JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 1 EXAMINATION- 2023

B.Tech. - VII Semester (CSE/IT/ECE/BT)

COURSE CODE(CREDITS): 22B1WCE733 (3) MAX. MARKS: 15

COURSE NAME: Perennial Power Structures

COURSE INSTRUCTORS: Saurabh Rawat MAX. TIME: 1 Hour

Note: (a)All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

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Q1) Answer briefly (ONE LINERS):

a) Difference between Octane number and Cetane Number
b) Difference between Coal tar and Charcoal
c) Difference between caking and non – caking coal *CO1* [1+1+1 = 3]

Q2) Three coal mines A, B and C are available for extracting coal for a boiler. The boiler is to be fed with 500 tons of coal. The following information is only available regarding coal mines A, B and C.

Mine A: The coal visible is amorphous in nature
Mine B: The coal visible is hard having shining lustre
Mine C: On burning the coal produces long yellow smoky flame

Based on the information, ***select*** the coal mine which you would prefer for extracting the coal. Support your selection with ***logical reasons*** based on the properties which you can expect from the coal extracted based on ***carbon content, calorific value, combustion characteristics and residue characteristics.*** *CO1* [2]

Q3) Calculate the theoretical amount of air required for the combustion of propane (C_3H_8) which is the main constituent of LPG having 0.04% oxygen. *CO1*; *CO2* [4]

Q4) In a boiler, the quantity of steam raised per hour was 2250 kg and the coal consumption was 225 kg per hour. From the analysis by weight, the dried fuel was found to contain 87% carbon and 4% hydrogen. The feed water temperature was 61°C which contributes to the loss of heat supplied to the steam per kg. The calorific value of carbon is 33700 kJ/kg and that of hydrogen is 144600 kJ/kg. The specific enthalpy of saturation water is 670.4 kJ/kg; specific enthalpy of evaporation is 2085 kJ/kg with dryness of steam as 0.95. The specific heat for water at 61°C is 4.18 kJ/kg-K. Determine the gross thermal efficiency of boiler. *CO1*; *CO2* [6]