UMMUL-QURA HIGH SCHOOL

Arowona Bus-Stop, Amuloko, Ibadan, Oyo State

Second Term Examination, 2020/2021 Academic Session.

Subject: ENT/Elect. ***Class:*** SSS 3 ***Time:*** $2\frac{1}{2}$ hours

Instructions: Answer ***all*** questions in *Section A* and ***three*** in *Section B*.

PAPER I & II [Objective and Theory]

SECTION A: OBJECTIVE (20 marks).

1. The SI unit of Current is ----.
   A. ampere
   B. volts
   C. Ohm
   D. farad
2. A multimeter is a device which can measures ----.
   A. resistance
   B. voltage
   C. current
   D. all of the above
3. The bedding on a cable consists of ----.
   A. hessian cloth
   B. jute
   C. any of the above
   D. none of the above
4. The system that supplies power to consumers at voltages of 415 volts and/or 240 volts three phase or single phase respectively is known as ----.
   A. secondary distribution system
   B. primary distribution system
   C. secondary transmission system
   D. primary transmission system
5. The ratio of the real power flowing to the load to the apparent power in the circuit is known as ----.
   A. maximum demand
   B. power factor
   C. load factor
   D. none of the above
6. Voltage rating of incoming supply for domestic use is ----.
   A. 220 V ± 10%
   B. 220 V ± 5%
   C. 220 V ± 15%
   D. 220 V ± 8%
7. Unit of capacitance is —--.
   A. Henry
   B. Ohm
   C. Farad
   D. Watt
8. Unit of Reactive Power, Active Power and Apparent Power respectively are ----.
   A. W, VAR and VA
   B. VA, VAR and W
   C. W, VA and VAR
   D. VAR, W and VA
9. The part of the motor that is mounted on the shaft, support the rotor and allow it to turn is ----.
   A. stator
   B. terminal box
   C. enclosure
   D. bearings

10. Split phase induction motor has ____ starting current and ____ starting torque.
    A. low, moderate respectively
    B. high, low respectively
    C. moderate, low respectively
    D. high, high respectively
11. The running winding of the capacitor start capacitor run induction motor is ----.
    A. resistive in nature
    B. capacitive in nature
    C. inductive in nature
    D. all of the above
12. The single-phase induction motor is ***not*** self-starting because the magnetic field produced is ----.
    A. rotating type
    B. not rotating type
    C. sometimes rotating type and sometimes not rotating types
    D. none of the above
13. The part of the motor that protects the internal components from moisture and contamination is ----.
    A. stator
    B. terminal box
    C. enclosure
    D. bearings
14. A universal motor can work on ----.
    A. AC
    B. DC
    C. AC and DC
    D. none of the above
15. A compensating winding is used for ____ the effect of the armature reaction and

    ____ the commutation processes.
    A. improving, reducing respectively
    B. improving, improving respectively
    C. reducing, reducing respectively
    D. reducing, improving respectively
16. In DC series motor, to get the required torque the number of conductors in the armature is ----.
    A. decreased
    B. increased
    C. remains same
    D. none of the above
17. The stator core and yoke are laminated to reduce ----.
    A. eddy current loss
    B. hysteresis loss
    C. both (a) and (b)
    D. none of the above
18. The purpose of centrifugal switch is to disconnect the auxiliary winding from the main circuit when the motor attains a speed up to ----.
    A. 50% to 60%
    B. 75% to 80%
    C. 90% to 100%
    D. 20% to 30%
19. In a split phase AC motor, the resultant of two starting winding and running winding produces ----.
    A. rotating magnetic field
    B. static magnetic field
    C. electromagnetic field
    D. none of the above
20. Centrifugal switch is ***not*** required in ----.
    A. split phase induction motor
    B. capacitor start induction motor
    C. permanent split capacitor motor

