International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Autumn-2018   Program: B.Sc. Engg. (EEE)
Course Code: EEE 4707   Course Title: Power Plant Engineering
Time: 2 hours 30 minutes   Full Marks: 50

Part A

[Answer any *two* questions from the followings; figures in the right margin indicate full marks.]

1(a). Draw the schematic diagram of a Hydro-electric power plant and give a short description of the   4
       basic parts.

1(b). For a Hydroelectric power plant the following data is supplied: 4

       Annual rainfall = 1000 mm.

       Catchment area = 120 sq. km.

       Effective head = 450 m.

       Load factor = 40%

       Yield factor to allow for run-off and evaporation loss = 50%

       Efficiency of the power plant = 70%

       Find out the (a) average power produced and (b) capacity of the power plant.

1(c). What are the advantages of Hydro-electric Power Plant over Steam turbine power plant?   2

2(a). Define the following terms: 2

       i) Fertile material   ii) Primary fuel   iii) Secondary fuel   iv) Thermal neutron

2(b). What are the factors to be considered during the design of a nuclear power reactor? Explain the   5
       principle of operation of a sodium graphite reactor.

2(c). •Explain the superior and inferior characteristics of sodium coolant over water coolant.   3

3(a). What is meant by governing of turbine? Discuss about the various components of the oil   3
       pressure governor.

3(b). What is the power output of a $_{92}U^{235}$ reactor if it takes 30 days to use up 2 kg of fuel? Given
       that energy released per fission is 200MeV and Avogadro's number = 6.023×10^{26} per kilo 4
       mole.

3(c). A reaction turbine is supplied with 100 cu m of water per second and works under a maximum   3
       head of 120 m at 350 R.P.M. Assuming overall efficiency of the plant 80% and specific weight
       of water 1000 kg/m^3; calculate the horse power developed and power in kW.

Part B

[Answer any _three_ questions from the followings; figures in the right margin indicate full marks.]

4(a). Discuss Open-cycle MHD system with suitable sketch. 3

4(b). Write short notes on various types of Tariffs. Discuss the type that is used in our country. 4

4(c). The annual peak load on a 40 MW power station is 35 MW. The power station supplies loads having maximum demands of 15 MW, 10 MW, 8 MW and 5 MW. The annual load factor is 40%. Find out average load, energy supplied per year, diversity factor and demand factor. 3

5(a). What are the advantages of combining a MHD generator with a steam turbine power plant? 2

5(b). Why the total capacity of a plant is divided into several generating units of different sizes? Describe the points that should be considered while selecting the number and sizes of the generating units. 4

5(c). Describe the factors on which cost of electrical energy depends. 4

6(a). Discuss how wastes from nuclear power plant are disposed. 3

6(b). A power station has the following daily load cycle: 4

Time in hours	6-8	8-12	12-16	16-20	20-24	24-6
Load in			60	20	50	

Plot the load curve and load duration curve. Also .... energy generated per day.

6(c). A consumer has a maximum demand of 200kW at 40% load factor. If the tariff is 50 taka per kW of maximum demand plus 3 taka per kWh, find the overall cost per kWh. 3

7(a). What is load curve? Write down its importance in power system. 3

7(b). • Explain Demand factor, Load factor and Diversity .... in cost analysis 4 of electric.. power generation.

7(c). Concerning the ongoing power crisis in our country what could be the solution .... .ven..ial 3 power plants or Renewable energy sources. Defend your opinion w.. p.oper reasoning.