



*Knowledge Resource & Relay Centre (KRRC)*

AIKTC/KRRC/SoET/ACKN/QUES/2018-19/

Date: \_\_\_\_\_

School: SoET-CBSGS

Branch: MECH. ENGG.

SEM: VIII

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		No. of Copies
			SC	HC	
1	Design of Mechanical Systems	MEC801		✓	02
2	Industrial Engineering and Management	MEC802		✓	02
3	Refrigeration and Air Conditioning	MEC803		✓	02
4	Elective- II <i>Automobile engineering</i>	MEE802X		✓	02
5					
6					

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)  
 Librarian, AIKTC

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Paper / Subject Code: 53301 / Design of Mechanical Systems

(Hours 3)

[Total 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) Give the basic constructional details of different types ropes used in EOT crane. And what do you understand by  $6 \times 37$  rope? 5
- b) Explain Methodology for mechanical system design with suitable example? 5
- c) State the significance of specific speed and NPSH in the design of a centrifugal pump? 5
- d) Explain why an I - section with  $I_{xx} \leq 4 I_{yy}$  is selected for connecting rods of an I.C. Engine? 5
- e) Why cleaning of belt is necessary for belt conveyor? List down the usual types of cleaners. 5

Q.2 The following specification refers to an EOT crane. 20

Application - Class II

load to be lifted - 80 KN

Hoisting Speed - 6 m/min

Maximum lift - 10 m

- 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.

Q.3 A centrifugal pump directly coupled to a motor is required to deliver 1000L.PM of water at  $30^\circ C$  against a total head of 25 m. 20

- 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.

TURN OVER

- Q.4. Design the complete 20° troughing belt conveyer including drive for the following Specification. 20
- Material to be conveyed = Coal.
  - Maximum lump size = 100 mm.
  - Capacity = 250 TPH.
  - Inclination = 12°.
  - Center to centre distance = 100 m.
- Q.5. a) For the design of a 2 X 3 machine tool gear box with following specification. 15
- $N_{min} = 100\text{rpm}$ ,  $N_{motor} = 960\text{rpm}$ , GP ratio = 1.26
- i. Draw structural diagrams.
  - ii. Draw ray diagram and speed chart.
- Q.5. b) Distinguish between gear pump and the centrifugal pump. 5
- Q.6. a) A four stroke single cylinder water cooled Diesel engine develops 7.5 KW brake power when operating at 1000rpm. 15
- a) Determine the size of engine ( bore and stroke)
  - b) Design wet liner and cylinder.
  - c) Design piston with pin and piston rings
- Q.6. b) Explain arithmetic progression law of stepped regulation in multispeed gear box? 5
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B.E - Sem - VIII - CBSGS - Mech

14/5/19

Paper / Subject Code: 53302 / Industrial Engineering & Management

(3 Hours)

Total Marks: 80

- N.B. 1) Question No.1 is compulsory.  
2) Attempt any three questions out of the remaining five questions.  
3) Figures to the right indicate full marks.  
4) Assume suitable data wherever required but justify the same.

- Q.1 Short Answer questions. (Any Four) 20
- a. Analyzing layouts with computers with the help of CORELAP
  - b. What are the different costs incurred while increasing the value of the product?
  - c. Draw a FAST diagram considering the example of a 'Pen'.
  - d. State the different steps involved in Method Study.
  - e. Illustrate the concept of time value of money with the four variables involved in it.
- Q.2 a. Define white productivity. What are the factors influencing Productivity of an Enterprise? 10
- b. What are the steps involved in micro motion study? Describe five therbligs with their symbol, code, colour and description. 10
- Q.3 a. Define the term element. What are the reasons for breaking a job into elements? What are the different types of elements? 10
- b. What is the importance of plant layout? Explain types of layout with their advantages and disadvantages. 10
- Q.4 a. Classify the different types of displays and different types of controls with respect to work system design. 10
- b. Draw a Two handed process chart considering the example of assembly of 'Nut and Bolt'. 10
- Q.5 a. Define Rating. Why is it necessary to apply rating to the actual time which an operator takes to perform an operation? 10
- b. An operation involves the following elements given below with their related data.

Element	Observed time (minutes)	Rating	Remarks
A	0.20	90	-
B	0.05	80	-
C	0.03	100	-
D	0.78	100	-
E	0.06	100	-
F	0.05	100	-
G	0.02	85	Once in 5 pieces
H	0.06	80	-
I	0.10	90	-
J	0.04	90	Once in 20 pieces

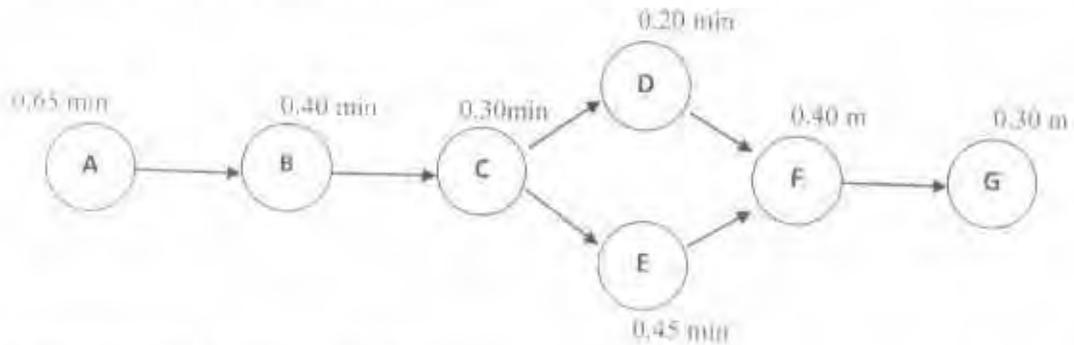
Assuming rest and personal allowances as 13% and contingency allowance as 2%, calculate standard time of the job. 10

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Q.6 a. What do you understand by the term depreciation? What are the inputs required to calculate it? Give at least four different types of depreciation. 10

Q.6 b. The precedence diagram for assembly activities A to G is shown below. The element times required for the activities are shown in the diagram in minutes. The line operates for 7 hours per day and an output of 350 units per day is desired.



