

Answer any **THREE** questions from this section.

1. (a) Define the following terms with respect to electrical installation work.
 - (i) equipotential bonding;
 - (ii) earth electrode. (4 marks)

- (b) With the aid of a labelled circuit diagrams, explain the following methods of earthing
 - (i) TNC - S
 - (ii) TT (11 marks)

- (c) Draw the sequence of switch gear control arrangement at the consumers intake point. (5 marks)

2. (a) State **three** IEE Regulations regarding the rising main bus-bar systems. (6 marks)

- (b) It is a requirement that before carrying out calculations for cable size using current edition of the IEE regulations, the assessment of general characteristics of the installation must be taken into consideration. Outline the considerations under the following headings:
 - (i) purpose supplies and structure;
 - (ii) external influences;
 - (iii) compatibility. (8 marks)

- (c) Illustrate the following connection circuits:
 - (i) joint box method;
 - (ii) three plate ceiling rose method. (6 marks)

3. (a) With the aid of labelled single line diagram, show the sequence of supply arrangement from the generating station to the consumer indicating the voltage levels at each stage. (8 marks)

- (b) Draw a labelled schematic diagram and explain the operation of the pumped storage type Hydro-power station. (12 marks)

4. (a) State the reasons for carrying out tests in a completed electrical installation. (4 marks)

- (b) With the aid of labelled single line diagram, explain the operation of the trembler bell. (10 marks)

(c) Describe the following wiring systems:

- (i) conduit wiring system;
- (ii) trunking wiring system.

(6 marks)

SECTION B

Answer any TWO questions from this section.

5. (a) Define the following terms with respect to solar system installations.

- (i) photo voltaic system;
- (ii) surge capacity;
- (iii) transfer switch.

(6 marks)

(b) Explain the reason for connecting solar cells in series.

(2 marks)

(c) With the aid of labelled diagrams, explain the earthing arrangement for the solar array.

(12 marks)

6. (a) State the application of the following tools and materials used in the maintenance of solar electric systems:

- (i) hydrometer;
- (ii) voltmeter;
- (iii) petroleum Jelly;
- (iv) distilled water.

(4 marks)

(b) Outline how the following maintenance checks are carried out in batteries and modules.

- (i) cleaning of batteries;
- (ii) checking and topping up the electrolyte;
- (iii) inspecting for dust and cleaning the modules.

(10 marks)

(c) In the installation of smaller solar array systems it is recommended that a 2.5 mm² cable be used throughout the installation without compromising the quality of supply. State the conditions of installation necessary for this recommendation to hold true.

(6 marks)

7. (a) State any **two** safety measures necessary when installing solar systems in order to avoid shock risks arising from electricity.

(4 marks)

- (b) Describe the care necessary when handling batteries with respect to:
- (i) battery acid;
 - (ii) location of batteries. (6 marks)
- (c) Draw a schematic diagram of **two** photo voltaic modules supplying the following loads:
- (i) 1 - television set using dc system;
 - (ii) 2 - fluorescent luminaries using ac system. (10 marks)
8. (a) Describe the "Photo Electric Effect" of solar arrays. (4 marks)
- (b) State **four** factors that affect the changes in the output of solar cell modules. (4 marks)
- (c) With the aid of labelled graphical sketch of the current-voltage characteristic curve (I -V curve) of a typical solar cell module, describe the various changes in the curve at particular points. (12 marks)

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