AIKTC KALSEKAR TECHNICAL CAMPUS

INNOVATIVE TEACHING · EXUBERANT LEARNING

Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2022-23/   Date: 25/01/23

School: **SoET-REV. C-SCHEME**   Branch: **MECH. ENGG.**   SEM: **VII**

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following **Semester/Unit Test-I/Unit Test-II (Reg./ATKT)** question

papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format SC	Format HC	No. of Copies
1	Design of Mechanical System	MEC701		✓	
2	Logistics and Supply Chain Management	MEC702		✓	
3	Department Level Optional Course – 3 Renewable energy system	MEC703		✓	
4	Department Level Optional Course – 4 Automotive Power System	MEC704		✓	
5	~~Institute Level Optional Course – I~~ Vibration Control.	MEE701X		✓	
6					

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

ME   R-19

(3 Hours)   Maximum Marks: 80

N.B.   1) **Question No. 1 is compulsory**
2) Solve **Any Three** from remaining **Five** questions.
3) Use of standard data book like PSG, Mahadevan and Kale Khandare is permitted
4) Assume suitable data if necessary, giving justification

Q1   Answer any **Four** from the following
a) Explain lays in wire rope with construction of wire rope.   5
b) Explain Design Methodology and Optimum Design   5
c) State the significance of specific speed and NPSH in the design of a   5
   centrifugal pump?
d) Explain why an I – section with $I_{xx} \leq 4 I_{yy}$ is selected for connecting   5
   rods of an I.C. Engine?
e) Write assumptions made by Lewis and derive Lewis beam strength   5
   equation

Q2   The following specification refers to an EOT crane.   20
   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. Select a standard hook, material and design stresses induced at the most
   critical section.
b. Select suitable type and size of the wire rope for an expected life of 12
   months.
c. Design the pulley axle and select suitable bearing.
d. Design the rope drum.

Q3   A centrifugal pump directly coupled to a motor is required to deliver 100 m³/hour   20
   of water at 25⁰C against a total head of 50 m.
a. Select the type of motor speed and determine the power.
b. Determine the impeller diameter, inlet and outlet vane angles and no. of
   vanes.
c. Design the impeller shaft.
d. Design the shape of the volute casing.
e. Decide diameters of the suction and delivery pipes.

15911   Page 1 of 2

Q4   A 20° troughing belt conveyer has following specifications.   20
     Material to be conveyed = Lime stone, Maximum lump size = 125mm.
            Capacity = 300 TPH, Inclination = 12^0, Center distance = 50 m.
        a) Determine width, number plies and thickness of belt.
        b) Select proper motor for conveyor
        c) Design the drive pulley along with its shaft
        d) Design the troughing idler for the belt.

Q5   A pair of straight bevel gear is used to transmit 25 kW power from output shaft   20
     of gear box to agitator shaft. The two axes are inclined at 85^0. The agitator shaft
     rotates 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.
        b) Give constructional detail of both gears.
        c) Draw sketch of the two gears in assembled condition with leading
            dimensions.

Q6a) A four stroke single cylinder water cooled diesel engine develops 7.5 kW brake   15
      power when operating at 1000rpm.
        a) Determine the size of engine (bore and stroke)
        b) Design wet liner and cylinder.
        c) Design piston with pin and piston rings
Q6b) Illustrate the working of external gear pump with neat sketches.   05

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Sem–VII–C–19– Reg.

ME–R–19

12/12/22

Time: 3 Hours   Marks : 80

Note: (1). Q.1 is Compulsory.
        (2). Attempt any three questions out of the remaining five.

Q.1   Attempt any four: **20**
(a)   What is meant by Supply Chain Management? What are the objectives of Supply Chain
      Management?
(b)   What is meant by Bullwhip Effect in Supply Chain? How can it be reduced?
(c)   What are the reasons for holding inventory?
(d)   What are the objectives of Logistics Management? What are the factors affecting logistics
      function?
(e)   How do businesses incorporate RFID into the Supply Chain?

