

**Scheme – G**  
**Sample Test Paper - I**

**Course Name : Electrical Engineering Group**

**Course Code : EE / EP / EU**

**Semester : Sixth**

**Subject Title : Testing and Maintenance of Electrical Machines**

**Marks : 25**

**17637**

**Time: 1 Hour**

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. Attempt any THREE**

**9 Marks**

- a) State the tolerance limit for the followings-
  - (i) No load current for single-phase transformer
  - (ii) Speed for three phase induction motor
  - (iii) Voltage regulation for DC generator
- b) State the factors on which severity of electric shock depends.
- c) State any three safety precautions to be followed while working with electrical installation.
- d) Draw safety symbols for the followings-
  - (i) Heat hazard
  - (ii) Explosive hazard
  - (iii) Flammable

**Q2. Attempt any TWO**

**8 Marks**

- a) Describe the procedure to carry out phasing out test on a three-phase transformer with the help of circuit diagram.
- b) Draw the equivalent circuit of rotor of three-phase induction motor and write the equation related to it and also draw the equivalent circuit of three-phase induction motor.
- c) State sequential steps to carry out moisture proofness test on single-phase induction motor.

**Q3. Attempt any ONE**

**8 Marks**

- a) A three phase, 400 Volts induction motor gave the following test readings-  
No load Test- 400 volts, 1250 watts, 9 A  
Short circuit Test - 150 volts, 4000 watts, 38 A

Draw the circle diagram. If the normal rating is 14.9 kw, Find from the circle diagram, the full – load value of current, p.f and slip.

- b) Two 2.5 KVA single-phase transformers A of 250/125 volts and B of 250/120 volts are to be loaded by fully back to back method as shown in figure 1. For each of them the ratio of reactance to resistance is  $\sqrt{3}$  and iron losses are 50 watts.
- (i) State the range of wattmeter shown at the primary side. If an ammeter is connected in the secondary winding, what should be the range of ammeter?
- (ii) When both are fed from 250 Volts supply (no additional injected e.m.f), the secondary current circulated is 20A. Find efficiency and regulation of transformer A at full load, 0.8 leading power factor.

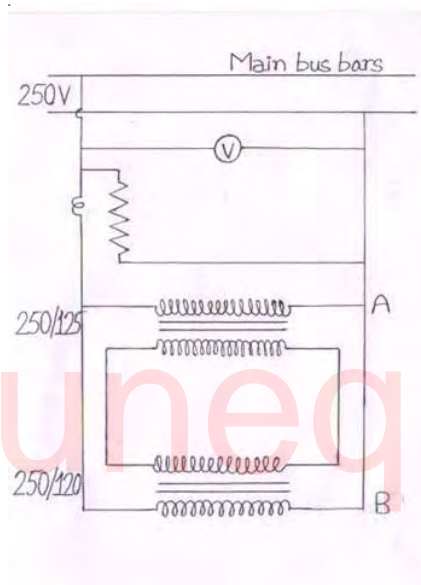


figure 1

**Scheme – G**  
**Sample Test Paper - II**

**Course Name : Electrical Engineering Group**

**Course Code : EE / EP / EU**

**Semester : Sixth**

**Subject Title : Testing and Maintenance of Electrical Machines**

**Marks : 25**

**17637**

**Time: 1 Hour**

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. Attempt any THREE**

**9 Marks**

- a) List any three causes of failure of electrical machines.
- b) State any three advantage of preventive maintenance.
- c) Name the tools for carrying out the following electrical maintenance activities.
  - i) To check out the run out of rotating parts
  - ii) To withdraw bearings
  - iii) To check the correct level of foundation
- d) State the meaning of the following terms related to transformer oil.
  - i) Fire point
  - ii) Flash point
  - iii) Viscosity

