ISC SEMESTER 1 EXAMINATION
SPECIMEN QUESTION PAPER
ELECTRICITY & ELECTRONICS

Maximum Marks: 80

Time allowed: One and a half hours

(*Candidates are allowed additional **15 minutes** for **only** reading the paper.*)

ALL QUESTIONS ARE COMPULSORY

Each question / subpart of a question carries one mark.

Question 1

With reference to generator, in lap winding, the number of brushes is always:

(a) Double the number of poles.

(b) Same as the number of poles.

(c) Half the number of poles.

(d) Two.

Question 2

For starting a D.C. motor a 'starter resistor' is required because:

(a) It limits the speed of the motor.

(b) It limits the starting current to a safe value.

(c) It starts the motor.

(d) It limits the torque on the motor.

Question 3

In a 'capacitor start' motor, the phase displacement between starting and running windings can be nearly:

(a) 10°

(b) 30°

(c) 60°

(d) 90°

Question 4

Through which of the following systems can electric power be distributed?

(a) Overhead system.

(b) Underground system.

(c) Both (a) and (b).

(d) None of the above.

Question 5

Which of the following materials is not used for distribution of electrical power?

(a) Copper

(b) Aluminium

(c) Steel

(d) Tungsten

Question 6

A semiconductor diode has:

(a) One p-n junction.

(b) Two p-n junctions.

(c) Three p-n junctions.

(d) Four p-n junctions.

Question 7

If the arrow of crystal diode symbol is positive with reference to bar, then diode is _____ biased.

(a) Forward

(b) Reverse

(c) Either forward or reverse

(d) None of the above

Question 8

When the crystal diode current is large, the bias is**:**

(a) Forward

(b) Inverse

(c) Poor

(d) Reverse

Question 9

If the temperature of a crystal diode increases, then leakage current:

(a) Remains the same

(b) Decreases

(c) Increases

(d) Becomes zero

Question 10

Semiconductor diode is used as:

(a) Oscillator

(b) Amplifier

(c) Rectifier

(d) Modulator

Question 11

For controlling the initial inrush of current:

(a) Reduced voltage is applied to the stator during the starting period.

(b) Reduced voltage is applied to the stator when the motor is running at rated speed.

(c) Either (a) or (b).

(d) The number of turns in the stator coil are increased.

Question 12

A crystal diode has forward resistance of the order of _____.

(a) kΩ

(b) Ω

(c) MΩ

(d) GΩ

Question 13

If the p type of the crystal diode is connected to the positive terminal of the battery, then this diode is:

(a) Forward biased

(b) Reverse biased

(c) Both (a) and (b)

(d) Unbiased

Question 14

The reverse current in a diode is of the order of _____.

(a) kA

(b) mA

(c) μA

(d) A

Question 15

The forward voltage drop across a silicon diode is about:

(a) 2.5 V

(b) 3 V

(c) 10 V

(d) 0.7 V

Question 16

The D.C resistance of a crystal diode is _____ its A.C resistance.

(a) The same as

(b) More than

(c) Less than

(d) Equal to

Question 17

An ideal crystal diode is one which behaves as a perfect _____ when forward biased.

(a) conductor

(b) insulator

(c) resistance material

(d) none of the above

Question 18

The leakage current in a crystal diode is due to _____.

(a) minority carriers

(b) majority carriers

(c) junction capacitance

(d) none of the above

Question 19

If the temperature of a crystal diode increases, then leakage current _____.

(a) remains the same

(b) decreases

(c) increases

(d) becomes zero

Question 20

If the doping level of a crystal diode is increased, the breakdown voltage _____.

(a) Remains the same.

(b) Is increased.

(c) Is decreased.

(d) First increases and then gradually decreases.

Question 21

The knee voltage of a crystal diode is approximately equal to _____.

(a) applied voltage

(b) breakdown voltage

(c) forward voltage

(d) barrier potential

Question 22

When the crystal diode current is small, the bias is:

(a) forward

(b) inverse

(c) poor

(d) reverse

Question 23

A crystal diode is a _____ device.

(a) non-linear

(b) bilateral

(c) linear

(d) unilateral

Question 24

If the doping level in a crystal diode is increased, the width of depletion layer _____.

