**Basic Electrical Principles**

**Possible Questions**

**Question 1**

Describe 5 effects of electrical current.

**Question 2**

(a) Sketch the circuit diagram of a single phase circuit, protected by a fuse, controlled by a double pole switch and supplying three resistors connected in parallel.

Include an ammeter to measure the total circuit current and a voltmeter to measure the voltage across the resistors.

(b) If each resistor is 150 ohms and the voltmeter shows 225 volts, what is:

(i) the reading on the ammeter?

(ii) the total power-dissipated by the resistors?

**Question 3**

(a) Draw a circuit diagram using all of the following electrical components connected to a 23OV a.c. supply:

(i) Two load resistors, one of 23 ohms and the other of 46 ohms.

(ii) A two-position selector switch to connect the supply to either of the load resistors.

(iii) A voltmeter to measure the voltage across the load.

(iv) An ammeter measuring the total current flowing in the load.

(v) A fuse.

(b) Calculate the current flow in the circuit when this selector switch connects the supply to the 46 ohm resistor.

**Question 4**

A 230-Volt electrical circuit contains two heating elements, each having a resistance of 46 ohms.

(a) If the two elements are connected in series to the 230 Volt supply what will be the value of:

(i) the current drawn from the supply

(ii) the total power dissipated by the elements

(b) If the two elements are connected in parallel to the 230 Volt supply what will be the value of:

(i) the circuit resistance

(ii) the current drawn from the supply

(iii) the total power dissipated by the elements

**Question 5**

A 240V household radiator has a resistance of 23 Ω and was switched on for 2 hours. Calculate the cost of using the radiator if the tariff is 13c/kWh.

**Question 6**

A private residence consumes 1123 kWh of energy plus 803 kWh for a hot-water heater on an off-peak basis. Calculate the amount of the electricity bill, given the following tariff scale:

• off peak: all units 5.53c/kWh

• general domestic: all units 14.66c/kWh

• general service charge: $26.36.

**Question 7**

If electrical energy costs 12 c/kWh, for how many hours could a 100 W lamp be used for 60c ?

**Question 8**

Briefly outline the generation of a voltage by a rotating loop in a fixed field.

**Question 9**

With reference to a sine wave, what is meant by the terms cycle, frequency and periodic time.

**Question 10**

Compare the relationships between voltage and current if a.c, is applied to a pure resistive, pure inductive or pure capacitive circuit.

**Question 11**

Explain the differences between true power, apparent power and reactive power.

**Question 12**

What is power factor?

**Question 13**

What are the effects of poor power factor on a distribution system ?

**Question 14**

Explain how a poor power factor can be improved.

**Question 15**

Explain with the aid of a diagram how power factor can be measured.

**Question 16**

How does placing a capacitor in parallel to the load improve the power factor?

**Question 17**

A three phase, star connected alternator supplies a delta connected induction motor at a line voltage of 600 V. The current in each line is 40 A. Find:

1. the phase voltage of the alternator
2. the current in each phase of the motor.

**Question 18**

Three resistors, each having a resistance of 25 Ω, are connected to a 415 V, three phase supply. Determine the voltage across each resistor and the current through each resistor when they are connected:

(a) in star configuration

(b) in delta configuration.

**Question 19**

Three heating elements are connected in star across a three phase, 415 V line. If 10 A flows in each line wire, determine:

(a) the resistance of each heating element

(b) the power drawn from the supply by the three elements.

**Question 20**

Briefly state what a block diagram of an electrical circuit represents.

**Question 21**

What is the main difference between a schematic circuit diagram and a wiring diagram ?

**Question 22**

Draw a circuit diagram of the control circuit and main circuit for a three phase D.O.L. motor starter.