with suitable examples. [RTU 2019]
Q17. Discuss specification of grinding wheel in detail. [RTU 2018]
Q18. Write short notes on:
(a) Hydraulic forming (b) Explosive forming
Q19. Find the time required for taking a complete cut on a plate of 600 x 900mm², if the cutting speed is 9m/min. The return time to cutting time is 1:4 and feed is 3mm for the shaper. The clearance at each end is 75mm. Calculate cutting time and material removal rate. [RTU, March 2021]

Swami Keshvanand Institute of Technology, M & G, Jaipur
Department of Mechanical Engineering
Theory of Machines, IV-Semester-(2021-22)
ASSIGNMENT SHEET NO: 1

Date of submission: on or before 03-04-2022

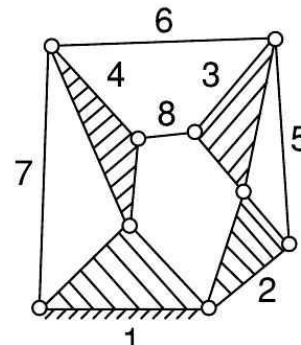
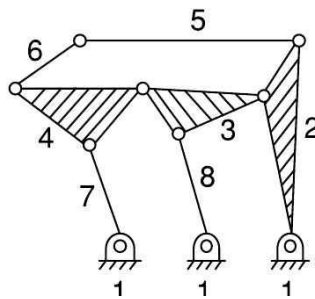
- Attempt all question
- Draw neat sketches with accurate dimensions

PART-A

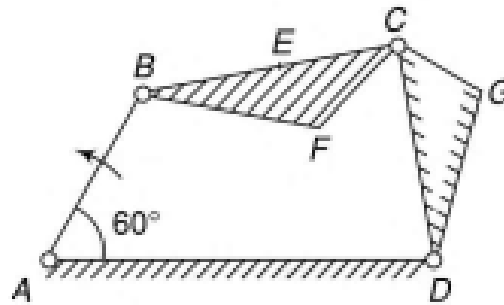
- Q. 1 Define: Kinematic link, Kinematic pair, Kinematic Chain, Machine and Mechanism.
- Q. 2 Explain Single Slider crank chain with all inversions.
- Q. 3 State laws of friction. Define angle of friction and angle of repose.
- Q. 4 Define pivot and collar with neat sketches.
- Q. 5 What is I-Centre of rotation. State and explain both **Kennedy's and Angular velocity ratio** theorem.

PART-B

- Q. 6 For the kinematic linkage shown in figures below, calculate the following
- | | |
|---------------------------------------|--|
| Q. 1 Numner of binary links (N_b) | b). Numner of ternary links (N_t) |
| c). Numner of total links (N) | d). Number of joints or pairs (P) |
| e). Number of loops (L) | f). Number of degrees of freedom (F) |

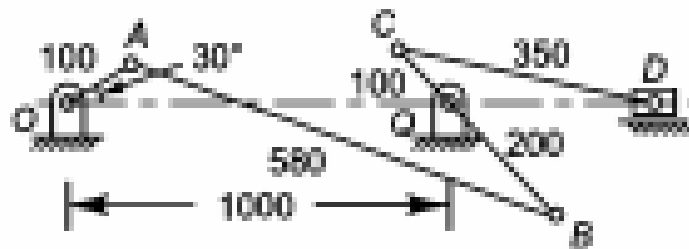


- Q. 7 In a four-link mechanism. The dimensions of the links are as under: $AB = 50$ mm, $BC = 66$ mm, $CD = 56$ mm and $AD = 100$ mm. At the instant when angle $DAB = 60^\circ$, the link AB has an angular velocity of 10.5 rad/s in the counter-clockwise direction. Determine the
- velocity of point C.
 - velocity of point E on the link BC when $BE = 40$ mm.
 - angular velocities of the links BC and CD.
 - Velocity of an offset point F on the link BC if $FB = 45$ mm, $CF = 30$ mm and BCF is read clockwise.
 - Velocity of an offset point G on the link CD if $CG = 24$ mm, $DG = 44$ mm and DCG is read clockwise.
 - Velocity of rubbing at pins A, B, C and D when the radii of the pins are 30, 40, 25 and 35 mm respectively.



