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

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B.TECH
PBE1B101

1st Semester Regular/Back Examination 2017-18
BASICS OF MECHANICAL ENGINEERING
BRANCH: AEIE, AERO, AUTO, BIOMED, BIOTECH, CHEM, CIVIL, CSE, ECE, EEE, EIE, ELECTRICAL, ENV, ETC, FAT, IT, MANUTECH, MECH, METTA, MINERAL, MINING, MME, PE, PLASTIC, PT

Time: 3 Hours

Max Marks: 100

Q.CODE: B902

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 Answer the following questions: ***multiple type or dash fill up type*** **(2 x 10)**

a) All-------- functions are thermodynamic properties.
b) --------- law of thermodynamics tell about the law of conservation of energy.
c) Latent heat of steam ---------- with increase in pressure.
d) C.O.P. of refrigerator is ratio of ------- and --------.
e) A general relationship between the shear stress and velocity gradient for Newtonian fluid is----------.
f) Forging involves --------deformation of the material to get desired shape.
g) -------- is used to shape the inside of a tube during extrusion of tubes.
h) The properties of composite materials are-------- from the properties of their constituent materials.
i) In thermocouples the temperature is measured by change in------- property.
j) A washer is normally used to------- the load in a threaded fastener.

Q2 Answer the following questions: ***Short answer type*** **(2 x 10)**

a) Explain about reversible and irreversible process with example.
b) Show that the entropy of Universe is increasing.
c) Define critical point and triple point.
d) Name the components of steam power plan with their function.
e) Define viscosity and state its unit of measurement.
f) Differentiate the homogeneous and heterogeneous welding process.
g) Write about the different processes commonly used for wire drawing.
h) Draw the stress strain diagram for ductile and brittle material.
i) What is the principle of strain gauge?
j) How coupling differ from gearing?

Part – B (Answer any four questions)

Q3 a) A gas whose pressure, volume and temperature are 275KN/m^2, 0.09m^2 and 185^{0}C respectively, has the state changed at constant pressure, until its temperature becomes 15^{0}C. Calculate (i) Heat transferred, (ii) work **(10)**

done during the process and (iii) change in internal energy. Take R=0.29LJ/KgK and C_p=1.005Kj/KgK for Gas.

b) A reversible heat engine absorbs 1400KJ as heat from a source at 600^0C and delivers 700KJ as work and rejects the rest of the energy to a sink. Find the temperature of the sink. **(5)**

Q4 **a)** 20kg of water at 40^0C is heated at a constant pressure of 10 bar until it becomes superheated vapour at 300^0C. Find the changes in volume, enthalpy, internal energy and entropy. **(9)**

b) Calculate the heat required to form2.5kg of dry steam at 1.1 MPa from water at 20^0C. Determine the amount of heat removed at constant pressure to cause the steam to become 0.985 dry. Calculate the specific volume at respective conditions. **(6)**

Q5 **a)** Explain in detail with line diagram the working of a two stroke petrol engine. **(10)**

b) Explain what to mean by single acting and double acting air compressor. **(5)**

Q6 **a)** Describe the different modes of heat transfer with suitable examples. Also state and derive the Newton's low of cooling. **(10)**

b) The pressure inside an air bubble of diameter 0.01mm is 29.2kPa in excess of ambient pressure. Workout the surface tension at air water interface. **(5)**

Q7 **a)** Explain in detail with line diagram the turning operation and also different types of turning operations. **(10)**

b) Describe the steps in casting process for producing a product. **(5)**

Q8 **a)** Explain about the different categories of engineering materials with specific applications. **(10)**

b) Describe the working principle of venturimeter with its advantages. **(5)**

Q9 **a)** Explain the function of a clutch and different types of clutches with their relative advantages and disadvantages. **(10)**

b) Classify the brake on basis of mode of operations. **(5)**