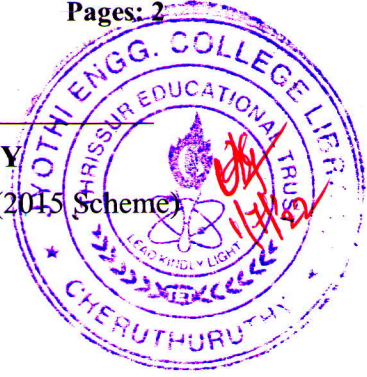Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Supplementary Examination June 2022 (2015 Scheme)

Course Code: EE405

Course Name: Electrical System Design

Max. Marks: 100   Duration: 3 Hours

Approved data handbook to be permitted inside examination hall

PART A

Answer all questions, each carries 5 marks.   Marks

1   List down the standard voltage levels in single phase and three phase systems.   (5)
Explain how voltage levels are classified and the variations allowed in each case

2   Differentiate between MCB and MCCB   (5)

3   With block schematic explain the parts of outdoor substation   (5)

4   Briefly explain the tests carried out before the commissioning of power cables   (5)

5   Explain the design steps involved in calculating the number of lamps using   (5)
Average Lumen Method (given Light loss factor and Coefficient of Utilisation)

6   A room size of 10m x 8m is to be illuminated at 500 lux using fluorescent lamp   (5)
of luminous flux 4000 lumens. Considering the Coefficient of Utilisation (CU)
to be 0.767, find the number of lamps required if the room to be illuminated is a)
air-conditioned room and b) located in a dusty environment.

7   Explain continuous power, prime power and standby power of generators   (5)

8   With block diagram explain grid interactive PV system   (5)

PART B

Answer any two full questions, each carries 10 marks.

9   What is the need of standards and codes? Explain in detail on IS 3042 and IS   (10)
732

10   a)   What is the significance of National Electric Code 2011?   (5)

    b)   Explain ELCB and compare its operation with current operated device   (5)

11   Explain briefly Miniature Circuit Breaker. How they are classified according to   (10)
fault current and compare it with normal fuse?

PART C

Answer any two full questions, each carries 10 marks.

12   Draw the single line diagram of an 11kV outdoor substation. Calculate the   (10)
      ratings of each device specified in Single line diagram for 160kVA, 11kV/433V
      oil immersed transformer

13 a) What are the factors to be considered for selection of transformer and   (5)
      substation?

   b) With a neat sketch explain the pipe earthing method used in 11 kV substation   (5)

14   An industry is provided power supply from utility substation through an 11kV   (10)
      overhead transmission line of length 2.6km. The type of conductor used for
      transmission line is MINK with an equilateral spacing of 900mm and nominal
      area of cross section 63.06sq.mm. The industry proposes to have a transformer
      substation with a 750kVA, 11kV/0.433kV, delta-star connected transformer. The
      percentage reactance of the transformer is 4% with a full load copper loss of
      1.5%. The three-phase short circuit power at the utility substation is 350MVA.
      The resistance of line conductor is 0.45 ohm per km. Calculate a) Initial
      symmetrical short circuit current and b) peak short circuit current on the primary
      side of proposed transformer.

PART D

Answer any two full questions, each carries 10 marks.

15 a) Explain rising mains arrangement for high rise buildings   (5)

   b) What are the factors to be considered while designing road lighting scheme   (5)

16 a) Explain the significance of coefficient of utilisation in lighting design   (5)

   b) With block diagram explain a standalone PV system   (5)

17   Draw and explain emergency standby power supply scheme for hospital. How it   (10)
      is different from simple emergency standby power supply for general utility?

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