Total No. of printed pages = 3

EE 181601

12/6/23

Roll No. of candidate | | | | | | | | | | |

2023

B.Tech. 6th Semester End-Term Examination

POWER SYSTEM – III

(New Regulation (w.e.f. 2017-18) & New Syllabus (w.e.f. 2018-19)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. 1 and any *four* from the rest.

1. Answer the following (Fill in the blanks) (10 × 1 = 10)

   (i) The different entities in the restructured environment are ————————

   (ii) Safe voltage of current for human body is given by the equation ————————

   (iii) The two Synthetic test methods are called ————————

   (iv) A fuse is defined as a————————

   (v) The CB generally used for railway electrification is ————————

   (vi) The purpose of back up protection relays is to ————————

   (vii) The making current of a CB rated at 2000 MVA, 33 kV is equal to ————————

   (viii) BIL is defined as ————————

   (ix) DC links are classified as ————————

   (x) The different classes of Lightning Arresters with voltage ranges are ————————

2. (a) The melting point of a lead fuse is 624 degree Farenheit. What will be the temperature of the fuse when 5/6 of the fusing current passes through it? Room temperature is 55 degree Farenheit. (3)

(b) What are the steps in a Sub-Station design? (5)

(c) Name a few high voltage ACSR conductors and their voltages with current carrying capacities. (2)

(d) Name the different equipment you would see in a Sub-Station. Draw a simple electrical scheme to show how they are placed. Define Switchgear. (5)

3. (a) What is Deregulation? Discuss the Indian economic scenario after deregulation. What does the Electricity Act 2003 focus on? (5)

(b) Define step and touch voltage. How are they created and what is the risk to human beings? How can these be mitigated? (5)

(c) Two relays R1 and R2 are connected in two sections of a feeder. Plug setting of relay R1 is 100% and that of R2 is 125%,, The TMS of R1 is 0.3. Discrimination margin for time grading scheme is 0.5 sec. Find actual operating time of R1 and R2 and the TMS of R2 with the help of the table below: (5)

PSM :	2	4	5	8	10	20
Operating time(s) :	10	5	4	3	2.8	2.4

4. (a) Discuss the effect of power swing on the performance of different types of distance relays. (5)

(b) Discuss the protective devices employed for the protection of alternators against (i) overvoltage (ii) loss of excitation (iii) failure of prime mover (iv) unbalanced loading (v) over speed. (10)

5. (a) Write a short note on capacitive current breaking with relevant figure. What are the magnitudes of capacitive current encountered in practice for (i) an unloaded line (ii) UG cable? (5)

(b) Describe the arc extinction process in an SF_6 CB. Give its advantages and disadvantages. (5)

(c) List the names of all CB'S with their arc quenching medium, voltage rating and breaking capacity. (5)

6. (a) Discuss the lightning phenomenon with relevant figures illustrating pilot stream, stepped leader dart leader and cold lightning stroke. (4)

(b) What are the functions of Ground wires? Discuss the two configurations used with neat sketches. (6)

(c) Show analytically how voltage and current get attenuated exponentially while travelling over a transmission line. (5)

7. (a) Discuss two non–shielding methods used for protection against internal over–voltages. (8)

(b) Describe all the equipment used for HVDC transmission with neat sketches. (7)