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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MID TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: MEC 1004

Course Name: Elements of Mechanical Engineering

Program & Sem: B.Tech – II Semester

Date: 12 May 2022

Time: 10:00 AM – 11:30 AM

Max Marks: 50

Weightage: 25%

Instructions:

- (i) Read all the questions carefully and answer accordingly.
- (ii) Remember that talking is NOT allowed at any time in the exam hall.
- (iii) Scientific Calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M= 20M)

1. The mean effective obtained from the engine indicator indicates the _____.
[C.O. 1] [Knowledge]
2. Carburetor is an integral part of _____ Engines. [C.O. 1] [Knowledge]
3. In a refrigeration system, the expansion device is connected between the _____ and _____.
[C.O. 1] [Knowledge]
4. 7.5 ton in kW is equal to _____. [C.O. 1] [Knowledge]
5. In Refrigerator, _____ is a device which releases the heat to the atmosphere.
[C.O. 1] [Knowledge]
6. What do you understand by Closed System? [C.O. 1] [Knowledge]
7. State Second law of Thermodynamics. [C.O. 1] [Knowledge]
8. As per sign convention of 1st law of thermodynamics, heat input is _____ and Work input is _____. [C.O. 1] [Knowledge]
9. During Photosynthesis in plants, _____ energy is converted into _____ energy.
[C.O. 1] [Knowledge]
10. The pressure of 1950 mm of Hg is equal to _____ kPa. [C.O. 1] [Knowledge]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries SEVEN marks.

(2Qx7M=14M)

11. A new Samsung Refrigerator RT28T3453UT is installed in your house by a technician. Technician knew that you are a student of Mechanical Engineering in Presidency University and out of curiosity, technician asked you to explain how the substances or items which are kept inside the refrigerator attain lower temperature than surrounding. Explain the working of Samsung Refrigerator RT28T3453UT with proper diagram. [C.O. 1] [Comprehension]

12. A new person joined as a trainee in your new startup Automobile Company. He does not know how to assemble the engines' parts. His manager gave him a task to assemble the Diesel engine parts. He was trying to fit Carburetor in Diesel Engine but failed to do that. You are watching him from a corner of a room and you approached him. Explain him the working of that Engine with diagram. [C.O. 1] [Comprehension]

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries EIGHT mark.

(2Qx8M=16M)

13. The following details refer to a 4-stroke engine. Cylinder diameter = 200 mm, Stroke of 300 mm, Speed is 300 rpm, effective brake torque is 312.5 N-m, Mean effective pressure = 6 bar. Calculate
- (i) Indicated power
 - (ii) Brake power
 - (iii) Mechanical efficiency
 - (iv) Brake Specific Fuel consumption if amount of fuel consumed by engine is 2 grams per second. [C.O. 1] [Application]
14. Suppose you have an ice cube of 1800 grams at -20°C and heat is supplied to get the same amount of steam at 140°C . So, how much heat should be supplied to convert ice into steam? Take latent heat of fusion is 334 kJ/kg and latent heat of vaporization is 2260 kJ/kg. Specific heat of ice, water and steam are 2.108 kJ/kg K, 4.187 kJ/kg K and 1.996 kJ/kg K respectively. [C.O. 1] [Application]



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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

END TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: MEC 1004

Course Name: Elements of Mechanical Engineering

Program & Sem: B.Tech & II Sem

Date: 8th July 2022

Time: 01:00 PM to 04:00 PM

Max Marks: 100

Weightage: 50%

Instructions:

(iv) Read all the questions carefully and answer accordingly.

(v) Scientific calculators are permitted.

(vi) You are not permitted to share dictionaries, calculators or any other materials during the examination.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries five marks.

(6Qx 5M= 30M)

1. Explain the major parts of Lathe Machine. (C.O.No.4) [Knowledge]
2. Write the advantages and disadvantages of Gear Drive. (C.O.No.3) [Knowledge]
3. What is Machining. How is it different from casting? (C.O.No.4) [Knowledge]
4. What is BP, IP and FP and how all three are related. (C.O.No.2) [Knowledge]
5. What is radial flow, Axial flow and Mixed flow? (C.O.No.2) [Knowledge]
6. Define the following terminology with respect to belt drives? (C.O.No.3) [Knowledge]
A. Driver pulley B. Driven pulley C. Angle of contact

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries ten marks.

