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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4671112

Date: 28/10/2025

Subject Name: Design of Mechanical Systems
Subject Code: MEC701 Branch: Mechanical Engineering
Duration: 3 Hrs.
Semester: VII
Max Marks: 80

Note:

1) Attempt all questions.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.
4) Use of standard design data book like PSG, Mahadevan & Kale Khandare are permitted.

		CO	Marks
Q.1	**Answer the following (any two)**	**1**	**8**
a.	Explain system concept in design with suitable example.		4
b.	Draw flow chart for methodology of design.		4
c.	What is optimum design?		4
Q.2	**Answer the following (any two)**	**2**	**18**
a.	A single stage spur gear box is used to transmit 15kW at 1440 RPM. i = 4. Assume material C55Mn1 for pinion and gear. Find module and check for Lewis Dynamic Load.		9
b.	A pair of straight bevel gear is used to transmit 25 kW power from output shaft of gear box to agitator shaft. The two axes are inclined at 850. The agitator shaft rotate at 15 rpm and reduction ratio is 4:1. a) Selecting suitable material for bevel pinion and gear, find module, face width, pitch circle diameter and outside diameter of two gears to satisfy strength and wear criteria.		9
c.	What are assumptions made by Lewis and derive Lewis beam strength equation.		9
Q.3	**Answer the following (any two)**	**3**	**16**
	The following specification refers to an EOT crane. Application - Class II; load to be lifted - 100 KN; Hoisting Speed - 8 m/min; Maximum lift -10 m; Velocity of cross travel - 20 m/min & Velocity of long travel - 30 m/min.		
a.	Design the hook and check for its most critical cross section.		8
b.	Select 6×37 type of rope and find its life.		8
c.	Select suitable hoisting motor.		8
Q.4	**Answer the following (any two)**	**4**	**8**
	The specification of belt Conveyor system are, Capacity : 200TPH Material to be conveyed: Coal having Lump Size : 80mm Horizontal distance20m & Vertical distance 3m Troughing angle 15^0		
a.	Determine width of belt.		4
b.	Find Total Force (Resistance) exerted by belt.		4
c.	Draw the neat sketch of conveyor belt assembly and explain function of Snub Pulley.		4

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Q.5	**Answer the following (any two)**	**5**	**16**
	A four stroke single cylinder diesel engine develops 10kW brake power when operating at 1000rpm. Determine		
a.	Size of engine (Bore and Stroke)		8
b.	Design Piston		8
c.	Explain types of piston rings with its function. What is ovality of the piston?		8
Q.6	**Answer the following (any two)**	**6**	**14**
	The following data refers to Gear Pump: Discharge =50 LPM Pressure =35 bar By making suitable assumptions,		
a.	Select standard Motor		7
b.	Design Gear and check for bending and dynamic load		7
c.	Write the significance of specific speed and NPSH in the design of centrifugal pumps.		7

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END SEMESTER EXAMINATION OCT / NOV 2025 (SIGCE R-19 C SCHEME)

QP Code: 4671233

Subject Name: Renewable Energy Sources
Subject Code:MEDLO7032
Branch: Mechanical Engineering
Duration:3 Hours

Date: 01/11/2025
Sem: VII
Max Marks: 80

Note:

1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks

		CO	Marks
Q.1	**Answer the following (any two)**	1	8
a.	Differentiate between Renewable and Non-renewable energy sources.		4
b.	Explain shortcomings and limitations to the existing energy sources.		4
c.	Explain construction and working of the Pyranometer used for measurement of solar radiation		4
Q.2	**Answer the following (any Three)**	2	15
a.	Solar thermal power plant system installation is expected to minimize the plant's annual energy bill by Rs. 14 lacs. If the capital cost of a new solar thermal power plant installation is Rs. 89 lacs and the annual operating and maintenance cost is 5 lacs. (a)The expected payback period for the proposed project.		5
b.	Explain the construction and working of solar water heater.		5
c.	Explain the concept of solar still.		5
d.	Explain how solar energy can be utilised systematically for space heating and cooling?		5
Q.3	**Answer the following (any Three)**	3	15
a.	Explain the working principle of a solar cell.		5
b.	Discuss the I-V characteristics of a solar PV cell.		5
c.	State the parameters which affect the efficiency and life cycle of PV cells.		5
d.	Describe the types of solar photovoltaic systems.		5
Q.4	**Answer the following (any two)**	4	12
a.	What are the considerations in selecting a windmill site?		6
b.	Differentiate between HAWT and VAWT.		6
c.	Wind at 1 standard atmospheric pressure & 15°C has a velocity of 15 m/s, turbine diameter is 120 m & turbine operating speed is 40 rpm at maximum efficiency. Calculate: (a) Total Power Density in wind stream. (b) Maximum Power Density.		6
Q.5	**Answer the following (any three)**	5	15
a.	Calculate (a) the volume of biogas digester suitable for output of four crows, and Retention time is 20 days and temperature 30 deg C. Dry matter consumed is 2kg / day biogas yield		5

