

B.E. ELECTRICAL ENGG. 2nd Year, 2nd Semester Examination 2017**Power Supply Systems**

Time: Three hours

Full Marks: 100

(50 marks for each part)

Use separate answer script for each part.

PART IAnswer **any three** questions.

Figures in the margin indicate full marks

Two marks allotted for neat and to the point answers

- 1.(a) Discuss the functions of (i) Control rod of nuclear reactor (ii) multi-stage turbine in gas turbine plant (iii) draft tube for hydroelectric turbine (iv) DM plant of steam power station. (2×4)
- (b) A steam power plant spends Rs.20 lakhs in one year as coal consumption. The coal has calorific value 4500 Kcal/kg and costs Rs.500 per ton. If the thermal efficiency is 30% and electrical efficiency is 92%, find average load on the power station. (5)
- (c) What should be the desirable feature of a peak load plant? (3)
- 2.(a). Justify the following (any two) (4×2)
 i) Balanced draught must be used in thermal power plants.
 ii) Pumped storage plants are economic as peak load plant.
 iii) Moderators are used to control the chain reaction of a nuclear power station.
- (b) Draw a schematic diagram of a close cycle gas turbine plant. Then discuss how it works. (8)
- 4.(a) Why combined operations of power generating stations are preferred than stand alone system? Distinguish between load curve and load duration curve. (4+2)
- (b) The following data refers to the average monthly flow available in a stream over a year at an average head of 100 m at a particular site. (10)
- | Month: | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------------------------------|-----|-----|-----|------|------|------|------|------|------|------|-----|-----|
| Discharge (m ³ /s) | 400 | 200 | 600 | 1500 | 1000 | 2500 | 2300 | 2000 | 1200 | 1900 | 800 | 400 |
- Draw flow duration curve and mass curve. Show average water flow required in the flow duration curve. Calculate average hydro power generated. Also estimate the capacity of the storage reservoir.
5. Write short notes on (8×2)
- (a) Pulverized fuel firing
- (b) main parts of nuclear reactor

[Turn over

Bachelor of Electrical Engineering, 2017

(2nd Year, 2nd Semester .)

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PART-II

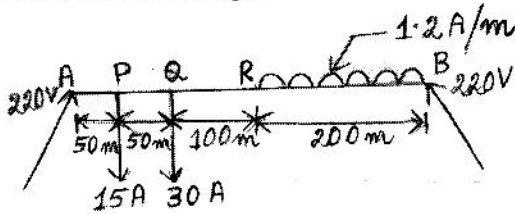
Answer *any three* questions from this part.

Two marks are reserved for neat and well organised answer

- | | | | |
|----|----|--|---|
| 1. | a) | What do you understand by stranded conductor? Mention its advantages | 4 |
| | b) | Determine the most economical cross section of a conductor for a three phase 800km long line to supply a load at a constant voltage of 33kV. During a 24 hour period the load is 2500kW for 8 hours, 1500kW for 10 hours and 1000kW for 6 hours at unity power factor. The capital cost per km of the line is Rs(16250+5000a) where a is in cm^2 . Interest and depreciation charges are 8% and cost of energy is 5 paise per unit. The resistance per km of a conductor of 1cm^2 cross section is 0.176ohm. | 6 |
| | c) | What do you understand by earthing? Mention the factors on which earth resistance depends. | 6 |
| 2. | a) | Compare the volume of conductor material required for two wire dc system (whose one conductor is earthed) with three phase four wire ac system with neutral point earthed in underground cables. State the assumptions. | 8 |
| | b) | A single phase ring distributor PQR is fed at P. The loads at Q and R are 40A and 60A respectively, both at power factor of 0.8 lag and expressed relative to voltage at P. The total impedance of the three sections PQ, QR and RP are $(2+j1)$, $(2+j3)$ and $(1+j2)$ respectively. Find the current in each section of the distributor with respect to the supply voltage at P. | 8 |
| 3. | a) | Show current loading and voltage drop diagram of a distributor with equal concentrated loading at three points at regular intervals and fed at both ends with equal voltages. | 4 |
| | b) | Derive an expression for the power loss in a uniformly loaded distributor fed at both ends | 4 |

with equal voltages.

- c) A two wire 400m long dc distributor shown in the figure below is fed by 220 V supply at both ends. The resistance of each conductor is 0.02ohm/ km. Calculate the point of minimum potential and its voltage. 8



4. a) What do you understand by busbar in connection with power supply system? Explain with diagram any one type of bus bar arrangement. 8
- b) Briefly discuss the functions of a circuit breaker and an isolator. 4
- c) Mention the common types of electrical testing which are required before a completed installation is put into service. 4
5. a) Mention the general stipulations which are to be followed in any house wiring scheme. 10
- b) What do you understand by grid in power system? 3
- c) What do you understand by “23/0.3 PVC cable”? 3