Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech**

PBE1B101

1st Semester Back Examination 2018-19

BASICS OF MECHANICAL ENGINEERING

BRANCH : AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FAT, IEE, IT, MANUFAC, MANUTECH, MECH, METTA, MINERAL, MINING, MME, PE, PLASTIC, PT, TEXTILE

Time : 3 Hours

Max Marks : 100

Q.CODE : E811

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.Use of Steam table and Refrigeration table are allowed in the examination hall.

Part- I

Q1 Short Answer Type Questions (Answer All-10) **(2 x 10)**

a) Classify the hydraulic turbines.
b) Classify welding processes.
c) Classify heat exchangers used in industries.
d) Find enthalpy, volume and entropy of steam at 10 bar, 200˚C.
e) Draw the p-v and T-s plot of pure substance (water- steam).
f) Classify heat exchangers used in industries.
g) Determine the absolute pressure (in bar) of a fluid flowing in a pipe line if the manometer reads 100 mm of Hg. The atmospheric pressure is 760 mm Hg.
h) Differentiate between intensive and extensive properties
i) State Clausius law of inequality.
j) What do you mean by bulk modulus?

Part- II

Q2 Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) **(6 x 8)**

a) Differentiate between Dynamic viscosity and Kinematic viscosity.
b) Differentiate between :
i) uniform and non uniform flow
ii) steady and unsteady flow
c) Explain in detail with diagram the spur gear and its application
d) With neat sketch, explain working of the refrigerator and a heat pump.
e) Explain the working of Pitot tube with a sketch.
f) Briefly write down different modes of heat transfer with governing equations of those.
g) Briefly explain different properties of engineering materials which are required to know before manufacturing a engineering component.
h) With schematic layout, describe different turning operations carried out in lathe machine.
i) Briefly discuss about the merits and demerits of rope drive and belt drive.
j) With sketch, explain working of fossil fuel based steam power plant.
k) Derive mass continuity and SFEE equation for the flow systems.
l) Write down eight components of an automobile with the type of materials used and manufacturing methods used for manufacturing those.

Part-III

Long Answer Type Questions (Answer Any Two out of Four)

Q3 Define the following, (i) C_p (ii) C_v (iii) H **(16)**

Two kg of a gas enclosed in a cylinder-piston assembly undergo three specific processes of volume expansion: P_1= 6 bar, V_1=0.2m^3 →P_2=2 bar, V_2=0.6m^3

Determine the work done in each following cases

(i) P varies as linear function of V (ii) PV=Constant (iii) P remains constant till the volume reaches 0.3 m^3 and PV^n= constant after that.

Q4 Write down the 1st law and 2nd law of thermodynamics. Mention key differences. **(16)**

Air at -15°C passes through a heat exchanger at a velocity of 30m/s where its temperature is raised to 800°C. It then enters a turbine with a velocity of 30 m/s and expands until the temperature falls to 650°C. On leaving the turbine, air is taken at a velocity of 60 m/s to a nozzle where it expands until the temperature has fallen to 500°C. if the air flow rate is 2 kg/s, calculate (i) the rate of heat transfer to the air in the heat exchanger. (ii) the power output from the turbine assuming no heat loss (iii) the velocity exit from the nozzle, assuming no heat loss. Take the enthalpy of air as $h=c_pt$, where c_p is the specific heat equal to 1005J/kgK and t is the temperature.

Q5 Briefly explain different properties of engineering materials which are required to know before manufacturing a engineering component. **(16)**

Q6 What is wet steam? How is differs from dry steam? Write down the formula for enthalpy, entropy, and volume. **(16)**

A vessel of volume 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature 250°C. The mass of the liquid present is 9 kg. Find the pressure, the mass, the enthalpy, the entropy, and the internal energy.