D. none of the above

21. The efficiency of universal motor becomes low because of ----.
    A. hysteresis loss
    B. eddy current loss
    C. both (a) and (b)
    D. none of the above
22. The choice of bearing arrangement is based on ----.
    A. load carrying capacity in the axial and radial direction
    B. over speed and duration
    C. rotating speed
    D. all of the above
23. The speed of ____ connected motor is high.
    A. delta
    B. star
    C. both (a) and (b)
    D. none of the above
24. In D.C. generators, the cause of rapid brush wear may be ----
    A. severe sparking
    B. rough commutator surface
    C. imperfect contact
    D. any of the above
25. The insulating material used between the commutator segments is normally ----.
    A. graphite
    B. paper
    C. mica
    D. insulating varnish
26. Sparking at the commutator of a D.C. motor may result in ----.
    A. damage to commutator segments
    B. damage to commutator insulation
    C. increased power consumption
    D. all of the above
27. Which one of the following is ***not*** necessarily the advantage of D.C. motors over A.C. motors?
    A. low cost
    B. wide speed range
    C. stability
    D. high starting torque
28. A transformer ***cannot*** raise or lower the voltage of a D.C. supply because ----.
    A. there is no need to change the D.C. voltage
    B. a D.C. circuit has more losses
    C. Faraday's laws of electromagnetic induction are not valid since the rate of change of flux is zero
    D. none of the above
29. The primary coil of a transformer is connected to a 60 V ac source. The secondary coil is connected to a 330 Ω load. The turns ratio is 3:1. What is the secondary voltage?
    A. 2 V
    B. 20 V
    C. 180 V
    D. 18 V
30. In a certain transformer, the input power to the primary is 120 W. If 8.5 W are lost to the winding resistance, what is the output power to the load, neglecting any other issues?
    A. 0 W
    B. 14.1 W

C. 111.5 W
D. 1,020 W

31. The winding in which the end of one coil is connected to the starting of another coil of same polarity as that of the first coli is ----.
    A. lap winding
    B. wave winding
    C. duplex winding
    D. all of the above
32. The device that converts chemical energy to electrical energy is known as ----.
    A. battery
    B. motor
    C. generator
    D. all of the above
33. In an alkaline battery (cells), the powdered zinc serves as ____, manganese dioxide

    serves as ____ and potassium hydroxide serves as ____.
    A. cathode, anode and electrolyte respectively
    B. anode, cathode and electrolyte respectively
    C. electrolyte, cathode and anode respectively
    D. cathode, electrolyte and anode respectively
34. In the cables, location of fault is usually found out by comparing ----.
    A. the resistance of the conductor
    B. the inductance of conductors
    C. the capacitances of insulated conductors
    D. all above parameters
35. A cable carrying alternating current has ----.
    A. hysteresis losses only
    B. hysteresis and leakage losses only
    C. hysteresis, leakage and copper losses only
    D. hysteresis, leakage, copper and friction losses
36. The breakdown voltage of a cable depends on ----.
    A. presence of moisture
    B. working temperature
    C. time of application of the voltage
    D. all of the above
37. In single core cables armoring is ***not*** done to avoid excessive ----.
    A. sheath losses
    B. make it flexible
    C. either of the above
    D. none of the above
38. Solid type cables are considered unreliable beyond 66 kV because ---- .
    A. insulation may melt due to higher temperature
    B. skin effect dominates on the conductor
    C. of corona loss between conductor and sheath material
    D. there is a danger of breakdown of insulation due to the presence of voids
39. The breakdown of insulation of the cable can be avoided economically by the use of ----.
    A. Inter-sheaths

B. insulating materials with different dielectric constants
C. both (A) and (B)
D. none of the above

40. Copper as conductor for cables is used as ----.
A. annealed
B. hardened and tempered
C. hard drawn
D. alloy with chromium

41. In a cable, the maximum stress under operating conditions is at ----.
A. insulation layer
B. sheath
C. armor
D. conductor surface

42. The thickness of metallic shielding on cables is usually ----.
A. 0.04 mm
B. 0.2 to 0.4 mm
C. 0.05 mm
D. 40 to 60 mm

43. The electrostatic stress in underground cables is -----.
A. at the conductor and the sheath
B. minimum at the conductor and maximum at the sheath
C. maximum at the conductor and minimum at the sheath
D. zero at the conductor as well as on the sheath

44. Which of the following method is/are used for reactive or voltage compensation?
A. Shunt capacitor
B. Series capacitor
C. Generating citation control
D. All the above