(a) Remains the same.

(b) Decreases.

(c) Increases.

(d) Initially increases and then abruptly decreases.

Question 25

The PIV rating of each diode means:

(a) Reverse voltage

(b) Forward voltage

(c) Reverse safe voltage

(d) Forward safe voltage

Question 26

If the PIV rating of a diode is exceeded:

(a) The diode conducts poorly.

(b) The diode is destroyed.

(c) The diode behaves like a resistor.

(d) The diode conducts heavily.

Question 27

Diode is made up of _____ material.

(a) Conducting

(b) Insulating

(c) Semiconducting

(d) Electronic

Question 28

Semiconductors are classified as _____.

(a) Intrinsic semiconductors

(b) Extrinsic semiconductors

(c) Both (a) and (b)

(d) None of the above

Question 29

Diode is a _____ device.

(a) Unidirectional

(b) Bidirectional

(c) Non-linear

(d) Both (a) and (c)

Question 30

Diode turns OFF if the applied voltage polarity is _____ the diode polarity.

(a) Similar to

(b) Matches

(c) Same as

(d) Opposite to

Question 31

A part of an electric circuit which is used to limit the amount of electric current flowing through the circuit is known as a:

(a) Diode

(b) Thermistor

(c) Radiator

(d) Resistor

Question 32

The capacitors which use chemical reactions to store charge are called:

(a) Ceramic capacitors

(b) Fixed capacitors

(c) Parallel plate capacitors

(d) Electrolytic capacitors

Question 33

The capacitor which has a dielectric between its plates and is made of a flexible material that can be rolled into the shape of a cylinder is called:

(a) Ceramic capacitor

(b) Fixed capacitor

(c) Parallel plate capacitor

(d) Electrolytic capacitor

Question 34

The figure 1 given below shows the symbol for:

figure 1

(a) An air core.

(b) A ferrite core.

(c) An iron core.

(d) None of the above.

Question 35

Why is the armature of a DC generator laminated?

(a) To reduce the bulk.

(b) To provide the bulk.

(c) To insulate the bulk.

(d) To reduce the eddy current loss.

Question 36

What are the field coils of a DC generator usually made up of?

(a) Mica

(b) Copper

(c) Cast iron

(d) Carbon

Question 37

A DC generator may lose a residual magnetism due to:

(a) Heating

(b) Vibrations

(c) Over excitation

(d) Any of the above

Question 38

If a D.C. motor is connected across the A.C. supply, it will:

(a) Run at anormal speed.

(b) Not run.

(c) Run at a speed lower than the rated speed.

(d) Burn due to heat produced in the field winding by eddy current.

Question 39

How can the speed of a D.C. shunt motor be increased?

(a) By increasing the resistance in armature circuit.

(b) By increasing the resistance in field circuit.

(c) By reducing the resistance in the field circuit.

(d) By reducing the resistance in the armature circuit.

Question 40

In a split-phase motor, the running winding should have:

(a) High resistance and low inductance.

(b) High resistance and High inductance.

(c) Low resistance and high inductance.

(d) Low resistance and low inductance.

Question 41

If the capacitor of a single-phase motor is short-circuited:

(a) The motor will not start.

(b) The motor will run in the same direction at a reduced speed.

(c) The motor will run in the reverse direction.

(d) None of the above.

Question 42

In a split-phase motor:

(a) Both, starting and running windings are connected through a centrifugal switch.

(b) Centrifugal switch is used to control supply voltage.

(c) The running winding is connected through a centrifugal switch.

(d) The starting winding is connected through a centrifugal switch.

Question 43

A shunt generator delivers 450 A at 230 V and the resistance of the shunt field and armature are 50 Ω and 0.03 Ω respectively. What will be the generated e.m.f?

(a) 243.6 V

(b) 243.06 V

(c) 243 V

(d) 240 V

Question 44

400 V DC shunt motor takes 5 A at no load (Ra = 0.5 ohm, R_f = 200 ohm). What is the difference between emf no - load and emf full - load when the DC shunt motor takes 50 A on full load?

