UMMUL-QURA HIGH SCHOOL

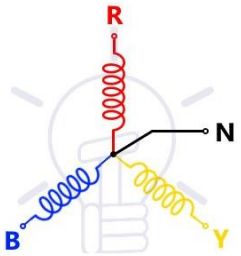
Arowona Bus-Stop, Akanran Road, Oyo State, Ibadan.
First-Term Examination, 2020/2021 Session.

SUBJECT: ENT/Elect. CLASS: SSS 3 TIME: 2:15 minutes

PART I: ***OBJECTIVES***

Instructions: Answer ***all*** questions in this part.

1. The instruments used in measuring the speed of a motor is;
   A. pulley.
   B. megger.
   C. speedometer.
   D. tachometer.
2. The term three-phase four wires refer to;
   A. four live wires.
   B. three lives and earth wires.
   C. three lives and neutral wires.
   D. two lives, one neutral and earth wires.
3. The main winding connection used for armature are;
   A. lap and wave.
   B. lap and duplex.
   C. lap and wave.
   D. lap and simplex.
4. The turning effect produced by the shaft of a motor is;
   A. torque.
   B. inertial.
   C. momentum.
   D. acceleration.
5. Face-plate starter is used for starting;
   A. ac motors.
   B. dc motors.
   C. three phase motors.
   D. two phase motors.
6. Two types of motor enclosures are;
   A. shaded pole and squire-cage.
   B. totally enclosed and shaded pole.
   C. dust-proof and totally enclosed.
   D. plain enclosed and fan protected.
7. The Fleming's right-hand rule is used to determine;
   A. number of lines of magnetic force.
   B. magnitude of induced emf in a motor.
   C. direction of induced emf in a generator.
   D. direction of induced emf in a motor.
8. When a conductor cuts lines of magnetic flux, it leads to the production of;
   A. electromotive force (emf).
   B. alternating (ac).
   C. magnetomotive force (mmf).
   D. electrostatic.



9. What type of connection does the diagram illustrates?
   A. Delta.
   B. Star.
   C. Parallel.
   D. Series.
10. The data of an electrical machine could be collected from;
   A. manufacturing company.
   B. nameplate.
   C. test plate.
   D. design company.
11. The main purpose of laminating iron core is to reduce;
   A. voltage losses.
   B. hysteresis.
   C. eddy current.
   D. friction.
12. The reason why a dc motors fails to start is due to;
   A. overloading.
   B. dirty commutator.
   C. open field circuit.
   D. high voltage.
13. A bell transformer delivers 12 ***V*** from a supply of 240 ***V***, if the input is at the 20***A***. What is the output current at bell terminal?
   A. 0.6 ***A.***
   B. 1 ***A.***
   C. 2 ***A.***
   D. 4 ***A.***
14. The type of motor enclosure used in petrol stations is;
   A. drip proof.
   B. screen protected.
   C. open type.
   D. totally enclosed.
15. Which of the following statements describe a shunt machine?
   A. A dc in which field coils are connected in series with the armature.
   B. An ac in which field coils are connected in series with armature.
   C. A dc coils are connected in parallel with the armature.
   D. An ac in which field coils are connected in parallel with the armature.
16. A 3 *hp* machine has an output power of 1.528 ***KW***. What is the efficiency of the machine?
   A. 20 %.
   B. 30 %.
   C. 40 %.
   D. 50 %.
17. When an open circuit occurs in one phase conductors supplying a 3-phase motor, it is referred to as;
   A. out of phase.
   B. phase angle.
   C. single phasing.
   D. Pandora diagram.

18. A type of motor that has only one winding is;
    A. capacitor start induction motor.
    B. induction start induction motor.
    C. shaded pole motor.
    D. repulsion start induction motor.
19. The direction of rotation of an electric motor can be changed by;
    A. interchanging the incoming voltage.
    B. increasing the fuse rating.
    C. reducing the phase voltage.
    D. all of the above.
20. The following are ways of removing armature reactions ***except***;
    A. commutation.
    B. interpoles.
    C. compensating winding.
    D. shifting brush position.
21. Which of the following components is ***not*** a part of a dc generator?
    A. commutator.
    B. commutator slot.
    C. slip ring.
    D. shaft.
22. Which of the following can be specified on a nameplate of an electric motor?
    A. Magnetic flux.
    B. Number of slots.
    C. Number of turns.
    D. Input/output power.
23. An induction motor is so-called because its operation depends on the phenomenon of;
    A. self-induction.
    B. mutual induction.
    C. eddy current.
    D. hysteresis.
24. The frequency of rotor current in a 6-pole, 50 *Hz*, 3-phase induction motor running at 950 *rpm* is;
    A. 2.5 *Hz.*
    B. 1.5 *Hz.*
    C. 5 *Hz.*
    D. 0.05 *Hz.*
25. In a single-phase induction motor, the two stator windings are;
    A. main and auxiliary windings.
    B. main and slotted windings.
    C. slotted and unslotted windings.
    D. main and unslotted windings.
26. The frequency of a 2-pole alternator running at 3600 *rpm* is;
    A. 50 *Hz.*
    B. 60 *Hz.*
    C. 120 *Hz.*
    D. 7200 *Hz.*
27. The magnitude of the emf generated by an alternator depends on;
    A. numbers of its poles.
    B. rotor speed.
    C. flux per pole.
    D. all of the above.