45. During maintenance activity of tripping device, the sequence for maintenance to be followed is ----.
A. review current carrying capacity and maximum demand, check for over-current requirements, determine the voltage drop based on cabling and current being carried
B. review current carrying capacity and maximum demand, check for over-current requirements
C. review carrying capacity and maximum demand, determine the voltage drop based on cabling and current being carried, check for over-current requirements
D. none of none above

46. The main action of the rectifier is to convert ----.
A. AC supply to DC supply
B. DC supply to AC supply
C. DC supply to AC supply
D. AC supply to DC supply

47. High tension cables are generally used up to ----.
A. 11 kV
B. 33 kV
C. 66 kV
D. 132 kV

48. The metallic sheath may be made of ----.
A. lead
B. lead alloy
C. aluminum
D. non the above

49. PVC stands for ----.

A. polyvinyl chloride
B. post varnish conductor
C. pressed and varnished cloth
D. positive voltage conductor

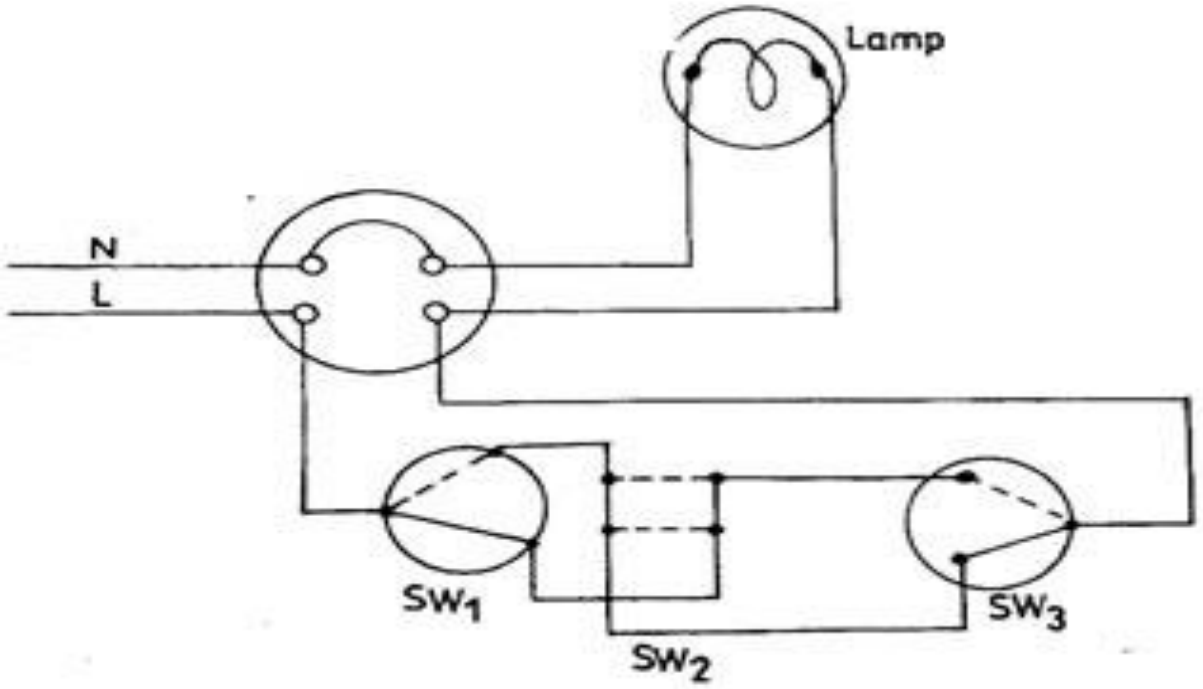
50. _____ cables are used for 132 kV.
A. High tension
B. Super tension
C. Extra high tension
D. Extra super voltage

SECTION B: THEORY (50 marks).

Instructions: Answer question 1 in Part A and ***any two*** from Part B.

PART A: Test of Practical

1a. The diagram below shows a circuit consisting of a lamp controlled be three independent switches (Sw_1, Sw_2 and Sw_3).



(i) Using the diagram above, complete the table below.

	Switch Positions			Circuit Condition	Lamp Condition
SN	Sw1	Sw2	Sw3		
1	up	Up	up		
2			down		
3	up	Down			
4		Down			
5	down		down		
6				close	ON
7			up		

(ii) State ***one*** precaution to be taken while carrying out the installation in 1a(i).