$0.24m^3$ per kg. Burner efficiency is 60% methane proportion is 0.8. Heat of combustion of methane may be assumed to 28MJ / m^3

b. Differentiate between floating drum type and fixed dome type biogas plants. 5

c. Explain the factors affecting the performance of a biogas digester. 5

d.. Explain construction, working and applications of fuel cell. 5

Q.6 Answer the following (any three) **6 15**

a. What is wave energy? Explain any one type of wave energy conversion device.

b. What are the different types of OTEC power plants? Describe the working of anyone type in brief.

c. Explain the methods by which energy conservation in buildings can be achieved.

d. Describe the working principle of oscillating water column wave energy system.

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4671121

Date: 30/10/2025

Subject Name: **Logistics and Supply Chain Management**

Subject Code: MEC702 Branch: Mechanical Engineering

Sem: VII

Duration: 3 Hours

Max Marks: 80

Note:

1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks

		CO	Marks
			10
Q.1	**Answer the following (any two)**		
a.	Write objectives of supply chain.	CO1	5
b.	What is green supply chain management	CO1	5
c.	Write advantages and disadvantages of forward supply chain and reverse supply chain .	CO1	5
			15
Q.2	**Answer the following (any three)**		
a.	What is meant by bullwhip effect in supply chain and how it can be reduced	CO2	5
b.	Explain supply chain performance measure SCOR model with neat diagram	CO2	5
c	What are the challenges in establishing a global supply chain?	CO2	5
d..	Discuss how to create supplier score card in measurement of supplier performance evaluation	CO2	5
			15
Q.3	**Answer the following (any three)**		
a.	Explain EOQ in terms of ordering cost and carrying cost.	CO3	5
b.	What are the objectives that should be fulfilled by an inventory control system	CO3	5
c.	Perform ABC analysis using following data:	CO3	5

Items	Number of units	unit price
1	120	250
2	800	15
3	50	600
4	200	40
5	1000	5
6	300	60

d. Define lead time,demand,buffer stock,stock out,reordering level

Q.4 Answer the following (any three) **15**

a. A company wants to locate one warehouse at either W1 or W2 to serve three customer locations (L1–L3). The transport cost (₹/unit) and demand for each location are given below.Select the best one. CO4 5

:

Location	w1	w2	Demand
L1	4	5	20
L2	6	4	25
L3	5	7	13

b Write briefly about third Party Logistics CO4 5

c. What are the objectives of logistic management? CO4 5

d. Discuss the factors in packaging that leads to efficient logistic management CO4 5

Q.5 Answer the following (any two) **10**

a Explain corporate social responsibility n supply chain CO5 5

b. Write a short note on RFID and explain its significance in SAPRFID. CO5 5

c What do you mean by green supply chain management CO5 5

Q.6 Answer the following (any three) **15**

a Define minimum order quantity,manufacturing critical path time,Takt time. CO6 5

b What do you mean by resilience? Explain CO6 5

c Obtain the initial basic feasible solution using the least cost method. It involves three sources and four destinations .The cell entries represent the cost of transportation per unit CO6 5

:

		Destinations				Supply
		1	2	3	4	
Source	1	6	2	14	8	3000
	2	4	12	10	18	4000
	3	16	6	6	4	5000
Demand		2500	3500	4000	2000	

PTO

d. A delivery vehicle starts from a depot (0,0) and must visit each customer once before returning to the depot. Find the route with minimum travel cost (Euclidean distance) CO6 5

Location	x	y
Depot	0	0
Customer1	2	3
Customer 2	5	2
Customer3	4	6

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4671142

Date: 30/12/25

Subject Name: Machinery Diagnostics

Subject Code: MEDLO7041 Branch: ME

Duration: 3 Hours

Sem: VII

Max Marks: 80

Note:

