

18/19

Name of the Program: B. Sc. in EEE  
Semester: 8<sup>th</sup> Semester

Date: 16 May, 2023  
Time: 10:00am – 01:00pm

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)  
ORGANISATION OF ISLAMIC COOPERATION (OIC)  
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Semester Final Examination  
Course Number: EEE 4801  
Course Title: Power Generation

Summer Semester: 2021 - 2022  
Full Marks: 150  
Time: 180 Minutes

There are 06 (six) questions. Answer **all** the questions. The symbols have their usual meanings. Marks of each question and corresponding CO and PO are written in the brackets.

1. a) Define a steam power station. Explain the factors are taken into account while selecting the site for a steam power station. (12.5)  
(CO1)  
(PO1)  
b) A diesel engine power plant has one 700 kW and two 500 kW generating units. The fuel consumption is 0.25 kg per kWh and the calorific value of fuel oil is 10000 kcal/kg. Determine (i) the fuel oil required for a month of 30 days and (ii) overall efficiency. Plant capacity factor is 40%. (12.5)  
(CO2)  
(PO2)
2. a) Discuss the advantages of interconnected grid system. (12.5)  
(CO1)  
(PO1)  
b) A generating station is to supply four regions of load whose peak loads are 10 MW, 5 MW, 8 MW and 7 MW. The diversity factor at the station is 1.5 and the average annual load factor is 60%. Calculate: (i) the maximum demand on the station, (ii) annual energy supplied by the station and (iii) suggest the installed capacity and the number of units. (12.5)  
(CO2)  
(PO2)
3. a) Discuss the diminishing value method of determining the depreciation of the power plant equipment. (12.5)  
(CO1)  
(PO1)  
b) The equipment in a power station costs Tk 15,60,000 and has a salvage value of Tk 60,000 at the end of 25 years. Determine the depreciated value of the equipment at the end of 15 years using (i) straight line method, (ii) diminishing value method and (iii) sinking fund method at 5% compound interest annually. (12.5)  
(CO2)  
(PO2)
4. a) Describe some of the important types of power factor tariff commonly used. (12.5)  
(CO1)  
(PO1)  
b) The monthly readings of a consumer's meter are as follows: maximum demand = 50 kW, energy consumed = 36000 kWh and reactive energy = 23,400 kVARh. If the tariff is Tk 80 per kW of maximum demand plus 8 paise per unit plus 0.5 paise per unit for each 1% of power factor below 86%, calculate the monthly bill of the consumer. (12.5)  
(CO2)  
(PO2)

5. a) Derive an expression for the most economical value of power factor which may be attained by a consumer. (12.5)  
(CO1)  
(PO1)
- b) A factory has an average demand of 50 kW and an annual load factor of 0.5. The power factor is 0.75 lagging. The tariff is Tk 100 per kVA of maximum demand per annum plus 5 paise per kWh. If loss free capacitors costing Tk 600 per kVAR are to be utilised, find the value of power factor at which maximum saving will result. The interest and depreciation together amount to 10%. Also determine the annual saving effected by improving the p.f. to this value. (12.5)  
(CO2)  
(PO2)
6. a) Explain with a neat sketch the various parts of a nuclear reactor. (12.5)  
(CO1)  
(PO1)
- b) The daily load duration curve for a typical heavy load being served by a combined hydro-steam system may be approximated by a straight line; maximum and minimum loads being 60,000 kW and 20,000 kW, respectively. The hydro power available at the time of minimum regulated flow is just sufficient to take a peak load of 50,000 kWh per day. It is observed that it will be economical to pump water from tail race to the reservoir by utilizing the steam power plant during the off-peak periods and thus running the station at 100% load factor. Determine the maximum capacity of each type of plant. Assume the efficiency of steam conversion to be 60%. (12.5)  
(CO2)  
(PO2)