NEW SCHEME

EE51

Reg. No. | | | | | | | | | | |

# Fifth Semester B.E. Degree Examination, January/February 2006

## Electrical & Electronics Engineering

## Electrical Power Generation

Time: 3 hrs.) (Max.Marks : 100

**Note:** *1. Answer any FIVE full questions.*
*2. Missing data may be suitably assumed.*

1. (a) With neat diagrams explain the following w.r.t hydel power plant

   i) Penstock ii) Surge tank
   iii) Water jet mechanism iv) Tail race. **(8 Marks)**

   (b) With a neat sketch explain the function of a governor used to control the speed of a hydraulic turbine. **(6 Marks)**

   (c) With a neat sketch explain the function of pumped storage plant. Discuss how such a plant will meet the peak load requirement. **(6 Marks)**

2. (a) With neat sketches explain the function of any two types of coal handling system. **(8 Marks)**

   (b) With a neat sketch explain the condenser used in the thermal power plant. Discuss on electrostatic precipitator. **(6 Marks)**

   (c) With a neat sketch explain any one method of ash handling system. **(6 Marks)**

3. (a) With a neat schematic diagram explain the functioning of pressurized water reactor. Also indicate diagrammatically the pressurized water reactor with water as coolant and moderator. **(8 Marks)**

   (b) With a schematic diagram explain the LMFBR. Differentiate between fast breeder reactor and thermal reactor. **(6 Marks)**

   (c) Discuss on the following :

   i) Harmful effects of nuclear reactor

   ii) Disposal of nuclear wastes. **(6 Marks)**

4. (a) Explain the alternator excitation system showing the generator control loops and the functional diagram of excitation system. **(8 Marks)**

   (b) With a neat diagram explain a simple gas turbine. Discuss the advantages of the same over steam power plant. **(8 Marks)**

   (c) Highlight main features of the combined-cycle power plants. **(4 Marks)**

Contd... 2

5. (a) Define the following with illustration :

i) Demand factor

ii) Plant use factor

iii) Plant capacity factor. **(6 Marks)**

(b) The load is kW on a substation is as follows :

| Time | Load in kW | Time | Load in kW |
|---|---|---|---|
| 12.0 AM to 1 AM | 1200 | 12 PM to 4 PM | 1100 |
| 1 AM to 3 AM | 1000 | 4 PM to 8 PM | 1800 |
| 3 AM to 5 AM | 900 | 8 PM to 10 PM | 1000 |
| 5 AM to 7 AM | 1400 | 10 PM to 12 AM | 600 |
| 7 AM to 9 AM | 1000 | | |
| 9 AM to 12 PM | 800 | | |

Assume the connected load to be 5200 kW

Draw the load curve and load duration curve.
Determine :

i) Maximum demand

ii) Demand factor

iii) Load factor. **(10 Marks)**

(c) Discuss the base load and peak load power plants. **(4 Marks)**

6. (a) What do you understand by electrical tariff? Discuss on two part tariff, three part tariff and power factor tariff. **(8 Marks)**

(b) What are the causes of low power factor? Explain the methods of improving power factor. **(4 Marks)**

(c) Load factor of a consumer is 35% and monthly consumption is 504 kWhr. If the rate of electricity is Rs.180 per kW of maximum demand plus Rs.2.00 per kWhr, find

i) the monthly bill and average cost per kWhr.

ii) The overall cost per kWhr if the consumption is increased by 20% with same LF

iii) Overall cost per kWhr if consumption remains same but LF is increased to 40% **(8 Marks)**

7. (a) It is desired to improve the power factor from $cos\ \phi 1$ to $cos\ \phi 2$ keeping the kW of the system at a constant value of PKW. Derive an expression for the rating of the capacitor. **(8 Marks)**

(b) Discuss the importance of grounding system in electrical systems. With neat sketches explain

i) Resistance grounding

ii) Reactance grounding. **(8 Marks)**

(c) With a neat sketch explain an ungrounded system. **(4 Marks)**

Contd... 3

**8.** **(a)** With neat sketches explain the following :

i) Single busbar system with bus sectionalizer.

ii) Double busbar system with single breaker. **(6 Marks)**

**(b)** Discuss on the following :

i) Location of substation ii) Substation equipments. **(6 Marks)**

**(c)** Fig.1 shows a three-phase transmission line operating at 33 kV and having a resistance and reactance of 5Ω and 20Ω respectively connected to the generating station busbar through a 5000 kVA step up transformer which has a reactance of 6%. Connected to the busbars are two alternators one 10,000 kVA, 10% reactance and another 5000 KVA, 7.5% reactance. Calculate the KVA at a short circuit fault between phases occurring

i) at the HV terminals of the transformers.

ii) at load end of transmission line. **(8 Marks)**

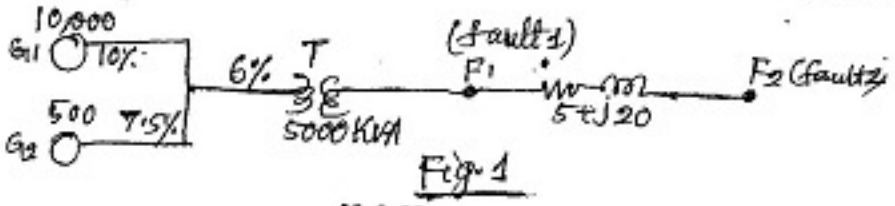


Fig. 1