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Roll No ....

BE - 203
B.E. I & II Semester Examination, June 2014
Basic Mechanical Engineering

Time : Three Hours   Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
ii) All parts of each question are to be attempted at one place.
iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.
iv) Except numericals, Derivation, Design and Drawing etc.
v) Use of steam table is permitted.

Q-1   (A)   Explain the difference between malleability and ductility.
(B)   Explain the stress-strain diagram for mild steel.
(C)   Give the classification of carbon steel.
(D)   Explain the Steel and Iron Carbon diagram.
                              OR
(E)   A rod 150 cm long and diameter 2 cm is subjected to an axial pull of 20 kN. If the modulus of elasticity of the material of the rod is 2×10^5 N/mm^2, determine stress, strain, and the elongation of the rod.

Q-2   (A)   Briefly explain the devices used for measuring the pressure of a fluid.
(B)   Explain the principle of temperature measurement.
(C)   Describe vernier caliper with neat sketch.
(D)   Explain the construction and working principle of a simple lathe machine.
                              OR
(E)   Explain the principle of venturimeter with a neat sketch and derive the expression for the rate of flow of fluid through it.

Q-3   (A)   What do you mean by vacuum pressure.
(B)   State the Newton's law of viscosity and give examples of its application.
(C)   What factors decide whether Kaplan, Francis or a Pelton type turbine would be used in a hydroelectric project?
(D)   State Bernoulli"s theorem and derive equation for the flow of an incompressible fluid. Mention the assumptions made for deriving it.
                              OR
(E)   Calculate specific weight, density, specific volume and specific gravity of petrol, if one liter of petrol weighs 6.867 N.

Q-4 (A) State and explain second law of thermodynamics.

(B) Show the various process of steam in a T-S diagram.

(C) How boilers are classified? Write down few names of mountings and accessories of a boiler.

(D) Calculate the internal energy of 1 kg of steam at a pressure of 10 bar, when the steam is
(i) 0.9 dry   (ii) dry saturated   (iii) super heated to 250 °C

OR

(E) The following observations were made in a boiler

Coal used = 200 kg/hr   Mass of steam = 2000 kg/hr
Steam pressure = 11.2 bar   Dryness fraction = 0.95
Feed water temperature = 32.15 °C   Calorific value of coal = 28800 kJ/kg

Calculate the equivalent evaporation from and at 100 °C per kg of coal and boiler efficiency.

Q-5 (A) What is Carnot cycle and its importance?

(B) Write any four advantage of 4 stroke petrol engine over 2 stroke petrol engine.

(C) For the same compression ratio and heat supplied, state the order of decreasing air standard efficiency of Otto, diesel and dual cycle.

(D) Find the power output of a diesel engine working on a diesel cycle with compression ratio of 16 and air flow rate of 0.25 kg/sec. the initial condition of air at 1 bar absolute and 27 °C temperature, heat added per cycle 2500 kJ/kg.

OR

(E) The minimum pressure and temperature in a Otto cycle are 100 kPa and 27 °C. The amount of heat added to the air per cycle is 1500 kJ/kg. Determine the pressures and temperatures at all points of the air standard Otto cycle. Also calculate the specific work and thermal efficiency of the cycle for compression ratio of 8 : 1.