Q. 8 A six-link mechanism shows in figure below. The dimensions of the links are $OA = 100$ mm, $AB = 580$ mm, $BC = 300$ mm, $QC = 100$ mm and $CD = 350$ mm. The crank OA rotates clockwise at 150 rpm. For the position when the crank OA makes an angle of 30° with the horizontal, determine the following using I-centre method.

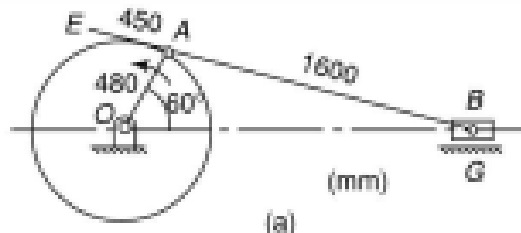
- Linear velocities of the pivot points B , C and D .
- Angular velocities of the links AB , BC and CD .



Q. 9 For the configuration of a slider-crank mechanism shown in figure below, calculate the

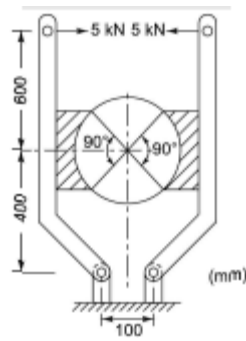
- Acceleration of slider at B .
- Acceleration of the point E .
- Angular acceleration of the link AB .

OA rotates at 20 rad/s counter-clockwise.



PART-C

- A conical pivot with angle of cone as 100° supports a load of 18 kN. The external radius is 2.5 times the internal radius. The shaft rotates at 150 rpm. If the intensity of pressure is to be 300 kN/m^2 and coefficient of friction as 0.05, what is the power lost in working against friction.
- A spring operated pivoted shoe brake is used for a wheel diameter of 500 mm. The angle of contact is 90° and the coefficient of friction is 0.3. The force applied by the spring on each arm is 5 kN. Determine the brake torque on the wheel.



- Q. 12 A band and block brake having 12 blocks, each of which subtends an angle of 16° at the centre, is applied to a rotating drum with a diameter of 600 mm. The blocks are 75 mm thick. The drum and the flywheel mounted on the same shaft have a mass of 1800 kg and have a combined radius of gyration of 600 mm. The two ends of the band are attached to pins on the opposite sides of the brake fulcrum at a distances of 40 mm and 150 mm from it. If a force of 250 N is applied on the lever at a distance of 900 mm from the fulcrum, find the
- Maximum braking torque
 - Angular retardation of the drum
 - Time taken by the system to be stationary from the rated speed of 300 rpm.

Swami Keshvanand Institute of Technology, M & G, Jaipur
Department of Mechanical Engineering
Theory of Machines, IV-Semester-(2021-22)
ASSIGNMENT SHEET NO: 1

Date of submission: on or before 25-05-2022

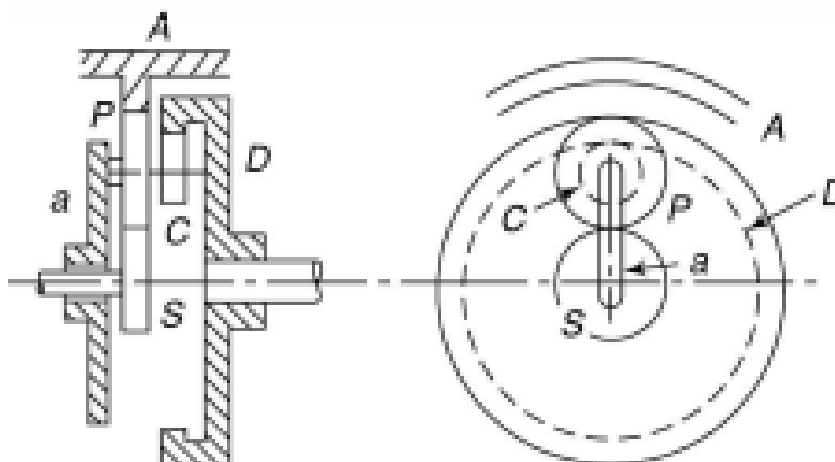
- Attempt all question
- Draw neat sketches with accurate dimensions

PART-A

- Q. 1 What is worm and worm wheel? Where is it used?
- Q. 2 What is a gear train? What are its main types?
- Q. 3 Define base circle, pitch circle, trace point, pitch curve and pressure angle of a cam.
- Q. 4 Why is balancing necessary for rotors of high speed engines?
- Q. 5 What do you mean by spin, precession and gyroscopic planes?

