PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JAN 2023

Course Code: EEE 210

Course Name: Electrical Machines-II

Program: B. Tech

Date: 30 Jan 2023

Time: 9.30AM-12.30PM

Max Marks: 100

Weightage: 50%

Instructions:

(i) Read the all the questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 2 marks.   **(10Qx 2M= 20M)**

1. In all types of transformer construction, the central iron core is constructed from of a highly permeable material made from thin silicon steel laminations. These thin laminations are assembled together to provide the required magnetic path with the minimum of magnetic losses. The most suitable material for transformer core is

    (C.O.No.1) [Knowledge]

    a) Hot Rolled Grain Oriented Steel   b) Cold Rolled Grain Oriented Steel
    c) Medium Cold Rolled Grain Oriented Steel   d) Both B and C

2. We know that due to the losses in a transformer, the output power of a transformer is less that the input power supplied. Taking the above statement, the % efficiency of transformer at the maximum efficiency condition is _____.

    (C.O.No.1) [Knowledge]

3. A distribution transformer is also known as a typical kind of isolation transformer. The main function of this transformer is to alter the high voltage to the normal voltage like 240/120 V to use in domestic loads. The efficiency of the distributed transformer can be computed in terms of all day efficiency
    (True/False)   (C.O.No.2) [Knowledge]

4. A 20MVA, 33/220KV, ONAF, BHEL make three phase Transformer is connected in Y-Y configuration. Which of the following loads it works satisfactorily.   (C.O.No.2) [Knowledge]

    a) Unbalanced b) Balanced c) Both the loads d) Independent on type of the load

5. NAVBHARAT MOTOR MFG. CO. make three phase induction motor is used for wood cutting application is having following specifications: 2HP, 1440rpm, 4 poles, 415V and 50Hz supply. While cutting the wood piece, It is required to operate at a speed of 1350 rpm. The value of slip is _____
    (C.O.No.3)[Knowledge]

    a) 0.2   b) 0.15   c) 0.1   d) 0.18

6. SIEMENS make 200HP, 48.4 A, 593 rpm, 50Hz three phase induction motor used in cement industry application to crush the lime stone. While crushing the lime stone, It is operating at slip of 0.3. The frequency of rotor induced currents is _____
   a) 15Hz   b) 25Hz   c) 50Hz   d) 45Hz   (C.O.No.3) [Knowledge]

7. In Indian railways in WDP4D locomotives are driven by 3phase AC Traction Motors, the requirement for starting torque is _____
   a) High   b) Minimum   c) Zero   d) medium   (C.O.No.3) [Knowledge]

8. The single phase induction motors are rugged and economical compared to dc motors.   The major drawback of induction motor is _____   (C.O.No.4) [Knowledge]

9. The single phase induction motor is self-starting (True/False).   (C.O.No.4) [Knowledge]

10. Single phase induction motors are widely used in domestic, agriculture and industrial applications. Usually the rating of single phase induction motors is in the range of megawatts (True/False).
                                                                    (C.O.No.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries marks.   **(2Qx10M=20M)**

11. A SIEMENS make 105MVA Transformer is used in an electric furnace to heat the iron ore. The furncae tranformer is connected in Scott connection and supplied from a 3-Phase 1100V supply and shown in Fig.1.   (C.O.No.2) [Comprehension]

Fig.1. SIEMENS make 105MVA furnace transformer

   At the time of heating the core, it is observed that the transformation ratio of both teaser and main transformers are same.
   a) Analyze the circuit and identify the problem in the teaser transformer tapings
   b) Comment on current drawn by the primary, if the loads on secondary sides are not balanced.

12. A 6kV 3Ph - 2,200 kW - 1,000 rpm, three phase squirrel cage induction motors is used for pumping the liquid in chemical industry as shown in Fig .2   (C.O.No.3) [Comprehension]

Fig.2. BHEL make 2,200kW Induction motor

a) Due to some technical problem, It is observed that the rotor is running at the same speed of the R.M.F. Identify the problem and suggest the measures to overcome it.

b) If the rotor slots are not parallel to the axis of the rotor, Comment on working of the induction motor.

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 15 marks. **(4Qx15M=60M)**

13. A BHEL company manufactures transformers according to according to IS-2026, IS-1180:2014 standards. A 40kVA, single phase transformer has 400 turns on primary side and 100 turns on the secondary. The primary is connected to 2000V, 50Hz supply. Assume the required data and draw the phasor diagram for the load of your choice and comment on the nature of flux under loading.

(C.O.No.1) [Comprehension]

14. A 20kVA, 2500/250 V, 50 Hz single phase transformer gave the following test results: OC Test (LV Side) - 250V, 1.6A, 110W; SC Test (HV Side) - 90V, 7A, 300W. Draw and Enumerate the unknown parameters of the approximate equivalent circuit referred to LV Side.   (C.O.No.2) [Comprehension]

15. In a chemical industry a SIEMENS make three phase induction motor is used and the name plate details are present in Fig. 3.   (C.O.No.3) [Comprehension]
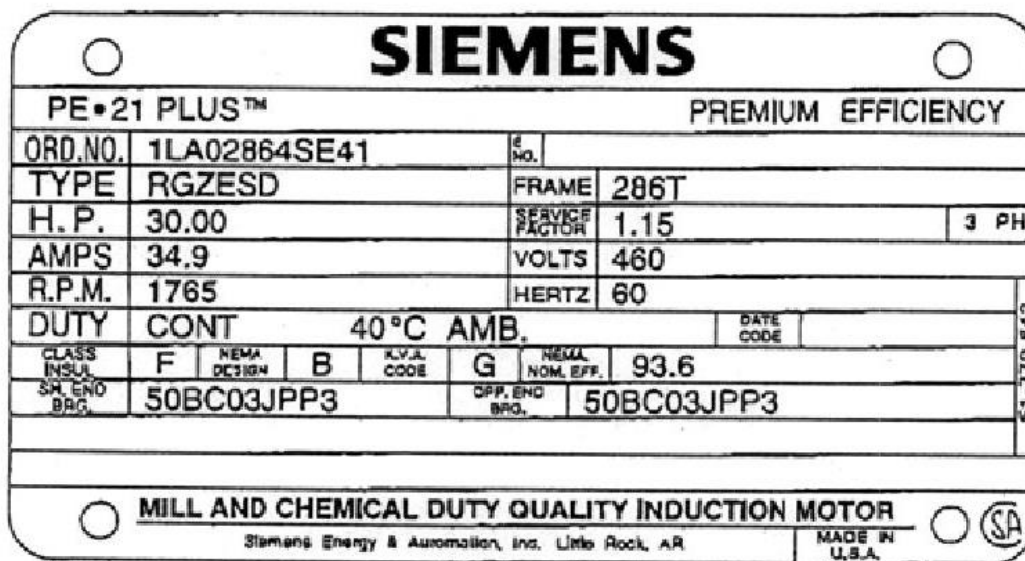

Fig.3. SIEMENS make 30HP MILL and Chemical duty quality Induction Motor

Assume the required details and compute the following parameters
   a) Synchronous speed
   b) Slip at a speed of 1500rpm(P=4)
   c) Torque at the starting if rotor resistance and reactance at standstill are 0.02ohms and 0.3 ohms.
   d) Comment on the maximum torque with the variation of rotor resistance.

16. Two tests are conducted on a three phase, 400V induction motor and produced following test results

Test 1: 400V, 1250W, 9A

Test 2: 150V, 4kW,38A

Assume the data which required and construct the circle diagram to compute the full load slip and power factor, if the normal rating is 14.91kW.

(C.O.No.4) [Comprehension]