1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks

		CO	Marks
Q.1	**Answer the following (any three)**		**15**
a.	Explain in brief types of maintenance.	CO1	5
b.	Explain the benefits of vibration-based condition monitoring.	CO1	5
c.	Write the steps involved in condition monitoring.	CO1	5
d.	Highlight the key differences between time domain and frequency domain analysis.	CO1	5
Q.2	**Answer the following (any two)**		**14**
a.	Explain briefly the instruments used for measuring vibrations.	CO2	7
b.	What is a laser vibrometer? Explain its working principle and benefits over traditional contac type vibration measuring instruments.	CO2	7
c.	Enumerate and briefly explain the factors influencing the selection of sensors used in vibratic measurement.	CO2	7
Q.3	**Answer the following (any three)**		**15**
a.	What is Fast Fourier Transform (FFT)? What are its advantages and disadvantages?	CO3	5
b.	Classify the signals based on their characteristics, and briefly explain each type.	CO3	5
c.	List and briefly explain the essential components of a Data Acquisition System employed in vibration and condition monitoring applications.	CO3	5
d.	What is meant by spectral leakage. How do we solve this problem?	CO3	5
Q.4	**Answer the following (any two)**		**12**
a.	What is a resonance test? Discuss the techniques to eliminate resonance.	CO4	6
b.	Write a short note on time and frequency domain analysis to identify unbalance.	CO4	6
c.	What is meant by mechanical looseness? Describe its various types.	CO4	6
Q.5	**Answer the following (any two)**		**12**
a.	Describe the characteristics of cavitation experienced in centrifugal pump.	CO4	6
b.	Write a short note on journal bearing fault diagnosis.	CO4	6
c.	List and describe the distinct frequencies observed in a rolling element bearing.	CO4	6

Q.6	**Answer the following (any two)**			**12**
a.	What are the challenges that needed to be addressed by the vibration monitoring system in sugar mills.	CO5	6	
b.	Illustrate a case study on turbine issues, detailing sensor choice, mounting, measurement, da plotting, and fault detection.	CO5	6	
c.	Write a short note on health monitoring of journal bearing.	CO5	6	

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4671113

Date: 20/12/25

Subject Name: Design of Mechanical Systems

Subject Code: MEC701 Branch: Mechanical Engineering

Semester: VII

Duration: 3 Hrs

Max Marks: 80

Note:

1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.
4) Use of standard design data book like PSG, Mahadevan & Kale Khandare are permitted.

		CO	Marks
Q.1	**Answer the following (any two)**	**1**	**8**
a.	What are objectives of optimum design?		4
b.	Explain Methodology for mechanical system design with suitable example.		4
c.	Explain the system concepts in design with suitable example.		4
Q.2	**Answer the following (any two)**	**2**	**18**
a.	A worm and worm wheel drive is to be designed for the following specification. Power to be transmitted: 12 kW Worm speed: 900 rpm Velocity ratio: 30 Determine the axial module of worm based on the wear failure under static condition by selecting suitable material.		9
b.	A pair of bevel gear is required to transmit 8 kW power from a pinion shaft rotating at 400 rpm with reduction ratio 3.5. The shaft angle is 90 degree and drive is subjected to moderate shock and operates at 12 hrs/day. Design gear pair in strength and check for wear.		9
c.	A pair of spur gear is required to transmit 10 KW power from a pinion shaft rotating at 600 rpm with reduction ratio 3.5. Design gear pair in strength and check for wear.		9
Q.3	**Answer the following (any two)** The following specification refers to an EOT crane. Application - Class II load to be lifted - 80 KN Hoisting Speed - 6 m/min Maximum lift – 10 m	**3**	**16**
a.	Select suitable type and size of the wire rope for an expected life of 12 months.		8
b.	Select a standard hook, material and design stresses induced at the most critical section.		8
c.	Design the rope drum.		8
Q.4	**Answer the following (any two)** The specification of belt conveyor system are, Capacity = 200 TPH Material to be conveyed = Lime stone. Maximum lump size = 90 mm. Inclination = 12°. Centre to centre distance = 100 m.	**4**	**8**

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a.	Design of conveyor belt.		4
b.	Find motor capacity		4
c.	Design of driver pulley		4
Q.5	**Answer the following (any two)**	**5**	**16**
	A single cylinder, water cooled four stroke diesel engine is to be designed for the following specification. Brake power : 22 kW Speed : 1500 rpm By making suitable assumptions.		
a.	Design of cylinder liner.		8
b.	Design of piston and piston pin.		8
c.	Design of connecting rod.		8
Q.6	**Answer the following (any two)**	**6**	**14**
	A centrifugal pump is to be designed for 1000 LPM discharge and 25 m total manometric head.		
a.	Design impeller		7
b.	Design of impeller shaft		7
c.	Design of volute casing		7

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME)

QP Code: 4671153

Subject Name: Disaster Management and Mitigation Measures
Date: 06/11/2025
Subject Code: ILO7017
Branch: Mechanical Engineering
Sem: VII
Duration: 03 hours
Max Marks: 80