28. In a synchronous motor, squirrel-cage winding is provided for making the rotor;
    A. noise free.
    B. self-start.
    C. cheap.
    D. quick-start.
29. The armature conductors of a 6-pole, lap-wound DC generator are divided into;
    A. two parallel paths.
    B. three parallel paths.
    C. four parallel paths.
    D. six parallel paths.
30. If the flux per pole of a dc generator is halved but its speed is doubled, its generated emf will;
    A. be halved.
    B. remain the same.
    C. be doubled.
    D. be quadrupled.
31. Stray losses in a dc generator consists of;
    A. magnetic and mechanical losses.
    B. magnetic and electrical losses.
    C. electrical and mechanical losses.
    D. copper and iron losses.
32. The ***KVA*** of an ac circuit having 80 ***KW*** and 60 ***KVAR*** is;
    A. 100.
    B. 140.
    C. 20.
    D. 53.
33. In a series circuit with R = 10 $\boldsymbol{\Omega}$, X_L = 25 $\boldsymbol{\Omega}$ and X_C = 35 $\boldsymbol{\Omega}$ and carrying an effective current of 5 ***A***. The power dissipated in watt is;
    A. $250\sqrt{2}$.
    B. 250.
    C. 500.
    D. 50.
34. In a three-phase, star connected system;
    A. the line and phase current are equal.
    B. the line and phase voltage are equal.
    C. line and phase voltage are 30^0 phases apart.
    D. none of the above.
35. A machine having 30 $\boldsymbol{\Omega}$ resistance and 70 $\boldsymbol{\Omega}$ impedance will have power factor of;
    A. 0.57.
    B. 0.43.
    C. 0.34.
    D. 0.55.
36. The end opposite the shaft of a motor is called
    A. torque.
    B. force.
    C. front end.
    D. end wheel.
37. DC motors are able to regulate their speed themselves with the aid of;
    A. supply voltages.
    B. back emf.
    C. rotor resistance.
    D. rotor turns.

38. Interpoles windings are connected with the armature winding in;
    A. parallel.
    B. series.
    C. star.
    D. delta.

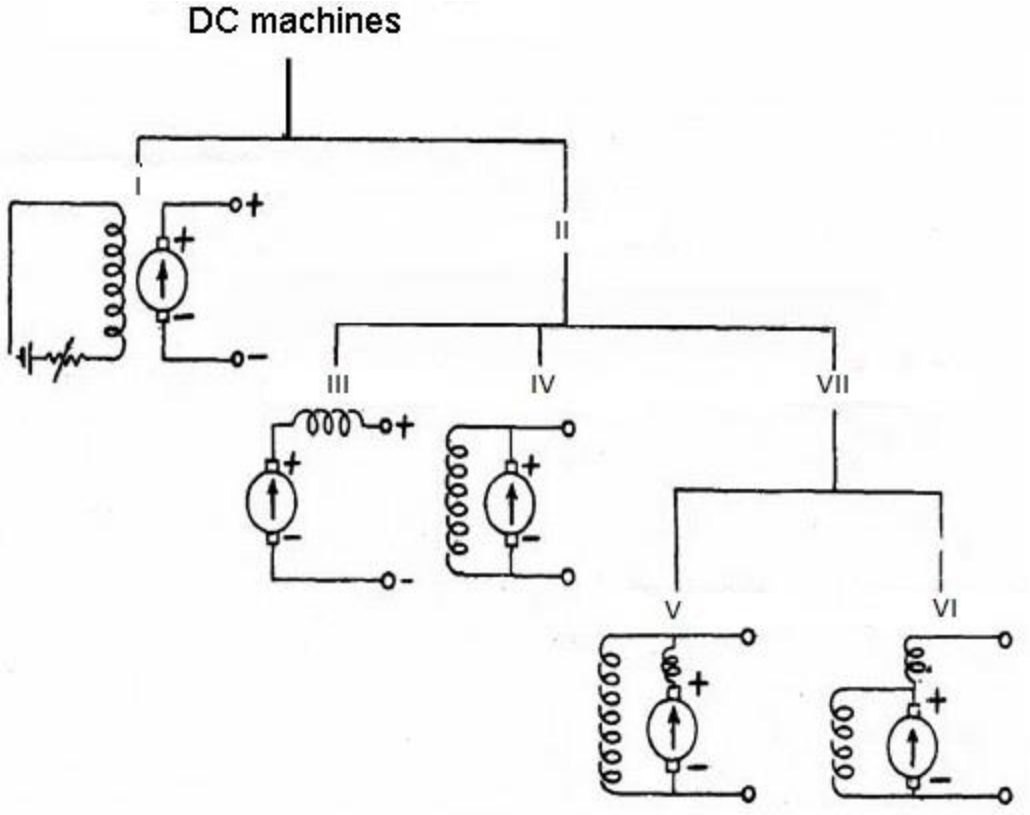
Use the information below to answer question 39-40.