Q.2 (a) What are the challenges in establishing a global supply chain?   **10**
Q.2 (b) Discuss how to create a supplier scorecard in supplier performance evaluation.   **10**

Q.3 (a) What is the difference between a P system and a Q system in inventory control?   **10**

Q.3 (b) Find the optimum order quantity given that annual usage is 500 pieces, setup cost is
        Rs. 10, I =20%, cost per unit is Rs. 100   **10**
Q.4 (a) Discuss the factors in packaging that lead to efficient logistics management.   **10**

Q.4 (b). What is the difference between a forward supply chain and a reverse supply chain?   **10**

Q.5 (a) What is a Transport Management System (TMS)? What are its different components?   **10**

Q.5 (b) What is a Warehouse Management System (WMS)? What are the essential processes in a
        WMS?   **10**

Q.6 Answer the following: **20**
   a.   What are the pros and cons of different modes of transportation?
   b.   What is the difference between takt time and lead time?
   c.   A company has received and order for 1,500 units of mugs that need to be manufactured in a
        period of 24 hours. Calculate the takt time. Assume that the firm has continuous manufacturing
        processes 24 hours a day.
   d.   What are the various design options for a distribution network? Draw their labelled sketches.?
   e.   What is meant by Supply Chain Resilience?

ME (R-19)

Sem-VII-C19-Reg.

Duration: 3hrs   [Max Marks:80]

N.B. : **(1) Question No 1 is Compulsory.**
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1		Attempt any **FOUR**	[20]
	a	Explain the working of Solar Pond.	5
	b	Explain various types of Fuel Cells.	5
	c	Discuss the advantages & disadvantages of Geothermal energy	5
	d	Explain OTEC system	5
	e	What are the various types of biogas generation plants.	5

2   a   Define and explain the followings:-   [5]

(a) Latitude (b) Hour angle (c) Declination

   b   State The various types of solar PV cells   [5]

   c   Calculate the variation at day length OVER A YEAR (on 26[Th] of the month of   [10]
       year 2022) of the following location and plot the same on graph. & make your
       comments. Location: Mumbai (19.076^0N, 72.877^0E)

3   a   Discuss in brief, what are the effects of various parameters on the performance   [10]
       of flat plate collector.

   b   Calculate the angle made by beam radiation with the normal to a flat plate   [10]
       collector on December 1, at 9.00 A.M., solar time for a location at 28° 35' N.
       The collector is tilted at an angle of latitude plus 10°, with the horizontal and
       is pointing due south.

4   a   Explain The Various Methods to improve the efficiency of PV cells.   [10]

   b   State The working principle of a solar PV system.   [10]

16047   Page **1** of **2**

5 a Wind at 1 standard atmospheric pressure & 15^0c has a velocity of 15m/s calculate, 1) the total power density in the wind 2) a maximum obtainable power density 3) the total power 4) the total torque & axial thrust. (Given data Turbine dia.=120M,turbine operating speed =40 RPM at max. efficiency assume propeller type wind turbine) **[10]**

b Discuss in details, the various Factors for selection of sites for wind mills. **[10]**

6 a The following data are given for a family biogas digester suitable for the output of 5 cows; the retention time is 20 days, temp. is 20^0c,dry matter consumed per day =2kg. Biogas yield is $0.24m^3$/kg, the efficiency of burner is 60%, methane proportion is 0.8, heat of combustion of methane=$28MJ/m^3$, calculate 1) the volume of Digester & 2) power available from digester. **[10]**

b For a Rs. 12 lacs investment in solar energy equipment which meets 54 % of annual load of 160 GJ. If first year fuel cost is Rs. 750 per GJ and expected to inflate at the rate of 11 % per year. Determine **[10]**

    (a) Undiscounted payback time.
    (b) Discounted payback time if the discount future cost is at rate 8 %.