(a) 22.5 V

(b) 22 V

(c) 25 V

(d) 23 V

Question 45

The material used for making the stator of an induction motor is:

(a) copper

(b) silicon steel

(c) iron

(d) gold

Question 46

What are the brushes of D.C. machines are made up of?

(a) carbon

(b) copper

(c) zinc

(d) Tungsten

Question 47

Inductors are _____ devices.

(a) active

(b) passive

(c) non-linear

(d) none of the above

Question 48

What happens to the speed of the D.C shunt motor if the load on it is increased?

(a) It reduces slightly.

(b) It increases slightly.

(c) Initially it increases and then decreases.

(d) Initially it decreases and then increases.

Question 49

The terminal voltage of a series generator is 150 V when the load current is 5 A. If the load current is increased to 10 A, then what will be the terminal voltage?

(a) greater than 150 V.

(b) less than 150 V.

(c) exactly doubles.

(d) exactly halved.

Question 50

Resistors are _____ devices.

(a) polar

(b) non- polar

(c) non-linear

(d) none of the above

Question 51

DC generator uses _____ to conduct current to the external circuit.

(a) slip rings

(b) split ring

(c) both (a) and (b)

(d) brushes

Question 52

AC generator uses _____ to conduct current to the external circuit.

(a) slip rings

(b) split ring

(c) both (a) and (b)

(d) brushes

Question 53

Single phase A.C motor works when _____ is given as input.

(a) A.C

(b) D.C

(c) both A.C and D.C

(d) none of the above

Question 54

The energy conversion in a loud speaker is:

(a) Sound energy to electrical energy.

(b) Electrical energy to sound energy.

(c) Mechanical energy to sound.

(d) Both (a) and (b).

Question 55

D.C motor converts:

(a) A.C to D.C voltage

(b) D.C to A.C voltage.

(c) mechanical energy to electrical energy

(d) electrical energy to mechanical.

Question 56

Boron is a _____.

(a) Trivalent atom.

(b) Pentavalent atom.

(c) Tetravalent atom.

(d) Hexavalent atom.

Question 57

SI unit of inductor is:

(a) henry

(b) farad

(c) tesla

(d) weber

Question 58

Overload release coil is used as _____ in a D.C motor.

(a) Protective device.

(b) Supporting device.

(c) Heating device.

(d) Voltage stabilising device.

Question 59

Resistors are:

(a) Passive components

(b) Active components

(c) Non-linear components

(d) All of the above

Question 60

A diode has:

(a) only p-region

(b) only n-region

(c) both p-region and n-region.

(d) none of the above

Question 61

The circuit shown in figure 2 below is a simple diagram of an ‘inductor start’ motor.

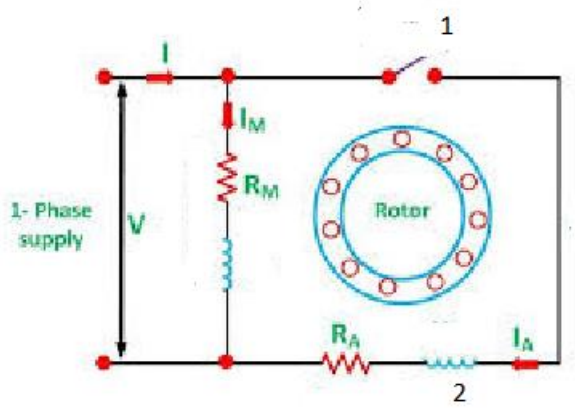

figure 2

(i) The component labelled 1:

(a) Switch

(b) Two way switch

(c) Centrifugal switch

(d) None of the above

(ii) The component labelled 2:

(a) Auxiliary winding

(b) Main winding

(c) Resistor

(d) Transformer

Question 62

Figure 3 given below is a diagram of a semiconductor diode. Choose the correct option to label markings 1 to 5.

