FACULTY OF ENGINEERING

B.E. 3/4 (E&EE) I – Semester (Old) Examination, May2013

Subject : Electrical Machinery – II

Time : 3 hours   **Max. Marks : 75**

Note: Answer all questions from Part-A and answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. For parallel operation of 1-phase transformers, what happens if polarities are connected wrongly to the bus bars.   3

2. What are the properties of transformer oil?   2

3. Write short notes on third harmonic voltages of 3-phase transformers.   3

4. Mention the applications of auto transformers.   2

5. What is synchronous speed, why 3-phase induction motor does not rotate at synchronous speed.   3

6. Show the similarities of 3-phase induction motor and transformer.   2

7. Explain the constructional features of double cage induction motors.   3

8. Mention the various starting methods of 3-phase induction motors.   2

9. How the 3-phase induction motor protected against single-phasing?   3

10. What do you understand by voltage unbalance?   2

PART – B (50 Marks)

11. Two transformers have the following particulars :

	Transformer 1	Transformer 2
Rated current	200 A	600 A
Per unit resistance	0.02	0.025
Per unit reactance	0.05	0.06
No-load emf	245 V	240 V

Calculate the terminal voltage when they are connected in parallel and supply a load impedance of $(0.25 + j0.1)\Omega$.   10

12.a) Explain the principle operation no-load tap changing transformer with neat schematic diagram.   5

b) A 5000 KVA, 3-phase transformer, 6.6/33 KV, $\triangle$/Y, has a no-load loss of 15 KW and a full-load loss of 50 KW. The impedance drop at full load is 7%. Calculate the primary voltage when a load of 3200 KW at 0.8 pf is delivered at 33 KV.   5

13. A 400 V, 30 KW, 50 Hz, delta connected 3-phase induction motor gave the following test data :　　　　10

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\begin{array}{llll}
\text{No-load test} & : & 400\ \text{V}, & 20\ \text{A}, & 1200\ \text{W} \\
\text{Blocked rotor test} & : & 90\ \text{V}, & 50\ \text{A}, & 2730\ \text{W}
\end{array}
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Construct the circle diagram and calculate line current, pf and slip for rated output. Also calculate maximum torque. Assume stator and rotor copper losses equal at standstill.

14. A 3-phase, star connected, 30 hp (rated output), 440 V, 6 pole, 50 Hz, slip ring induction motor has a stator resistance $R_1 = 0.5\ \Omega$ and rotor resistance referred to stator $R_2' = 0.5\ \Omega$. The rotational losses are 500 W and the core losses are 600 W. Assume that the change in the rotational losses due to change in the speed is minor. The motor load is constant-torque type. At full load torque, calculate (a) the speed of the motor   b) The added resistance to the rotor circuit needed to reduce the speed by 20%.   c) The motor efficiency without and with the added resistance.　　　　10

15. Explain the following in brief :　　　　10

　　a) Unbalanced operation of 3-phase transformer
　　b) Single phasing of 3-phase induction motor

16. a) Explain the Scott connected transformer with help of neat schematic diagram. 5

　　b) Explain the slip-torque characteristics of an 3-phase induction motor.　　5

17. Write short notes on the following :　　　　10
　　a) Speed control of 3-phase induction motor by pole changing method.
　　b) Maintenance of transformers.
　　c) Rotating magnetic field theory.

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