Fifth Semester B.E. Degree Examination, Dec.09/Jan.10
Energy Engineering

Time: 3 hrs.   Max. Marks·100

Note: *1. Answer any FIVE full questions, selecting*
at least TWO questions from each part.
2. Assume missing data, if any, suitably.

PART – A

1 a. Explain with sketch over feed and underfeed principle of firing coal.   (06 Marks)
   b. List the requirements of pulverized coal burners. Sketch and explain a cyclone burner with advantages and disadvantages.   (08 Marks)
   c. Describe with a sketch working of Multi-Retort Stoker (M.R.S.)   (06 Marks)

2 a. With schematic sketches give brief account of Velox and Benson steam generator. (06 Marks)
   b. Explain the working of forced draft and induced draft cooling towers with sketches.   (06 Marks)
   c. Estimate the height of a chimney required to produce a static draft of 18 mm of water if the mean temperature of the flue gases in the chimney is 260°C and the temperature of outside air is 25°C. The densities of atmospheric air and the flue gases at N.T.P. are 1.293 and 1.34 kg/m³ respectively.   (04 Marks)
   d. Briefly explain the function of air-preheater and superheaters in thermal power plant.   (04 Marks)

3 a. Sketch and explain briefly a plant layout for diesel power station showing all the required equipments.   (08 Marks)
   b. Why cooling of diesel engine is necessary? Give for important functions of lubrication system.   (04 Marks)
   c. Write a short note on application of diesel engine in power field.   (04 Marks)
   d. Sketch and briefly explain air exhaust system. What care is taken while designing exhaust system?   (04 Marks)

4 a. Classify hydro-electric plants. Sketch and explain pumped storage power plant.   (04 Marks)
   b. Briefly describe with a sketch drum gate and needle valve used in hydro-electric plant.   (06 Marks)
   c. Mean monthly discharge for 12 months at a particular site of a river is tabulated below.

Month	Discharge in millions of m³ per month
April	500
May	200
June	1500
July	2500
August	3000
September	2400
October	2000
November	1500
December	1500
January	1000
February	800
March	600

Draw :
i) Hydrograph and flow duration curve for the given discharges and find the average monthly flow.
ii) Power available at mean flow of water, if the available head is 80 mts. at site and overall efficiency is 80%. Take 30 days in a month. **(10 Marks)**

PART – B

5 a. Describe with sketch, working principle of pressurized water reactor highlighting its advantages and disadvantages. **(08 Marks)**
  b. Explain:
   i) Thermal utilization factor
   ii) Multiplication factor. **(04 Marks)**
  c. Draw a sketch showing different components of nuclear reactor. Explain the moderator stating its advantages and disadvantages. **(08 Marks)**

6 a. With a sketch explain the working of an instrument used to measure global radiation of solar energy. **(08 Marks)**
  b. Sketch and explain the principle of working of solar pond. **(06 Marks)**
  c. Calculate the local apparent time (LAT) corresponding to 13.30 hrs. (IST) on July 16,1998 at Delhi ($28°35'N$, $77°12'E$). The equation of time correction on July 16 is (-6) minutes. Indian Standard Time (IST) is the local civil time corresponding to $82°5'E$ longitude. Also calculate the declination. **(06 Marks)**

7 a. Explain the principle of working of OTEC. Explain with a sketch, Rankine cycle OTEC plant. **(08 Marks)**
  b. Describe low and high tides. What are the different techniques of harnessing tidal energy? **(06 Marks)**
  c. With a sketch explain the working of "Hot dry rock" geothermal plant. **(06 Marks)**

8 a. List the factors affecting **(04 Marks)**
  b. Write short notes on:
   i) Anaerobic fermentation
   ii) Photosynthesis. **(08 Marks)**
  c. Explain with sketch how biogas is produced in an Indian type biogas plant. **(08 Marks)**

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