



Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S8 (R,S) (FT/WP) Examinations April 2026 (2019 Scheme)

Course Code: EET402
Course Name: ELECTRICAL SYSTEM DESIGN AND ESTIMATION

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

- | | | |
|----|---|-----|
| 1 | Draw the standard symbols for | (3) |
| | i. Electric fault | |
| | ii. Plug socket | |
| | iii. Flood light | |
| 2 | Explain the features of the following IS codes | (3) |
| | (i) IS 732, (ii) IS 3043 | |
| 3 | Differentiate between luminous intensity and illuminance. | (3) |
| 4 | A lamp giving out 1200 lumen in all directions is suspended 8 m above the working plane. Calculate the illumination at a point on the working plane 6 m away from the foot of the lamp. | (3) |
| 5 | Explain the difference in working between RCCB and RCBO. | (3) |
| 6 | A building has a load of 1000W consisting of 10 light and fan points and power load of 2000W consisting of 2 points. Design a suitable Distribution board (DB) for the building. | (3) |
| 7 | Draw the single line diagram of a typical indoor distribution transformer | (3) |
| 8 | List the Pre-commissioning test of 11kV indoor substation of a HT consumer. | (3) |
| 9 | What are the Installation requirements of standby generators in high rise buildings? | (3) |
| 10 | Enumerate energy conservation techniques in industrial and domestic applications. | (3) |

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

- 11 a) Mention the objectives of National Electric Code (NEC) 2011. (6)

- b) Explain the classification of voltage, its standard values and specification as per NEC 2011. (8)

OR

- 12 a) Illustrate the main objectives of Electricity Regulatory Commission. (6)
- b) Describe the recommendations on safety procedures and practices in electrical installations as per IS 5216 Part 1 & 2? (8)

Module II

- 13 a) Enlist the advantages and disadvantages of using LED lamps for street lighting applications. (6)
- b) A factory area is 40m long, 20m wide and is 8m high. Point source luminaries are suspended 1.5 meters below ceiling level. The working plane is 1 metre high. Calculate the minimum number of luminaries which must be installed to conform with a recommended SHR of 1.5: 1. (8)

OR

- 14 a) Define (4)
1. Coefficient of utilization
 2. Depreciation factor
- b) A main road 2km long and 8m wide is required to be illuminated by 85W sodium vapour lamps. The lamps are mounted on poles of 10m high, so that the minimum level of illumination is 0.8 lux. Design a suitable street lighting scheme using underground cable feeders. Estimate the materials required. (10)

Module III

- 15 a) Specify a circuit breaker having both short circuit and overload protection. Differentiate MCB and ELCB. (6)
- b) A residential building has 3 bedrooms with attached toilets, a dining area, a living area, a kitchen, work area and sit out. Based on the guidelines of NEC 2011 design a proper electrical system. Determine the total connected load, number of sub circuits, ratings of main switch, size of cables used in sub circuit and rating of protective devices used in distribution board. (8)

OR

- 16 a) List the pre-commissioning tests conducted for domestic installations. (6)
- b) Design and draw the Electrical Schematic (Single line Diagram) of a house wiring connected with 1 Φ KSEB supply by providing 1 Φ LT Meter. (8)

Connected Loads are: Light load - LED lamps (5 Nos, 18W each); Ceiling Fan (4 Nos, 40W each), Exhaust Fan (2 Nos, 60W each), 6A plug(4 Nos, 100W each), Power load- 16A Power Plug (2nos, 1000W each), Water pump (1 No, 1HP); Water Heater (1 No, 1000W).

Module IV

- 17 a) Describe the design criteria to be followed while selecting cables for a motor circuit wiring. (6)
- b) Design a wiring plan for installing a 15HP induction motor in an industry. How do you select the starter for 15HP Induction motor of 0.8pf, 80% efficiency with proper fuse grading? (8)

OR

- 18 a) Briefly explain the importance of conducting pre-commissioning test before energizing a substation. Discuss the earthing arrangement for distribution transformers. (6)
- b) Fault current anticipated in a substation location is 13.12kA. Soil resistivity = 100 Ω -m. Earth resistance is limited to 1 Ω . Design an earthing system. Fault duration can be taken as 3 seconds. Plate electrode of 1.2m \times 1.2m \times 12.5mm shall be used. (8)

Module V

- 19 a) Explain with the help of block diagram the working of automatic main failure system. (6)
- b) Draw and explain the block diagram representation of an off-grid and on-grid solar PV system. (8)

OR

- 20 a) Distinguish between continuous power, prime power and standby power related with standby generator. (6)
- b) A residential building has the following electrical loads (i) Three LED lamp (20 W each) used for 6 hours/day (ii) Two Ceiling fans (40 W each) used for 8 hours/day (iii) One refrigerator (150 W) used for 24 hours with 50% duty cycle (iv) One washing machine (200 W) used for 1 hours/day. (8)

Design a suitable solar PV system, which is to be installed at a location having a minimum solar irradiation of 4.83kWh/m²/day.

Any missing data may be assumed.