(4Qx10M=40M)

7. There is a toothed wheel that works with others to alter the relation between the speed of a driving mechanism (such as the engine of a vehicle) and the speed of the driven parts (the wheels). Identify the type of Transmission Drive and Explain the different types of it with proper diagram. (C.O.No.3) [Comprehension]
8. US physician John Gorrie built a device "Z" to produce the ice for fever patients. Identify the device "Z" and explain the working with proper block diagram. (C.O.No.1) [Comprehension]
9. A turbine "X" is invented by American scientist, James Francis in 1849. This turbine "X" is a reaction-type water turbine, which extracts energy from the pressure energy of moving water. Identify the Turbine "X" and explain its working with neat diagram. (C.O.No.2) [Comprehension]
10. A machine "Y" is known as mother of all machines. In this machine, workpiece rotates about an axis of rotation to perform various operations. Identify the machine and explain the different operation which can be performed on the machine. (C.O.No.4) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries ten marks.

(3Qx10M=30M)

11. Calculate how much heat is being required to convert 10 kg of ice at -25°C into steam at 400°C ? Latent heat of fusion is 334 kJ/kg. Latent heat of vaporization is 2260 kJ/kg. Specific heat of ice, water and steam are 2.108 kJ/kg K, 4.187 kJ/kg K and 1.996 kJ/kg K respectively.
(C.O.No.1) [Application]
12. A single cylinder 4-stroke engine runs at 1000 rpm and has a bore of 115mm and a stroke of 140 mm. The brake load is 60 N at 600 mm radius and efficiency: $\eta_{\text{mech}} = 80\%$. Calculate brake power and mean effective pressure.
(C.O.No.2) [Application]
13. An electric motor provides 6 kW power to an open belt drive. The diameter of the motor pulley is 200 mm & it rotates at 900 rpm. Calculate the Tight side and Slack side tension in the belt if the ratio of tension is 2.
(C.O.No.3) [Application]



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SCHOOL OF ENGINEERING

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Date: 12 May 2022

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Max Marks: 50

Weightage: 25%

Instructions:

(vii) Read all the questions carefully and answer accordingly.

(viii) Remember that talking is NOT allowed at any time in the exam hall.

(ix) Scientific Calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M= 20M)

15. The mean effective obtained from the engine indicator indicates the _____. [C.O. 1] [Knowledge]
16. Carburetor is an integral part of _____ Engines. [C.O. 1] [Knowledge]
17. In a refrigeration system, the expansion device is connected between the _____ and _____. [C.O. 1] [Knowledge]
18. 7.5 ton in kW is equal to _____. [C.O. 1] [Knowledge]
19. In Refrigerator, _____ is a device which releases the heat to the atmosphere. [C.O. 1] [Knowledge]
20. What do you understand by Closed System? [C.O. 1] [Knowledge]
21. State Second law of Thermodynamics. [C.O. 1] [Knowledge]
22. As per sign convention of 1st law of thermodynamics, heat input is _____ and Work input is _____. [C.O. 1] [Knowledge]
23. During Photosynthesis in plants, _____ energy is converted into _____ energy. [C.O. 1] [Knowledge]
24. The pressure of 1950 mm of Hg is equal to _____ kPa. [C.O. 1] [Knowledge]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries SEVEN marks.

(2Qx7M=14M)

25. A new Samsung Refrigerator RT28T3453UT is installed in your house by a technician. Technician knew that you are a student of Mechanical Engineering in Presidency University and out of curiosity, technician asked you to explain how the substances or items which are kept inside the refrigerator attain lower temperature than surrounding. Explain the working of Samsung Refrigerator RT28T3453UT with proper diagram. [C.O. 1] [Comprehension]

26. A new person joined as a trainee in your new startup Automobile Company. He does not know how to assemble the engines' parts. His manager gave him a task to assemble the Diesel engine parts. He was trying to fit Carburetor in Diesel Engine but failed to do that. You are watching him from a corner of a room and you approached him. Explain him the working of that Engine with diagram. [C.O. 1] [Comprehension]

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries EIGHT mark.

(2Qx8M=16M)

27. The following details refer to a 4-stroke engine. Cylinder diameter = 200 mm, Stroke of 300 mm, Speed is 300 rpm, effective brake torque is 312.5 N-m, Mean effective pressure = 6 bar. Calculate
- (v) Indicated power
 - (vi) Brake power
 - (vii) Mechanical efficiency
 - (viii) Brake Specific Fuel consumption if amount of fuel consumed by engine is 2 grams per second. [C.O. 1] [Application]
28. Suppose you have an ice cube of 1800 grams at -20°C and heat is supplied to get the same amount of steam at 140°C . So, how much heat should be supplied to convert ice into steam? Take latent heat of fusion is 334 kJ/kg and latent heat of vaporization is 2260 kJ/kg. Specific heat of ice, water and steam are 2.108 kJ/kg K, 4.187 kJ/kg K and 1.996 kJ/kg K respectively. [C.O. 1] [Application]