PART-B

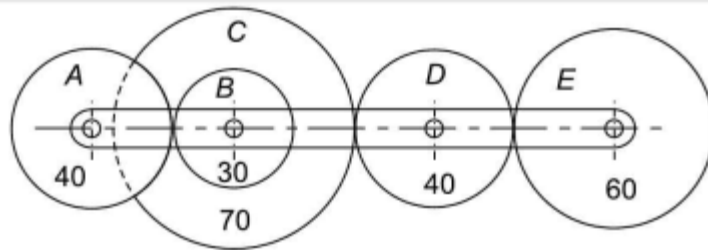
- Q. 6 A pinion of 20° involute teeth rotating at 275 rpm meshes with a gear and provides a gear ratio of 1.8. The number of teeth on the pinion is 20 and the module is 8 mm. If the interference is just avoided, determine (i) the addenda on the wheel and the pinion (ii) the path of contact, and (iii) the maximum velocity of sliding on both sides of the pitch point.
- Q. 7 In a reduction gear shown in figure below, the input S has 24 teeth. P and C constitute a compound planet having 30 and 18 teeth respectively. If all the gears are of the same pitch, find the ratio of the reduction gear. Assume A to be fixed.



- Q. 8 A cam with a minimum radius of 25 mm is to be designed for a knife-edge follower with the following data:
- TO raise the follower through 35 mm during 60° rotation of the cam
 - Dwell for next 40° of the cam rotation
 - Descending of the follower during the next 90° of the cam rotation
 - Dwell during the rest of the cam rotation
- Draw the profile of the cam if the ascending and descending of the cam is with simple harmonic motion (S.H.M.) and the line of stroke of the follower is offset 10 mm from the axis of the cam shaft.
- Q. 9 Three masses of 8 kg, 12 kg and 15 kg attached at radial distances of 80 mm, 100 mm and 60 mm respectively to a disc on a shaft are in complete balance. Determine the angular position of the masses of 12 kg and 15 kg relative to the 8 kg mass.
- Q. 10 The turbine rotor of a ship has a mass of 2.2 tonnes and rotates at 1800 rpm clockwise when viewed from the aft. The radius of gyration of the rotor is 320 mm. Determine the gyroscopic couple and its effect when the
- a) Ship turns right at a radius of 250 m with a speed of 25 km/h.
 - b) Ship pitches with the bow rising at an angular velocity of 0.8 rad/s.
 - c) Ship rolls at an angular velocity of 0.1 rad/s.

PART-C

- Q. 11 A rotating shaft carries three unbalanced masses of 4 kg, 3 kg and 2.5 kg at radial distances of 75 mm, 85 mm and 50 mm and at the angular position of 45° , 135° and 240° respectively. The second and the third masses are in the planes at 200 mm and 375 mm from the plane of the first mass. The angular positions are measured counter clockwise from the reference line along x – axis and viewing the shaft from the first mass end. The shaft length is 800 mm between bearings and the distance between the plane of the first mass and the bearing at that end is 225 mm. Determine the amount of counter masses in planes at 75 mm from the bearings for the complete balance of the shaft. The first counter mass is to be in a plane between the first mass and the bearing and the second mass in a plane between the third mass and the bearing at that end.
- Q. 12 A gear train shown in figure in which gears B and C constitute a compound gear. The number of teeth are shown along with each wheel in figure. Determine the speed and the direction of rotation of wheels A and E if the arm revolves at 210 rpm clockwise and the gear D is fixed.



- Q. 13 A 2.2 tonne racing car has a wheel base of 2.4 m and a track of 1.4 m. The centre of mass of the car lies at 0.6 m. above the ground and 1.4 m from the rear axle. The equivalent mass of engine parts is 140 kg with radius of gyration of 150 mm. The back axle ratio is 5. The engine shaft and flywheel rotate clockwise when viewed from the front. Each wheel has a diameter of 0.8 m and a moment of inertia of 0.7 kg.m^2 . Determine the load distribution on the wheels when the car is rounding a curve of 100 m radius at a speed of 72 km/h to the (i) left, and (ii) right.