

Roll No.

Total Pages : 3

80017

Dec., 2018

B.Tech. Ist Semester

BASICS OF MECHANICAL ENGINEERING

(ME-101C)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

- (i) *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
- (ii) *Answer any four questions from Part-B in detail.*
- (iii) *Different sub-parts of a question are to be attempted adjacent to each other.*
- (iv) *All missing data may be suitably assumed.*

PART-A

CO

1. (a) What is specific heat? CO1
- (b) What is flow process in thermodynamics? CO1
- (c) Reading of pressure guage of a vacuum is 600 mm of Hg and barometric pressure is 760 mm of Hg. Find the absolute pressure in N/m^2 . CO1
- (d) What is octane number? CO1
- (e) The efficiency of an otto cycle is 40%. Find the compression ratio if $\gamma = 1.5$. CO1

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[P.T.O.]

- (f) What is Laws of machines? CO2
- (g) Load lifted by a machine is 8mm, while travel of effort is 200 mm. If mechanical advantage is 12, what is efficiency of machine? CO2
- (h) What will be the longitudinal strain produced in a wire, when it is stretched to double of its length. CO3
- (i) What is the rack angle? CO4
- (j) What is ductility? CO4

PART-B

2. (a) State and prove 1st law of thermodynamics. 5 CO1
- (b) A quantity of a gas has a volume of 0.14 m^3 , pressure 1.5 bar and a temperature 100°C . If the gas is compressed at a constant pressure, until its volume becomes 0.112 m^3 , determine;
- (a) The temperature at the end of compression
- (b) Work done in compressing the gas
- (c) Decrease in internal energy
- (d) Heat given out by gas. 10 CO1
3. (a) Explain two stroke diesel engines. 5 CO1
- (b) An air standard diesel cycle has a compression ratio of 14. The pressure at the beginning of the compression stroke is 1bar and the temperature is 27°C . The maximum temperature is 250°C . Determine the thermal efficiency. 10 CO1

4. (a) Explain the single and double purchase winch crab with a neat sketch. 5 CO2
- (b) In a lifting machine, an effort of 98.2 N raised a load of 1000 N and as an effort of 498.2 N raised a load of 6000 N. Express law of machine according to the parameters. Find what effort is required to lift a load of 10,000 N? Find also the maximum mechanical advantages. 10 CO2
5. (a) Define manufacturing processes. What are the types of manufacturing processes? Explain them. 5 CO4
- (b) What is a slip? How does it affect the velocity ratio of belt drive? Derive an expression to show it. 10 CO2
6. (a) What is hook's law? Explain each stage of changes in material behaviour. 5 CO3
- (b) A hollow cast iron column 200 mm external diameter and 160 mm internal diameter is filled with concrete. The column carries a load of 300 kN. If the modulus of elasticity is of cast iron is 6 times that of concrete, find the stresses in the cast iron and the concrete. 10 CO3
7. Write short notes on the following :
- (a) Slip gauge and sine bar with neat sketch. 5 CO4
- (b) Brakes and clutches. 5 CO3
- (c) Differential pulley block. 5 CO2