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B.E. SEMESTER VI EXAMINATION MAY/2015

SUBJECT CODE: EE-602   **SUBJECT NAME:** ELECTRICAL MACHINES-III

DATE: 01/05/2015   **TIME:** 10: 30 a.m. to 1:30 p.m.   **TOTAL MARKS:** 70

Instructions:

1. Answer each section in separate answer sheets
2. Use of scientific Calculator is permitted.
3. All questions are compulsory
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work.

Section – I

Q-1 A   Choose the Correct Option: 5
  (1) The most economical method of finding No-load losses of a large DC shunt
      Machine is _____ test.
      (a) Swinburne's (b) Hopkinson's (c) Retardation (d) None of these
  (2) For the same rating, the size of a single phase Induction motor is about ____
      that of a 3-phase Induction motor.
      (a) 3 times (b) less than (c) 1.5 times (d) 0.33 times
  (3) The least expensive fractional HP motor is _____ motor.
      (a) Shaded-pole (b) Capacitor-start (c) Split-phase (d) AC Series
  (4) If starting winding of a single phase Induction motor is left in the circuit, it
      will _____
      (a) Draw excessive current (b) Run slower (c) Run faster (d) Spark at light load
  (5) The mechanical losses in DC Machine _____ with speed.
      (a) decrease (b) Increase (c) first decrease then increase (d) remain constant

  B   Explain Brake Test with suitable circuit diagram and relevant equations.   5
  C   How the behavior of single phase motor can be understood by Double Field   5
        Revolving Theory? Explain in detail.

OR

  C   Explain the equivalent circuit of Single Phase Motor with all diagrams associated   5
        with It. Also state the equations related to it.

Q-2 A   Two shunt machines loaded for the Hopkinson's Test take 15 A at 200 V from the   5
        supply. The motor current is 100 A and the shut currents are 3 A and 2.5 A. If the
        armature resistance of each machine is 0.05 ohm, Calculate the efficiency of each
        machine for this particular load condition.
  B   Which Test is used for finding stray losses? Explain the same test with circuit   5
        diagram and equations in detail.

OR

Q-2 A   The no load test of a 44.76 kW, 220 V DC shunt motor gave the following result.   5
        Input current= 13.25 A; field current=2.55 A; resistance of armature at 75^0
        C=0.032 Ω and brush drop= 2 V. Estimate the full load current and efficiency.
  B   Explain the Field Test applicable to two similar DC Series Machine. State the   5
        advantage and disadvantage for the same.

Q-3 A Explain the construction & working of Capacitor Start-and-run Motor.   5
    B Write a Short Note: Shaded Pole Induction Motor.   5

OR

Q-3 A Explain the principle of Repulsion in detail and then explain types of it in brief.   5
    B Write a short Note: Universal Motor.   5

Section – II

Q-4 A **Choose the Correct Option:**   5
       (1) A two phase AC Servomotor has _____ rotor.
           (a) wound (b) cage (c) wound or cage (d) a rotor similar to that in DC motor
       (2) By changing the number of stator poles of a squirrel cage motor, the number of
           synchronous speeds that can be obtained practically is
           (a) 6 (b) 4 (c) 8 (d) 2
       (3) For starting an Induction motor, a star-delta switch is equivalent to an auto-
           starter of ratio ____ percent.
           (a)33.3 (b)57.7 (c)73.2 (d)60
       (4) The low torque synchros cannot be used for
           (a)torque transmission (b)error detection
           (c)Instrument servos   (d) robot arm positioning
       (5) Which of the following motor would suit applications where constant speed is
           absolutely essential?
           (a)BLDC motor (b)Disk motor (c) PMS motor (d) Stepper motor
    B Explain construction, working, Advantages & Disadvantages of Brushless DC   5
       Motor.
    C Which are the methods for starting 3-phase Induction Motor? Explain Direct-on-   5
       line starting method.

OR

    C Which are the methods for starting Squirrel cage Motor? Explain Auto-   5
       transformer starting method.

Q-5 A Which are the methods for speed control of 3-phase Induction motor when   5
       controlled from rotor side? Explain cascade operation for the same.
    B A 15 HP, 3-phase, 6-pole, 50 Hz, 400-V, delta connected induction motor runs at   5
       960 rpm on full load. If it takes 86.4 A on direct starting, find the ratio of starting
       torque to full load torque with a star-delta starter. Full-load efficiency and power
       factor are 88% and 0.85 respectively.

OR

Q-5 A What is Crawling? Explain the same with reference to Harmonic torque. Also   5
       draw Torque-speed curve.
    B The rotor of a 4-pole, 50 Hz, slip ring induction motor has a resistance of 0.30 Ω   5
       per phase and runs at 1440 rpm at full load. Calculate the external resistance per
       phase which must be added to lower the speed to 1320 rpm, the torque being the
       same as before.

Q-6 A Explain stepper motor with the help of Step angle. State all the applications of   5
       stepper motor.
    B Explain AC Servomotors with types.   5

OR

Q-6 A Explain in brief Amplidyne and Metadyne machines.   5
    B Write a note on: 3-Phase Induction Regulator.   5