



R17 Regulation

Subject code: 1P4BB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY  
(Autonomous, Accredited by NAAC with 'A' Grade)

**B.Tech II Year II Semester Supplementary Examinations, July 2021**

**POWER SYSTEMS -I**

(EEE)

Maximum Marks: 70

Date:19.07.2021 Duration: 3 hours

- Note: 1.This question paper contains two parts A and B.  
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.  
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.  
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

- 1 What is a gas turbine plant?
- 2 Differentiate fission and fusion nuclear materials.
- 3 What are the requirements of a distribution system?
- 4 What is draft tube. Give the classification
- 5 List out the drawbacks of radial distribution system
- 6 Write the function of service wire
- 7 Give the classification of Gas Insulated Substations
- 8 What is a transformer sub-station?
- 9 Why is tariff for power load less than the lighting load?
- 10 The values of demand factor and load factor are always less than one. Why?

Part-B

Answer All the following questions. (10MX 5=50Marks)

- 11 a) Explain the function of feed water heater and air pre-heater. (5M)  
b) The overall efficiency of a 100 MW thermal power station is 30%. If the load factor of the station is 40% and the coal consumption is 0.9 kg/kWh, find the annual coal bill if the cost is Rs. 50 per tonne. (5M)

OR

- 12 a) Explain the working of Boiling Water Reactor (BWR) with a neat diagram. (5M)  
b) Explain with neat diagram various parts and its function in nuclear power plant. (5M)
- 13 a) With a help of neat diagram, explain the operation of Thermal power station. (5M)  
b) Calculate the average power in kW that can be generated in a hydro-electric project from the following data:  
Catchment area =  $5 \times 10^9$  m<sup>2</sup>; Mean head, H = 40 m  
Annual rainfall, F = 1.35 m; Yield factor, K = 80 %  
Overall efficiency = 75%.  
If the load factor is 50%, what is the rating of generators installed. (5M)

OR

- 14 a) Elaborate the details of turbines used in accordance with the head available in hydro electric power stations. (5M)  
b) A Pelton wheel is working under a head of 50 m and the discharge is 0.85 m<sup>3</sup> /sec. The mean bucket speed is 15m/sec. Find the power produced if the jet is deflected by the blades through an angle of 155°. The coefficient of velocity is 0.98. (5M)
- 15 a) Compare Overhead and under-ground distribution systems. (5M)  
b) 2-wire d.c. ring distributor is 300 m long and is fed at 240 V at point A. At point B, 150 m from A, a load of 120 A is taken and at C, 100 m in the opposite direction, a load of 80 A is taken. If the resistance per 100 m of single conductor is 0.03 Ω, find:  
(i) current in each section of distributor  
(ii) voltage at points B and C (5M)

OR

- 16 a) Draw the phasor diagrams of A.C. distributor with concentrated loads for power factors with respect to respective load points. (5M)  
b) An 800m distributor fed from both ends A and B is loaded uniformly at the rate of 1.2A/m run, the resistance of each conductor being 0.05 ohm per/km. Determine the minimum voltage and the point where it occurs if feeding points A and B are maintained at 255 V and 250 V respectively. Find also the current supplied from feeding point A and B. (5M)
- 17 a) Compare indoor and outdoor substations. (5M)  
b) With a neat diagram explain main and transfer bus bar? (5M)
- OR
- 18 a) Explain in detail about constructional aspects of gas insulated substation. (5M)  
b) What are pole mounted substations? Discuss the limitations of pole mounted substations. (5M)
- 19 a) Explain how a load duration curve is plotted? What is its use? (5M)  
b) An industrial organization takes a steady load of 2 MW at a p.f. of 0.75 lagging and pays Rs. 125 per annum per KVA of maximum demand. Determine the capacity of the phase advancing equipment required for minimum overall annual expenditure if the phase advancing equipment costs Rs. 200 per KVAR. An interest and depreciation charge on phase advancing equipment is 10%. Also, determine the new p.f. of the supply. (5M)

OR

- 20 a) What is meant by tariff? Explain some commonly used tariffs. (5M)  
b) The maximum demand of a consumer is 1MW and the units consumed per annum are 5, 00, 000 kWh. Calculate the reduction in cost if the power factor is raised from 0.5 to 0.8. The tariff is Rs 900 per annum per kW demand plus Rs 1.5 per kWh plus Rs 0.3 per kVAh reactive. Calculate the flat rate tariff for a unity power factor load. (5M)