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Ajay Kumar Garg Engineering College, Ghaziabad

Department of Mechanical Engineering

Pre-University Test (B)

Course: B.Tech
Session: 2024-25
Subject: Fundamentals of Mechanical Engineering
Max Marks: 70

Semester: I
Section: S11 – S20
Sub. Code: BME - 101
Time: 3Hrs.

OBE Remarks:

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CO No.	1	2	2	3	3	4	5	1	1	2	3	3	4	4	5	5	½
Bloom's Level	L1	L1	L3	L1	L1	L4	L2	L4	L4	L2	L2	L4	L2	L2	L2	L2	L4
Weightage CO4: 16											Weightage CO5: 16						

Note : Answer all the sections.

Section-A

(7x2 =14)

A. Attempt all the parts.

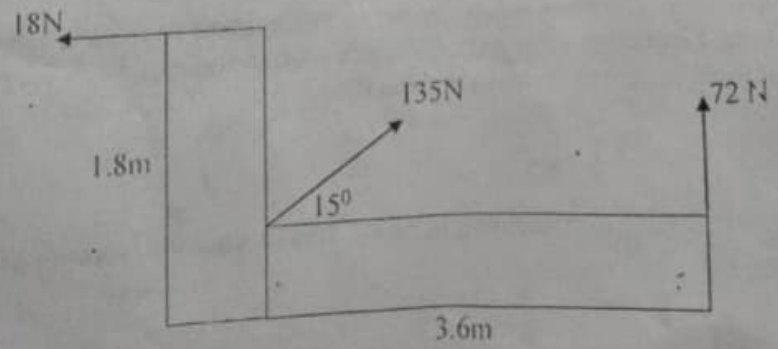
1. State parallelogram law of forces and principle of superposition.
2. What are the different modes of hybridization.
3. Why diesel engines are generally showing more mileage than petrol engines.
4. Define terms relative humidity and specific humidity.
5. Name two desirable properties of refrigerants.
6. A hydraulic lift used for lifting automobiles has 20 cm diameter ram which slides in a 20.016 cm diameter cylinder. Annular space between the cylinder and ram is filled with an oil of kinematic viscosity 3.5 stokes and relative density 0.85. If the travel of 3.2 m long ram has uniform rate of 15 cm/s, estimate frictional resistance experienced by ram.
7. Difference between active and passive transducers

Section-B

(3x7 = 21)

B. Attempt Any three.

8. State Varignon's theorem. Find out the resultant of forces shown in figure. (2+5)



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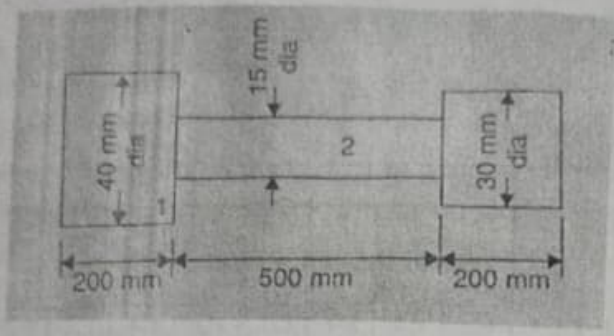
9. (a) Find out expression for elongation of tapered round bar.
(b) Find out elongation of bar as shown in figure subjected to an axial pull of 25 kN. E = 200 GPa



10. (a) Differentiate between 2 -stroke and 4 – stroke engine.
(b) Write functions of important components of electric vehicles.
11. Differentiate between winter and summer air conditioning. Also discuss the working of domestic referigerator with neat sketch.
12. Determine the power consumption of a domestic refrigerator if its refrigerating capacity is 1/8 TR. It is operating in ambient of 40° C. Temperature in the freezer must be maintained at -15° C COP of the system is half the Carnot COP. (2+5)

Section-C

C. Attempt all the parts. **(5x7 = 35)**

13. Attempt any one.

I. a) Define the following fluid properties Kinematic Viscosity, Specific Weight, Specific Volume, Compressibility. Derive the expression for discharge through venturi meter. (2+5)

b) What is the function of Pitot tube. Discuss working of Suspended type lift. (2+5)

14. Attempt any one.

a) Differentiate between impulse and reaction. Also discuss the working of centrifugal pump with neat sketch. (2+5)

b) State Newton's law of viscosity. The clearance space between shaft and concentric sleeve is filled with a Newtonian fluid. Shaft attains a speed of 60 cm/s when a force of 500N is applied parallel to the shaft. What force is needed if sleeve desired to move at 300 cm/s. (2+5)

15. Attempt any one.

a) Discuss various methods of pressure measurement in brief. Also discuss the working of bourdon tube pressure gauge. (2+5)

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b) Discuss various concepts for the measurement of force. Discuss working of Proving Ring. (2+5)

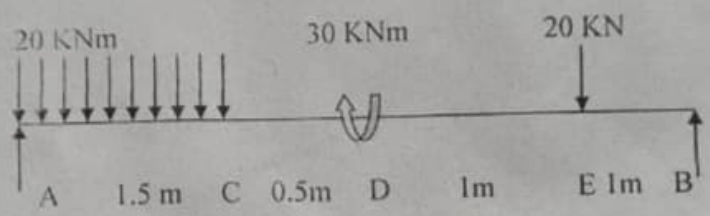
16. Attempt any one.

a) How sensor is different from a transducer. Differentiate between active and passive transducer. Explain classification of sensors based on various inputs and outputs. (2+2+3)

(b) Discuss the terms Bionics and Avionics. Also explain different types of Hydraulic Actuation System. (4+3)

17. Attempt any one.

a) Define Poisson's ratio. Find out reaction force for the beam shown in figure. (2+5)



b) Discuss working of 4 – stroke CI Engine with neat diagram. Write functions of main components of electric vehicles.

Faculty Sign

17/11/25
HoD Sign