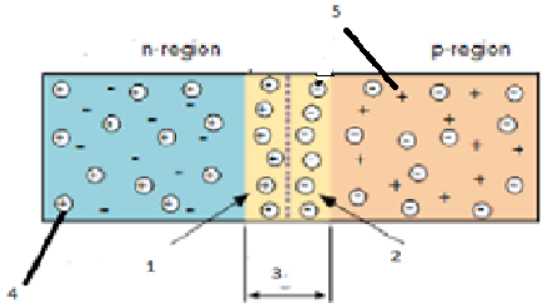

figure 3

(i) Label 1:

(a) Positive ion

(b) Hole

(c) Boron atom

(d) None of the above

(ii) Label 2:

(a) Positive ion

(b) Negative ion

(c) arsenic atom

(d) None of the above

(iii) Label 3:

(a) Depletion region

(b) Saturated region

(c) Region with large number of charge carriers

(d) Diffusion region

(iv) Label 4:

(a) Positive ion

(b) hole

(c) indium atom

(d) none of the above

(v) Label 5:

(a) minority charge carriers

(b) majority charge carriers

(c) immobile charges

(d) germanium atom

Question 63

The graph in figure 4 given below shows that the semiconductor diode is _____ biased.

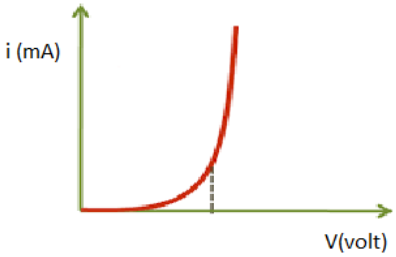

figure 4

(a) Forward biased

(b) Reversed biased

(c) Unbiased

(d) None of the above

Question 64

Answer the following question with reference to vacuum diode.

(i) What is the terminal which is close to heater circuit called?

(a) Plate

(b) Cathode

(c) grid

(d) none of the above

(iii) In 'space charge limited region':

(a) Plate current increases as plate voltage increases

(b) Plate current decreases as plate voltage increases

(c) Plate current remains constant as plate voltage decreases.

(d) Plate current becomes erratic as plate voltage increases.

Question 65

Choose the correct option to replace the underlined word.

(i) The insulation colour used for 'Live' wire is **yellow.**

(a) red

(b) black

(c) orange

(d) green

(ii) Minority charge carriers in a p type semiconductor are **holes.**

(a) Electrons

(b) Indium atom

(c) Positive ions

(d) Negative ions

(iii) Arsenic has **six** electrons in their outer most orbit.

(a) Five

(b) Four

(c) Three

(d) None of the above

(iv) Forward biasing of p-n junction offers **infinite** resistance.

(a) 100 kilo ohm resistance

(b) Almost Zero resistance

(c) 10 kilo ohm resistance

(d) None of the above

(v) Resistor dissipate **electric charge**.

(a) Power

(b) Electrical energy

(c) Current

(d) Voltage

Question 66

Figure 5 given below showing the circuit diagram is a motor starter with a protective device with parts labelled as I to V.

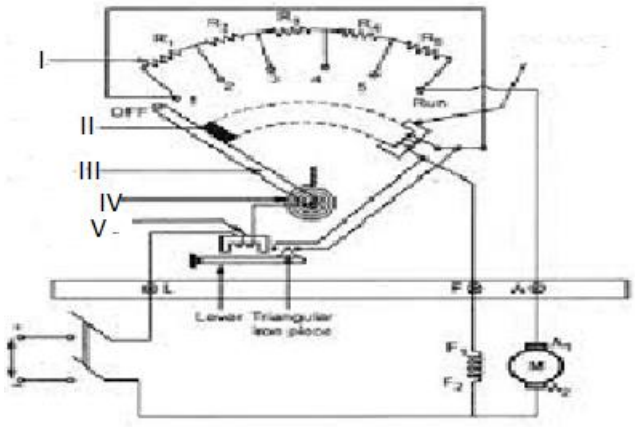

figure 5

Identify the parts:

(i) Labelled I

(a) starter resistor

(b) resistor for running the motor

(c) resistor in parallel to the motor

(d) all of the above

(ii) Labelled II

(a) soft iron

(b) glass

(c) wood

(d) Steel

(iii) Labelled III

(a) wooden keeper

(b) magnetic keeper

(c) rubber plank

(d) conducting rod

(iv) Labelled IV

(a) coil

(b) spiral spring

(c) supporting frame

(d) torsion spring

(v) Labelled V

(a) low volt release coil

(b) overload release coil

(c) supporting coil

(d) transformer.