Note:
1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks

		CO	Marks
Q.1	**Answer the following (any two)**		**10**
a.	Discuss the importance of studying disasters in human life. How can such knowledge help in disaster management?	1	5
b.	Write short notes on Global Warming.	1	5
c.	Define disaster and hazard. Explain the global and Indian scenario of disasters with suitable examples.	1	5
Q.2	**Answer the following (any two)**		**20**
a.	Define natural disasters. Describe the causes and effects of any two natural disasters.	2	10
b.	Explain the meaning and nature of a flood and a flash flood. How do they differ from each othe	2	10
c.	What is a cyclone? Describe its characteristics and the damage it can cause. Define manmade disasters. Give examples of chemical, industrial, and nuclear hazards.	2	10
Q.3	**Answer the following (any two)**		**10**
a.	What are the main objectives of a disaster management policy? Give examples of disaster risks by India.	3	5
b.	Describe the paradigm shift in disaster management from the past to the present.	3	5
c.	Outline the initial steps to start rescue operations in a disaster situation and how they should proceed over time.	3	5
Q.4	**Answer the following (any two)**		**20**
a.	What is the National Disaster Management Authority (NDMA)? Discuss its scope and key funct	4	10
b.	Explain the applications of GIS, Remote Sensing, and GPS in disaster management with suitable examples.	4	10
c.	Explain the importance of effective communication among different agencies during disaster management.	4	10

Q.5	**Answer the following (any two)**		**20**
a.	Discuss the role of government agencies and NGOs in financing disaster relief.	5	10
b.	Explain how international aid is mobilized and utilized in disaster-hit areas.	5	10
c.	What are the legal aspects related to raising funds and managing finances during disaster relief?	5	10

Q.6	**Answer the following (any two)**		**10**
a.	What is risk mapping? Describe its importance in disaster management.	6	5
b.	What are non-structural mitigation measures? Describe community-based disaster preparedness.	6	5
c.	How do capacity development and training help in disaster mitigation?	6	5

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END SEMESTER EXAMINATION (SIGCE R-19 C SCHEME) QP Code: 4671143

Subject Name: Machinery Diagnostics Date: 04/11/2025
Subject Code: MEDLO7041 Branch: ME Sem: VII
Duration: 3 hrs Max Marks: 80

Note:
1) Attempt all questions
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks

		CO	Marks
Q.1	**Answer the following (any Three)**		**15**
a.	Explain the basic maintenance principles in Industrial machinery.	CO1	5
b.	Explain the benefits of vibration-based condition monitoring.	CO1	5
c.	Differentiate between time and frequency domain analysis.	CO1	5
d.	Illustrate the concept prognosis in vibration-based condition monitoring with examples.	CO1	5
Q.2	**Answer the following (any two)**		**14**
a.	What is a laser vibrometer? Explain its working principle and benefits over traditional contac Type vibration measuring instruments.	CO2	7
b.	Explain different sensor mounting techniques used in vibration measurement. How does Mounting affect data accuracy?	CO2	7
c.	Explain the main methods are used for attaching sensors to monitoring locations in predictiv maintenance.	CO2	7
Q.3	**Answer the following (any Three)**		**15**
a.	What is Fast Fourier Transform (FFT)? What is its advantage, and disadvantages?	CO3	5
b.	Briefly describe the function and need of a signal conditioning unit in a vibration data Acquisition system.	CO3	5
c.	What Is Windowing? Describe Windowing functions with diagram.	CO3	5
d.	Explain the essential setting in Data Acquisition System.	CO3	5
Q.4	**Answer the following (any two)**		**12**
a.	What are the methods for shaft alignment and how do you diagnose a misalignment situation.	CO4	6
b.	What is the effect of a bent shaft on machine vibration? Also explain the monitoring frequency for bent shaft.	CO4	6
c.	Explain unique reasons for mechanical looseness.	CO4	6
Q.5	**Answer the following (any two)**		**12**
a.	Describe the characteristics of cavitation experienced in centrifugal pump.	CO4	6
b.	What are the different faults associated with rolling element bearing?	CO4	6
c.	Describe four areas that should be incorporated in an industrial pump maintenance program	CO4	6

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				12
Q.6	**Answer the following (any two)**			
a.	What are the challenges that needed to be addressed by the vibration monitoring system in sugar mills.	CO5	6	
b.	Explain case study of turbine problem from sensor selection and mounting, measurement, plot, and fault identification.	CO5	6	
c.	Describe the methods to reduce the gearbox problems using condition monitoring.	CO5	6	