**Q2. Attempt any TWO**

**8 Marks**

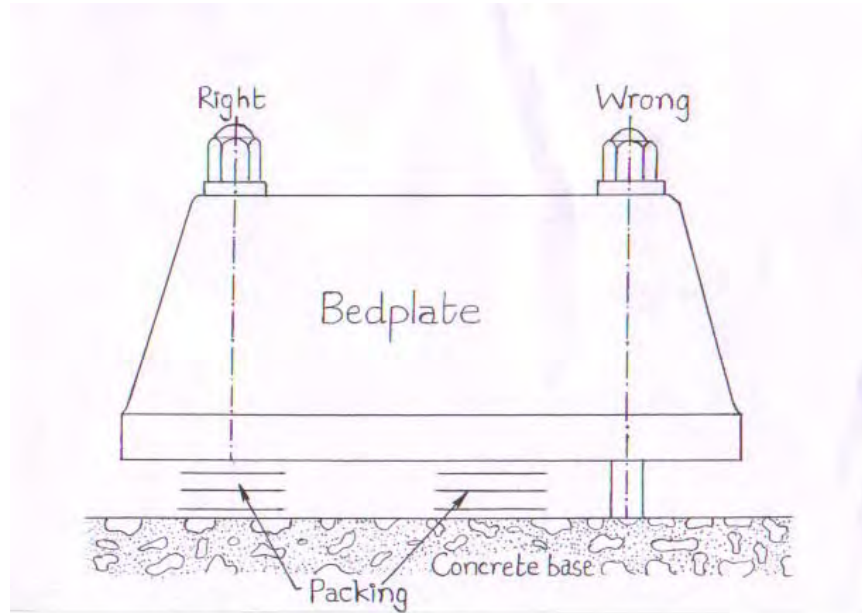
- a) What is the significance of trouble shooting chart? Give any two significances. State any one common trouble and two possible causes of trouble occur in a three- phase slip Ring induction motor.
- b) Describe the procedure of dielectric absorption test. Also state how the condition of insulation is interpreted from the test results.
- c) Compare preventive maintenance & breakdown maintenance on the basis of Schedule and activity carried out under each maintenance.

**Q3. Attempt any ONE**

**8 Marks**

- a) Answer the following questions related to transformer oil.  
What will happen if -
  - (i) It is heated up to 200°C?
  - (ii) It contains Sulphur and its compounds?

- (iii) It has high viscosity?
  - (iv) Sludging is formed in the tank of transformer oil?
- b) (i) A dc motor is observed to run slow with rated supply voltage applied. State any four possible reasons for the occurrence of trouble.
- (ii) Study the figure 1 of levelling and final alignment of direct coupled drives and Answer the following questions.



**Figure 1**

- 1) Suggest the correct position of packing pieces. (1)
- 2) What will happen if the packing pieces are not positioned property? (1)
- 3) Redraw the figure with the correction incorporated. (2)

Scheme – G  
Sample Question Paper

Course Name : Electrical Engineering Group

Course Code : EE / EP / EU

Semester : Sixth

Subject Title : Testing and Maintenance of Electrical Machines

Marks : 100

**17637**

Time: 3 Hours

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**Instructions:**

1. All questions are compulsory.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

**Q1. (A) Attempt any THREE**

**12 Marks**

a) Identify the following safety symbols.



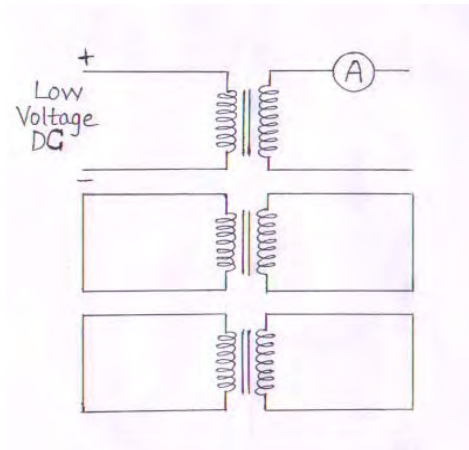
- b) State the meaning of a) Preventive maintenance b) Breakdown maintenance
- c) What is 'Polarization index'? How is it used for interpreting the condition of insulation?
- d) State any one application of Filler guage, Spirit level, growler and dial test indicator.

**Q1. (B) Attempt any ONE**

**06 Marks**

- a) State any three advantages and three disadvantages of finding out efficiency using indirect testing of electrical machines.

- b) Study the following incorrect figure 1 of phasing out test of three-phase transformer and answer the following questions.



