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3 Hours / 100 Marks Seat No. | | | | | | | | |

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) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any THREE of the following:** **12**

(i) State the factors on which severity of electric shock depends. Also state the effect of current on human system.

(ii) Why is the maintenance of electrical equipments necessary? State different catagories of maintenance.

(iii) Define the term 'Polorization Index'. How is it used for interpreting the condition of insulation.

(iv) State the limits of voltage current frequency and speed for the safe working of electrical machines?

Marks

b) **Attempt any ONE of the following:** **6**

(i) State the objectives of testing? Explain the roles of BIS (Bureau of Indian standards) in testing of Electrical Equipments.

b) How will you conduct the phasing out test on a 3 phase transformer as per IS 2026? Explain with necessary circuit diagram.

2. Attempt any TWO of the following: **16**

a) What precautions should be taken to avoid fire due to electrical reasons? Explain the operation of fire extinguishers.

b) Explain the maintenance schedule of distribution transformer as per ISS 10028-1981.

c) Give probable causes and remedies for the following troubles in 3-phase induction motor?

(i) Motor runs hot

(ii) Motor runs slow

(iii) Excessive sparking between brushes and slip rings in slip ring I.M.

(iv) Motor vibrates.

3. Attempt any FOUR of the following: **16**

a) State the objectives of high voltage test on 3-phase I.M.? Explain the procedure of carrying out H.V. test on 3-phase I.M.

b) Short circuit test with secondary S_1, S_2 shorted are conducted on single phase 2.5 kVA, 250/125V transformer. The following readings are obtained at 30°C.
Current = 8 Amp; Voltage applied = 36 volts
Power = 128 watts.
Assuming full load winding temperature as 75° C, Calculated Resistance, impedance and full load loss of the transformer at working temperature of 75°C.

Marks

c) State the different methods of purifying and filtration of insulating oil. Explain any one in brief. (Diagram not necessary)

d) Classify the insulating materials as per IS 1271-1985 as per the operating temperature with two examples of each classification.

e) State the Internal and External causes for failure/Abnormal operation of equipments. (four causes of each)

4. a) **Attempt any <u>THREE</u> of the following:** **12**

(i) Discuss about the 'Electrical Safety' as per IE Rules 1956.

(ii) Describe the 'moisture proofness' and 'leakage current' test on single phase induction motor?

(iii) List the devices and tools required for loading unloading; lifting and carrying heavy electrical equipments. (any eight)

(iv) What are the requirements for installation of transformers with respect to

1) Location

2) Facilities for maintenance.

b) **Attempt any <u>ONE</u> of the following:** **6**

(i) Explain with circuit diagram the open circuit voltage ratio test on 3-phase slip ring induction motor.

(ii) Explain in brief, how the cleaning of Insulation covered with loose dry dust; sticky dirt; oily viscous film is carried out. Also describe the methods of drying of electrical insulation by external heat method.

Marks

5. Attempt any TWO of the following: **16**

a) A three phase, 415 volts; 5.5 kW induction motor tested for circle diagram gave the following results. Power was measured by two wattmeter method.
No load test:- 415 V; 4.6 Amp; W_1 = 1000 W; W_2 = –560 watts.
Blocked rotor test:- 98 V; 10 Amps; W_1 = 770 W; W_2 = –160 watts.
Using scale 1 cm = 2 Amp find power scale. Estimate efficiency and current (magnitude and p.f.) at full load and maximum output.

b) Explain with sketch or figure: wherever possible; in brief the following tests conducted on Transformer oil:-

(i) Dielectric strength test

(ii) Acidity test

c) Explain with labelled neat diagram:-

(i) Plate earthing as per IS with components

(ii) Also give the difference between installation earthing and system grounding.

6. Attempt any FOUR of the following: **16**

a) Define the tolerances? Give the values of tolerances for power Transformer as per IS 2026-2011.

b) List the Routine tests conducted on synchronous generator as per IS 7132-1973.

c) Describe the factors affecting the preventive maintenance schedule.

d) Describe the procedure for levelling and aligning of direct coupled drive.

e) Describe the requirements of foundation for rotating electrical machinery.

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