(iii) Draw circuit do all the positions during the operation of the switches.

1b. (i) With annotated wiring diagram, briefly explain the wiring procedures.

(ii) Mention ***two*** areas where such wiring could be implemented.

PART B: Theory

2a. (i) State ***five*** causes of accidents in a temporary electrical installation.

(ii) Name ***three*** maintenance and three maintenance procedures to be carry out on electrical machines.

2b. (i) With the aid of relevant diagram, differentiate between single phase and single phasing.

(ii) State ***three*** advantages of digital over analog measuring instruments.

(iii) Sketch the British standard (BS) symbols of the following electrical accessories;

a. 2-way switch
b. Intermediate switch
c. 13 ***A*** sockets outlet

3a. (i) With the aid of a well labelled diagram, illustrate the wiring diagram of a point of light controlled by independently two 2-way switches.

(ii) List ***two*** types of earth leakage circuit breaker.

(iii) Give ***four*** reasons for installation of protective devices.

3b. (i) Mention ***two*** parts of a DC machine.

(ii) Briefly explain the meaning of back *emf* in a DC motor.

(iii) State the test that can be used to detect earth fault on a conductor.

4a. (i) What are the ***five*** possible sources of found to a small business to take-off.

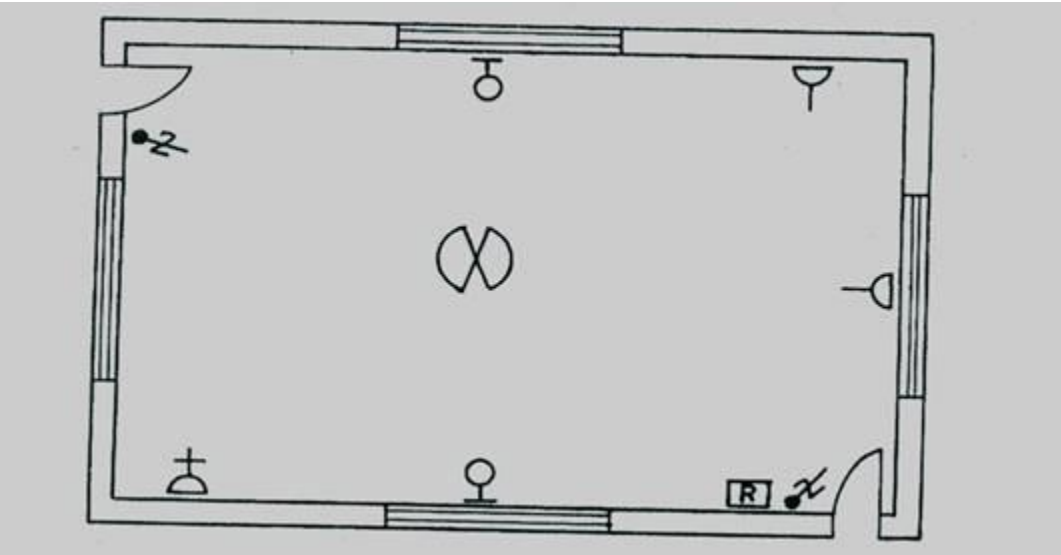
(ii) Mention ***two*** records that must be kept by a small-scale electrical business owner.

4b. (i) With the aid of a well labelled diagram, sketch a domestic ring circuit with nine 13 ***A*** socket outlets showing the recommended number of spurs.

(ii) What is the fuse rate for the circuit?

(iii) Give the standard cable size required for the installation.

5a. Study carefully the electrical layout of a living room as shown below. A surface wiring system is to be used for the installation.



(i) Prepare a key for the layout.

(ii) List the quantities of each of the fittings on the layout.

(iii) Sketch a labelled circuit diagram showing the layout in the circuit how a bulb is controlled by two switches independently.

5b. (i) Mention the instruments required for carrying out insulation resistance test on electrical cable.

(ii) State the use of each of the following conduit fittings;

i. elbow joint
ii. male and female
iii. locknut
iv. coupler

(iii) State ***three*** pieces of information about contained on the name plate of a three-phase machine.