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B. TECH.

THEORY EXAMINATION (SEM–VI) 2016-17 CONVENTIONAL & CAD OF ELECTRICAL MACHINES

Time: 3 Hours Max. Marks: 100

Note: Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION-A

1 Explain the following:

 $(10 \times 2 = 20)$

- a) What are the limitations in designing of machines?
- b) Write output design equation of core and yoke of a transformer.
- c) What is specific electrical loading?
- d) Give classification of insulating materials.
- e) Write down the factors affecting the size of rotating machines.
- f) Give basic difference between single layer and two layer winding.
- g) Define standardization.
- h) Write down the advantages and limitations of computer aided design.
- i) Define electrical specific loading
- j) Define dielectric losses.

SECTION-B

2 Attempt any five of the following:

 $(10 \times 5 = 50)$

- a) Explain the method of determination of full load mmf for a salient pole synchronous generator.
- b) Discuss an arrangement of low voltage and high voltage winding on core of 3-phase core type and 3-phase shell type transformers.
- c) Show that electrical specific loading of a rotating machine is constant provided that current density, ratio of conductor to slot area, ratio of slot width to the slot pitch and the slot depth area are constant.
- d) Explain continuous rating, short time rating and intermittent rating with reference to electrical machines
- e) Derive the output equation for a 3-phhase shell type transformer. State the assumption made. Explain why stepped ore is used in transformers.
- f) What is dielectric loss, loss angle and power factor? Explain with the help of equivalent circuit and phasor diagram.
- g) (i) What are the desired properties of magnetic materials used in electrical machines?
 - (ii) What is the effect of class of insulating materials used in electrical machines?
- h) Explain Simpson's rule to find out the ampere/turn/m in teeth of the electrical machines.

SECTION-C

Attempt any two of the following:

 $(15 \times 2 = 30)$

- Draw a flow chart and make a program to determine main dimensions, stator slots, conductor per slot, and winding details of a three-phase alternator. Mention the input data required in the programme.
- Design the stator frame for a 500 KVA, 6600 V, 50 Hz, 12-pole, star connected, three phase salient pole alternator, giving the following information:
 - (i) Internal diameter and gross lengths of stator frame.

- (ii) Number of stator conductors.
- (iii) Number of stator slots

Specific magnetic loading = 0.6 tesla

Specific electric loading = 26000 ampere conductor per meter

Assume other data needed if any.

- 5 (i) What is gap expansion factor? How does it affect the calculation of ampere turns of air gap of induction motor?
 - (ii) What changes would you suggest in the design of a 3 phase squirrel cage induction motor to achieve increased starting torque?