

**Central Public Works Department
Department Examination for
Assistant Executive Engineer (E)
Electrical Engineering Paper- I
(Without Books)
OCTOBER – 2020**

Time: 3 Hours

Maximum Marks: 100

Instructions to the candidates

- 1) Attempt any five questions. All questions carry equal marks.
- 2) Make your own assumptions wherever required & indicate them clearly in answer sheet.
- 3) For preparation of BOQ, for DSR item mention only item number/code instead of entire item.
- 4) In BOQ, major items of estimate are expected to be written.

Q1. Answer following:

2.5 X 8 = 20

- a) What is Circuit wiring and how it is measured?
- b) What is Submain wiring and how it is measured?
- c) Mention various components of concealed wiring.
- d) What are the different tests of an internal electrical Installation? Who witnesses these tests of completed installation in the department?
- e) What is the color coding followed in wiring? In case of point wiring how many joints are permitted in phase, neutral & earth connection?
- f) How many 16 Amps outlets can be fed from one power circuit in Non-Residential building and how many 5 Amps outlets can be fed from one power circuit in Residential building?

- g) What is Feeder Pillar and where it is used? Draw installation diagram of feeder pillar along with main road of Residential Colony clearly indicating the different parts.
- h) What is earth resistance and how it is measured? How many types of earth electrodes are used in Internal Electrical Installation? Where copper plates earth is used?

Q2. Answer following:

2.5 X 8 = 20

- a) What are the various types of Detectors used in fire detection system and specify their application?
- b) What is power factor? What is the desirable Power factor and how it is achieved?
- c) What is renewable Energy? How it is trapped in case of hostel building?
- d) What are the different tests carried out at factory and at site before commissioning of transformer?
- e) What is vector group? And list various components of transformer.
- f) What are the various operational and maintenance requirement of fire fighting installation in a multistoried building?
- g) What is difference between compact substation and conventional substation?
- h) Explain the difference between feeder pillar and distribution panel?

Q3. Answer following:

4 X 5 = 20

- (a) Explain procedure for obtaining electricity connection to the newly built CPWD building. Explain various documents required and approval from which authorities before energization?
- (b) Explain different components of central air conditioning system typically for G+ 8 floor.

- (c) List the various important components of lift installation and what are the tests carried out at site and what is the important requirement before commissioning and putting into beneficial use of lift.
- (d) List out different types of illuminations scheme and its application to different building. Also mention requirement of illumination level as per NBC.

Q4. Answer following:

4 X 5 = 20

- (a) Explain design criteria for installing lightning protection system for building having G+ 8 floor. Explain various components of lightning protection.
- (b) Explain various wiring methods and explain the advantages and disadvantages. Explain suitability of various wiring schemes for different regions of india based on whether etc.
- (c) What are the different components of gas based fire extinguishing system? What safety precautions are required for such installation?
- (d) List out various components with schematic diagram of automatic sprinkler system and guidelines for its provision in multistoried building as per NBC-2016.

Q5. State True or False:

20 X 1 = 20

- (a) Client department can charge electric charges from occupants of residential quarters.
- (b) In office building the illumination on working plane shall be 350 lux.
- (c) The dry type transformer is preferred for indoor application.
- (d) Feeder pillars are generally installed in indoor.
- (e) It is not mandatory in CPWD to construct green building.

- (f) DG set can be installed without silent enclosures.
- (g) Street lighting design is done with 100 lux on ground level.
- (h) It is a preferred design to have a smaller capacity transformer for feeding night time loads.
- (i) At no load, the power factor of the transformer is 0.9.
- (j) Preferred location of substation is at load centre.
- (k) Switch boards are placed at a height of 1.25 m.
- (l) For indoor application the IP protection required is IP 65.
- (m) Total harmonic distortion shall not exceed 10%
- (n) The clearance between bus bars shall be phase to phase 32 mm and phase to neutral is 26 mm.
- (o) R22 will be replaced by R410A in phased manner as per kyoto protocol.
- (p) Pipe lines in wet riser system is tested for 1.5 times the design pressure
- (q) The minimum capacity of lift to comply with barrier free environment is 10 passenger capacities.
- (r) Grid interacting roof top solar power generation system require battery bank for using during night time.
- (s) Latest specification for lift and Escalator is of 2013.
- (t) When both LT and HT cables are laid in same trench, HT cable shall be laid on top layer.

(a) Explain the need of a capacitor directly connected (not through APFC panels) and how the rating of the capacitor is calculated with reference to transformer capacity.

(b) Classify light points:

How measurements are made for point wiring, group controlled light points and twin controlled light points.

(c) (i) State the mandatory provision mentioned in internal specification 2013 for use of solar PV system for outdoor lighting

(ii) State the mandatory provision mentioned in internal specification 2013 for the renewable energy based water heating system capacity and state exemption to it.

(d) (i) what is the significance of load balancing in 3 phase circuits? What is the effect in the absence of load balancing?

(ii) Mentioned current density to be considered while designing bus bars in copper conductor and aluminum conductor.

Also mention the minimum bus bar clearance.