A dc machine is connected to an ac supply of frequency 50 Hz. If the coil resistance and inductor are 8 ***Ω*** and 0.0191 ***H*** respectively.

39. What is the impedance of the machine when used as dc motor?
    A. 6 ***Ω.***
    B. 8 ***Ω.***
    C. 14 ***Ω.***
    D. 10 ***Ω.***
40. What is the impedance when used as an ac machine?
    A. 6 ***Ω.***
    B. 8 ***Ω.***
    C. 14 ***Ω.***
    D. 10 ***Ω.***

PART II: **THEORY PART**

Instruction: Answer question ***one*** and any other ***three***.

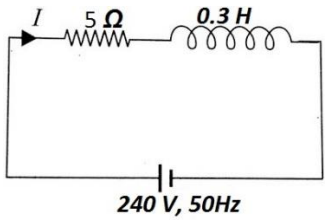


1a. What are the labels ***I***, ***II***, ***III***, ***IV, V*** and ***VI*** represent? 12 marks.

1b. The chart above shown that, the machine is classified base on -------. 2 marks.

1c. If the machine in ***IV*** supplies a load of 7.5 ***KW*** at 200 ***V***. Calculate the generated ***emf*** assuming armature resistance is 0.6 ***Ω*** and field resistance is 80 ***Ω***. 6 marks.

2a. Calculate the inductive reactance X_L for the circuit below. 4 marks.



2b. Calculate the current ***I*** in the circuit. 3 marks.

2c. With the aid of diagram only differentiate between auto-transformer and double wound transformer. 4 marks.

3a. With appropriate labeling describe the following;

i. single phase 2 wires.
ii. single phase 4 wires.
iii. 3-phase 3 wires.
iv. 3-phase 4 wires. 6 marks.

3b. Draw the 3a (iv) above in;

i. star connection.
ii. delta connection. 4 marks.

4a. What is a resonance in an ac circuit? 2 marks.

4b. List ***three*** features of circuits in resonance. 3 marks.

4c. Find the resonance frequency of an ac circuit with following parameters; R = 5 ***Ω***, L = 0.3 ***H*** and

C = 4 μ***F***. 5 marks.

5a. What is single phasing as regard 3-phase motor? 2 marks.

5b. A motor is delta connected to a 3-phase supply of 400 ***V***. What is the line voltage? 4 marks.

5c. If motor in 5b is run in star connection, what is the line current for an impedance of 40 ***Ω***. 4 marks.

6a. What are the features of an ac supply? 5 marks.

6b. With a simple graph differentiate between an ac and dc supply. 2 marks.

6c. Mention ***three*** advantages of 3-phase over a single-phase supply. 3 marks.

PART III: **PRACTICAL PART**

Instruction: Answer ***all*** *questions*.

1. Wire a point of light, a socket outlet and a ceiling fan to appropriate fuses in a fuse board. 20 marks.

2. Prepare a western union joint and provide the drawing in the space provided below. 2 marks.

3. State ***one*** safety precaution in each process.

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_____

5 marks.

4. List ***one*** areas each where such wiring in question 1 and joint in question 2 can be implemented.

_____

_____

_____

5 marks.

Student Name: _____