

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

- ✱ (a) Name **two**:
- (i) types of fire extinguishers and the type of fire they are used on;
 - (ii) components of a first aid box. (4 marks)
- (b) Explain **three** main causes of electric fires. (6 marks)
- (c) Sketch the following electrical joints.
- (i) tee joint;
 - (ii) married joint. (4 marks)
- (d) Describe the following methods used in joining electrical conductors.
- (i) soldering;
 - (ii) crimping. (6 marks)
2. (a) State **two**:
- (i) IEE regulations requirement regarding ceiling roses;
 - (ii) advantages of wiring socket outlets in ring. (4 marks)
- (b) Outline **four** installation tests carried out in a completed installation. (4 marks)
- (c) With aid of a labelled diagram, describe the sequence of control equipment at consumer's intake point. (8 marks)
- (d) Explain **two** factors considered when siting a hydro-electric power station. (4 marks)
3. (a) Outline **four** precautions to be observed when charging lead acid batteries. (4 marks)
- (b) With aid of a labelled diagram, describe the constant voltage charging method of charging a lead acid battery. (8 marks)
- (c) (i) State **four** IEE regulations requirement regarding bell transformers.
- (ii) Draw a wiring diagram of a bell controlled by a relay circuit. (8 marks)

4. (a) Explain how the following factors influence the choice of a wiring system:
- (i) type of building;
 - (ii) flexibility;
 - (iii) appearance. (6 marks)
- (b) State **two** advantages of using
- (i) PVC conduits over steel conduits;
 - (ii) trunking over conduits. (4 marks)
- (c) With aid of a labelled diagram, describe the catenary wiring system. (6 marks)
- (d) Outline **four** safety precautions observed when installing base conductor wiring systems. (4 marks)
5. (a) Distinguish between class P and class Q type of fuses. (4 marks)
- (b) (i) Draw a labelled diagram of a cartridge fuse.
- (ii) Show different colour codes for different ratings of the fuse in (b) (i). (5 marks)
- (c) Outline:
- (i) the purpose for earthing an electrical installation;
 - (ii) **three** parts that need not to be earthed in an electrical installation. (7 marks)
- (d) Draw a labelled diagram showing the parts of an earthing system. (4 marks)

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

6. (a) Define the following terms as used in solar systems
- (i) radiance; —
 - (ii) solar constant (4 marks)
- (b) With aid of a labelled diagram, explain how solar energy is harvested using a parabolic dish for thermal use. (6 marks)
- (c) Name **four** measuring instruments used in solar photo-voltaic (PV) systems. (4 marks)
- (d) Draw a solar PV module current-voltage (I-V) curve and on it label and explain the following parts
- (i) I_{sc}
 - (ii) P_m
 - (iii) V_{oc} (6 marks)
7. (a) Explain the following as used in solar systems
- (i) photo-voltaic effect;
 - (ii) tracking. (4 marks)
- (b) Describe the following types of PV module solar cell constructions
- (i) mono-crystalline;
 - (ii) poly-crystalline (4 marks)
- (c) (i) With aid of diagrams, explain how stratification occurs in batteries.
- (ii) State **two** ways of minimizing the effect in (c) (i). (6 marks)
- (d) With aid of a labelled diagram, explain the operation of a shunt type charge controller. (6 marks)

8. (a) State **three** maintenance and servicing procedures carried out on the following PV solar systems to ensure their longevity.
- (i) Solar battery
 - (ii) PV module
- (4 marks)
- (b) Outline **three**:
- (i) tools and materials required when servicing and maintaining solar PV batteries.
 - (ii) types of information required during trouble shooting and maintenance of solar systems.
- (6 marks)
- (c) Describe the following accessories used in PV solar systems.
- (i) Switches;
 - (ii) Socket outlets;
 - (iii) Circuit breakers.
- (6 marks)
- (d) A 12 V DC domestic PV solar electric system has three 10 W lamps and 30 W black and white television. Determine the:
- (i) size of fuse required;
 - (ii) ampere hour consumed if the daily use is 3 hours.
(Assume system losses are 15%)
- (4 marks)

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