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BME-031

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

00595

Term-End Examination

December, 2014

BME-031 : ENERGY CONVERSION

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any* ***seven*** *questions. Use of scientific calculator is permitted.*

1. How does a 4-stroke petrol engine work ? With the help of a neat sketch show the construction and working of a 4-stroke petrol engine. *10*

2. (a) Classify and explain the various modes of direct energy conversion. *6*

(b) A photovoltaic system is used to generate electric power. The total area of the module is 5 m^2. At an intensity of solar radiation of 800 W/m^2, the system can generate 400 W. Find the conversion efficiency of the system. *4*

3. (a) Classify and briefly explain the various non-conventional energy sources. 5

(b) With the help of a suitable sketch describe a Biomass Gasification system. 5

4. (a) Draw the schematic of the impulse steam turbine and explain its principle. 5

(b) What are the differences between velocity compounding and pressure compounding principles ? Explain. 5

5. (a) Classify Jet Condensers. With the help of suitable sketches explain the contra flow jet condenser. 5

(b) What are the advantages of using regeneration, reheat and intercooling in gas power plants ? 5

6. (a) What are the advantages of closed cycle gas turbine power plant over open cycle gas power plant ? 5

(b) Explain the factors on which the performance of a gas turbine power plant depends. 5

7. (a) Describe ultimate and proximate analysis of coal. 5

(b) Discuss the characteristics of the following gaseous fuels : 5

(i) Coal gas

(ii) Water gas

(iii) Producer gas

8. (a) Define octane number and cetane number of a fuel. Describe the physical significance of octane and cetane numbers. *5*

(b) Compute the composition of the exhaust gases resulting from the combustion of C_8H_{18} with 85% theoretical air. *5*

9. (a) What do you understand by heat of formation and heat of combustion ? *4*

(b) Determine the products of combustion and the air/fuel ratio by weight, when a liquid fuel of 16% H_2 and 84% carbon by weight is burnt with 20% excess air (i.e., 20% more air than is theoretically required). *6*

10. (a) With the help of a suitable sketch explain the working principle of electrostatic precipitator. *5*

(b) Discuss the various equipments used for coal handling in thermal power plant. *5*