- a) Calculate cycle time and theoretical minimum number of workers. 03
- b) Group the task into an appropriate number of work stations. 04
- c) Calculate the balance efficiency. 03

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(3 Hours)

[Total Marks: 80]

- N.B.: (1) Question No. 1 is compulsory.  
(2) Answer any three from the remaining five questions.  
(3) Assumptions made if any should be justified.  
(4) Use of Refrigerant Charts, Psychrometric Chart, Friction Chart and Steam Tables are allowed.

1. Answer any four of the following. [20]

- Draw simple vapour compression cycle on P-h diagram and explain the processes.
- What are non conventional refrigeration systems? Explain any one type.
- Air at  $T_{db}=30^{\circ}\text{C}$  and  $\text{RH}=40\%$  undergoes a constant humidity process until the final state is  $20^{\circ}\text{C}$ . Find i) Enthalpy of air at final state. ii) Cooling produced by the coil if the air flow is 200 CMM.
- List down types of aircraft refrigeration systems. Draw simple air cooling systems with neat schematic and T-s diagram.
- What is human comfort? Explain with help of ASHRAE Comfort chart.
- What are primary and secondary refrigerants? Give examples with application of each type.

2. a) A bootstrap air refrigeration system of 30 TR capacity is used for an aeroplane [12]  
flying at an altitude of 2000 m. The ambient air pressure and temperature are 0.8 bar and 0 C. The ram air pressure and temperature are 1.05 bar and 17 C. The pressure of air after isentropic compression in the main compressor is 4 bar. This air is now cooled to 27 C in another auxillary heat exchanger and then expanded isentropically upto the cabin pressure of 1.01 bar. If the air leaves the cabin at 25 C and the efficiencies for the main compressor, auxillary compressor and the cooling turbine are 80 %, 75 % and 80 % respectively; find : i) Power required to operate the system and ii. COP of the system

(The pressure is increased to 5 bar in auxillary compressor)

b) Classify refrigeration compressors. Explain each type in brief. [08]

3. a) Define the terms DBT, WBT, DPT and RH. [04]

b) What are the different types of Cooling Towers? Explain in brief. Define Range and Approach. [06]

c) Draw a neat diagram of Electrolux vapour absorption refrigeration system and explain its working. [10]

4. a) A vapour compression system using Ammonia works between  $-25^{\circ}\text{C}$  and  $40^{\circ}\text{C}$  as evaporator and condenser temperature respectively. Using P-h Chart, determine [12]

- i) COP                      ii) Mass of refrigerant per TR  
iii) Piston displacement per TR using volumetric efficiency = 83 %  
iv) Heat rejected in the condenser per TR  
v) Ideal COP
- b). Draw a neat sketch of Year Round Air Conditioning system and explain working of its components. [08]
5. a) What are the sources of cooling load for a Restaurant ? Discuss in details. [06]  
b) Define body temperature regulation and effects of extremes of hot and cold climate on human body. [06]
- d) A sling psychrometer reads 40 °C DBT and 28 °C WBT when atmospheric pressure is 750 mm of Hg. [08]
- Calculate using Steam Tables only i). Specific humidity ii). Relative humidity  
iii). Dew point temperature iv). Enthalpy
6. Write short notes on any four. [20]
- a) Liquefaction of Gases
  - b) Duct Design Methods
  - c) Desirable Properties of Refrigerants
  - d) Thermoelectric Refrigeration
  - e) Star Rating of Air Conditioners
  - f) DART rating of Air Refrigeration Systems
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BE - Sem-VIII - Mech - CBS 45

Paper / Subject Code: 53309 / 6) Automobile Engineering

Time: 3 Hours

Marks: 80

- N.B. 1) Qu. 1 is compulsory  
2) Solve any three questions out of remaining five.  
3) Provide neat diagrams wherever necessary.  
4) All questions carry equal marks.

- Qu. 1) Write short note on following (Any Four) [20]  
a) Final Drive,  
b) Disc brake,  
c) Stub axles,  
d) Reversibility of Steering Gears,  
e) Aerodynamic Drag.
- Qu. 2) A) Classify battery and explain Lead-Acid battery with neat diagram [10]  
B) State the importance of vehicle body design explain three layouts each of Passenger car and bus. [10]
- Qu. 3) A) Stating the requirements of suspension, explain Wishbone type suspension systems in detail. [10]  
B) What are the requirements of starting motors? Explain FOLO-through and Dyer drive. [10]
- Qu. 4) A) With neat diagram explain construction and features of Air suspension. [10]  
B) Classify gear box and explain sliding mesh gear box with diagram. [10]
- Qu. 5) A) What is Electronic Control Module (ECM)? Explain. [10]  
B) With neat diagram explain construction and working of Hydraulic braking system. [10]
- Qu. 6) Write short note on following, (Any four) [20]  
a) Steering geometry  
b) Differential  
c) Alternator  
d) Developments in Automobile sensor technology  
e) classification of Tyres

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