**Figure 1**

- i) Identify the two mistakes in the above figure. (2)
- ii) Draw the correct figure. (2)
- iii) What is the significance of this test? (2)

**Q2. Attempt any TWO**

**16 Marks**

- a) Answer the following questions related to fire extinguishers
  - i) State its types? (1)
  - ii) Describe its operation. (4)
  - iii) State the type of fire extinguisher used on live circuits? (1)
  - iv) State any two the advantages of CO<sub>2</sub> extinguisher? (2)
- b) In the electrical machines laboratory following Three-phase induction motor machine is available. The specification of motor is 4-pole, 40 HP, 400 V, 50Hz, delta connected. The monthly, half yearly and annual maintenance activities had to be carried out on this motor. Prepare a detailed chart for the same.
- c) State four possible causes for each for the following troubles of a DC motor ?
  - i) Motor runs hot
  - ii) Spark occurs at the brushes
  - iii) Motor runs fast
  - iv) Motor runs slow

**Q3. Attempt any FOUR**

**16 Marks**

- a) What are the internal causes for the abnormal operation of electrical equipment ?(any four)
- b) Describe the procedure of measuring dc resistance of transformer winding with the help of circuit diagram and related formulae.
- c) Describe how you will carry out re-varnishing of insulation using hot-dip method.

- d) State the meaning of the following terms related to transformer oil.
- i) Viscosity ii) Fire point iii) Flash point iv) Sludging.
- e) In a brake test for a dc motor the effective load on the brake pulley is 265 Newtons. The effective diameter of the pulley is 650 mm. The speed is 750 rpm. The motor takes 37 Amps at 215 V. Calculate the output power and the efficiency at this load.

**Q4. (A) Attempt any THREE**

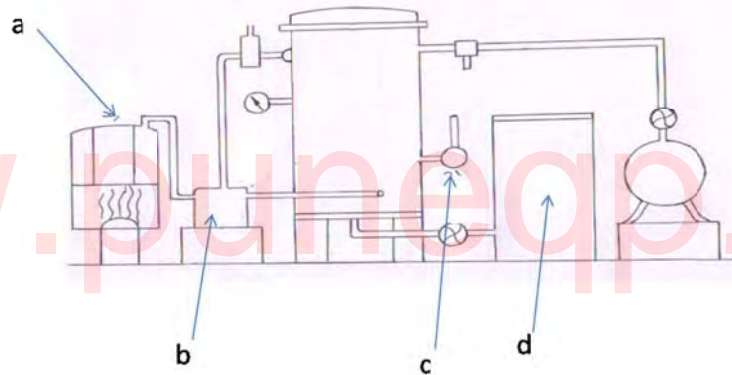
**12 Marks**

- a) "Three-phase induction motor is a generalized transformer". Justify the statement with the help of vector diagram.
- b) Describe any four methods used for reducing earth resistance.
- c) What are the requirements of foundation of transformer? (any four)
- d) What are the circumstances under which the authority should not issue the "Permit-to-work" card?

**Q4. (B) Attempt any ONE**

**06 Marks**

- a) Study the given figure 2 of vacuum impregnating plant and answer the following questions.



**Figure 2**

- i) Identify the parts a, b, c and d. (2)
  - ii) What temperatures to be maintained in the vacuum impregnating chamber during Baking? For what period it should be maintained? (2)
  - iii) State the function of parts a and b. (2)
- b) Draw the circuit diagram to find out the turns ratio of a three-phase slip ring induction motor. What stepwise procedure to be adopted to conduct this test?

**Q5. Attempt any TWO**

**16 Marks**

- a) Describe the method of purifying transformer oil with the help of general line diagram of centrifugal purifier.
- b) State sequential steps to level and align direct coupled drive. Draw necessary figure.

- c) Draw the circle diagram of 3.73 KW, 200V, 50Hz, 4 poles, 3 Phase Star connected Induction motor from the following test data:  
No load Test- Line voltage 200 V, line current 5Amps, total input 350W  
Blocked rotor Test - Line voltage 100 V, line current 26 Amps, total input 1700 W  
Find from the circle diagram for the full load condition the line current, power factor, maximum torque in terms of full load torque. The rotor copper loss at standstill is half the total copper loss.

**Q6. Attempt any FOUR**

**16 Marks**

- a) What are points to be considered while selecting the site for the location of indoor transformer as per IS 1886 ? (any four points)
- b) What precautions are essential while fitting pulleys and couplings to electrical machines' shaft as per IS 900 ?
- c) How will you find out the temperature rise of a 3 phase delta/delta connected transformer using open delta method as per IS 2026 ? Draw the related circuit diagram.
- d) How will you conduct power frequency high voltage test on transformer as per IS 2026 ? Also draw the tabular column specifying the voltage of transformer and the corresponding test voltages.
- e) Answer the following questions related to no-load test on single-phase transformer.
- Why it is advisable to use low power wattmeter in this test?
  - State, how it is possible to calculate efficiency of transformer from this test if values of winding resistance are known?