

Reg No.: _____

Name: _____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Supplementary Examination August 2021



Course Code: EE405

Course Name: ELECTRICAL SYSTEM DESIGN

Max. Marks: 100

Duration: 3 Hours

(approved data hand book may be permitted inside the examination hall)

PART A

Answer all questions, each carries 5 marks.

- | | | Marks |
|---|--|-------|
| 1 | What is the significance of IS codes? Explain any two IS codes with their scope. | (5) |
| 2 | Which are the factors to be taken into consideration while designing an electrical installation? | (5) |
| 3 | In a workshop one 15HP, 400V, three-phase, 50Hz induction motor is to be installed. Draw the single line diagram showing ratings of each component. | (5) |
| 4 | Why it is necessary to have pre-commissioning tests of electrical installations? List the different types of transformer test carried out before commissioning. | (5) |
| 5 | An illumination of 50 lux is to be produced on the floor of a room 12m×9m.36 lamps are required to produce this illumination in the room, if 50 percentage of the emitted light falls on the floor .Find the lumen output value of the lamp. | (5) |
| 6 | Explain the terms a) Quality of lighting, b) Colour rendering index | (5) |
| 7 | Enumerate the basic functions of charge controllers in a solar PV system | (5) |
| 8 | Explain general requirements of installation of medium-voltage standby generator. | (5) |

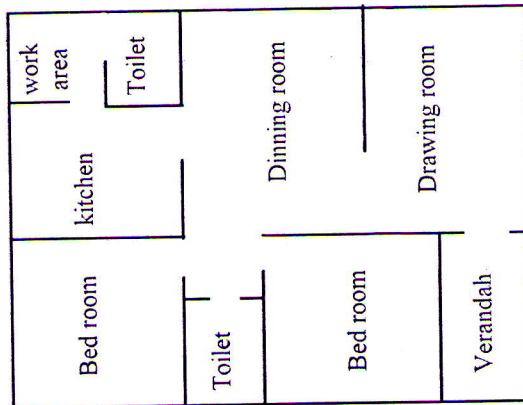
PART B

Answer any two full questions, each carries 10 marks.

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|----|---|-----|
| 9 | a) Which are the standard declared voltages for three phase ac system? Also specify the voltage limits. | (5) |
| | b) Explain the aims of electricity act 2003. | (5) |
| 10 | a) Describe the selection procedure of conductor size in domestic installations. | (5) |
| | b) Write a short note on safety aspects of electrical system design as per NEC 2011. What are the protective measures incorporated in the system? | (5) |

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- 11 The plan layout of a two bed room domestic building is shown in figure. (10)
Locate the light, fan, socket points etc., required for the electrification of the building as per NEC requirements. Calculate (a) Connected load of the building (b) Maximum demand in kW (c) Type of supply required (d) Number of light and power circuits (e) Details of the distribution board



PART C

Answer any two full questions, each carries 10 marks.

- 12 a) Classify the industrial buildings based on electrical power consumption. Give examples. (5)
b) Which are the pre-commissioning tests on power cables used in an electrical installation? Explain. (5)
- 13 A 600kVA, 11kV/433V delta-star connected transformer is installed in an industry. This transformer is connected to 11kV supply through an over-head line of length 2.5 km. The conductor used is RABBIT with an equilateral spacing of 900 mm. The percentage reactance of the transformer is 4% and the full load copper loss of the transformer is 12kW. The three-phase short circuit power at the utility substation is 250MVA. The resistance of the line conductor is $0.454\Omega/\text{km}$. Calculate peak short circuit current on the primary and secondary terminals of the transformer. (10)
- 14 a) An industrial electrical installation has a demand of 50 kW at a power factor of 0.75 lagging. Determine the rating of the capacitor bank required to improve the power factor to 0.95 lagging. (5)
b) Which are the factors deciding the selection of transformers in an electrical installation? (5)

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PART D

Answer any two full questions, each carries 10 marks.

- 15 a) A corridor is lighted by 4 lamps spaced 10 m apart and suspended at a height of 5 m above the centre line of the floor. If each lamp gives 200 candle-power in all directions below the horizontal, find the illumination at the point on the floor mid-way between the second and third lamps. (5)
- b) Explain with the help of block diagram the working of automatic main failure system. (5)
- 16 What are the design considerations of solar PV system for domestic applications? (10)
- 17 a) Design a street lighting scheme, by assuming that the lamps are placed on one side of road with following data. Road way width = 12m, illumination requirement = 18 lux, mounting height of lamps = 8 m, coefficient of utilization = 0.65, lamp loss factor = 0.75, by using 150W high pressure sodium vapour lamps with initial lumen 16000. (5)
- b) Explain with the help of schematic, the necessary protections to be provided for a 100 kVA standby diesel generator installed in an electrical installation. (5)