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Correction in **1T01437** - B.E.(Mechanical) Engineering)(SEM-VII)(Choice Base Credit Grading System) ((R- 19-20) (C Scheme) / **42874** - Renewable Energy Systems (DLOC - III)

Q.P Code: **16047**

Subject RES, B E **(Mech) Sem- VII QP Code -16047, Que. no. 6a**

consider the Std. Value of Density of Dry Matter = 50 Kg/m3

ME   R-19

Sem-VII -C19-Reg.

(3 Hours)   (Marks: 80)

N.B.

1) **Question No. 1 is compulsory.**
2) Solve Any Three of the remaining Five questions.
3) Assume suitable data if necessary and state it clearly.

Q.1 Solve any Four out of Six.
    A. Explain Conventional fuels used in I.C. Engines   (5)
    B. Explain SAE rating of lubricants.   (5)
    C. What are the constituents of exhaust emissions?   (5)
    D. Explain Electric system components for HEV.   (5)
    E. Explain the need and importance of EV & HEV.   (5)
    F. Explain Energy Sources for EV & HEV.   (5)

Q.2

    A. Explain the Fuel injection systems used in SI and CI engine   (10)
    B. Explain Oxygen sensors, their construction and importance in ECM.   (10)

Q.3

    A. Explain drive train topologies of EV & HEV.   (10)
    B. I) What are the Methods of controlling emissions.   (5)
       II) What is the Necessity of engine cooling and the disadvantages of overcooling? (5)

Q.4

    A. What are the Power energy supply requirement for EV & HEV applications?   (10)
    B. How would you calculate the torque, power, battery capacity RPM etc for EV.   (10)

Q.5

    A. Explain Fuel cells, flywheels and ultra-capacitors as energy sources for
       EV& HEV.   (10)
    B. Explain the Functions and working of the ignition coil.   (10)

Q.6
    A. What are the types of lubricants and their properties?   (5)
    B. Describe its harmful effect on the environment and human health.   (5)
    C. Discuss different types of Motors used in EV& HEV.   (5)
    D. What are the components of a charging station?   (5)

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From: support@muapps.in

To: controllerktc@yahoo.com

Date: Wednesday, 14 December, 2022 at 11:39 am IST

University of Mumbai

1T01437 - B.E.(Mechanical) Engineering)(SEM-VII)(Choice Base Credit Grading System
) ((R- 19-20) (C Scheme) / **42873** - Automotive Power Systems (DLOC - III)
Correction in Q.P.Code: **15667**
Corrected question as bellow
Q.6 B. Describe harmful effects of exhaust emission on the environment and human
health.

University of Mumbai
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Recd.
11:45AM.
(SS)

Time: 3 Hours   **Marks: 80**

Note :

- **Question No.1 is compulsory.**
- Solve **ANY THREE** questions from the **remaining** five questions.
- Figure to the right indicates full marks.
- Assume suitable data wherever required, but justify the same.

                                                   Marks

Q. 1 Solve **ANY FOUR** questions from following. (Each question carries 5 marks)

a) Explain Gyroscopic Vibration absorbers.   (5)

b) Compare vibration isolator and vibration absorber.   (5)

c) Explain the significance and limitations of active vibration control (AVC) over   (5)
    passive vibration control (PVC).

d) Discuss need and basic scheme of Adaptive Vibration Absorber.   (5)

e) Discuss Skyhook damping.   (5)

f) Discuss Resonance Detuning and Decoupling.

Q. 2 a) The seat of a automobile, with the driver, weighs 1000 N and is found to have a   (10)
    static deflection of 12 mm under self-weight. The vibration of the rotor is
    transmitted to the base of the seat as harmonic motion with frequency 5 Hz and
    amplitude 0.4 mm.
    a. What is the level of vibration felt by the pilot?
    b. How can the seat be redesigned to reduce the effect of vibration?

    b) Explain in detail Optimum design of Damped absorbers.   (10)

Q. 3 a) Discuss the transmissibility characteristics of different types of isolators.   (10)

    b) Write a note on actuators and sensors for active vibration control (AVC).   (10)

Q. 4 a) Discuss ground hook control method for Semi-Active tuned vibration absorber   (10)
    (SATVA).

16262

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