



**PRESIDENCY UNIVERSITY
BENGALURU**
SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JAN 2023

Course Code: EEE 2006

Date: 24-Jan-2023

Course Name: Electrical Machines

Time: 9.30AM-11.30AM

Program : B. Tech

Max Marks: 60

Weightage: 30%

Instructions:

- (i) Read the all the questions carefully and answer accordingly.
- (ii) Use scientific Calculator only

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M= 20M)

1. A d.c motor is an electromechanical energy conversion device which converts mechanical energy into electrical energy. Write the energy balance equation which satisfies the conversion. (C.O.No.1) [Knowledge]
2. There are two ferromagnetic materials namely A and B. When the magnetic field intensity is zero, material A has zero flux and B has a flux of 8mWb, suggest the suitable material for the construction of separately excited generator. (C.O.No.1) [Knowledge]
3. A d.c motor is used in stone cutting application, suitable method to control the speed of the motor at above rated speed is _____ (C.O.No.1) [Knowledge]
4. 2 kVA, 230/115V single phase transformer is used in India at a frequency of 50Hz, the same transformer is used in USA at a frequency of 60Hz. The iron losses are same (TRUE/FALSE) (C.O.No.2) [Knowledge]
5. A power transformer is used in generating stations and transmission substation at a voltage level of 400 kV or 200 kV or 110 kV or 66 kV or 33 kV and designed for an efficiency of above 95%. The efficiency of the power transformer can be computed in terms of all day efficiency (True/False) (C.O.No.2) [Knowledge]
6. A Crompton Greaves make three phase induction motor is used for sugar cane crushing application is having following specifications: 2HP, 1440rpm, 4 poles, 415V and 50Hz supply. While cutting the 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

7. 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 0.03. If the standstill rotor induced emf per phase is 210V, the rotor induced emf is _____
 a) 63V b) 50V c) 210V d) 65V (C.O.No.3) [Knowledge]
8. 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]
9. ABB make, three-phase, 4-pole, 15kV, 85,000kVA alternator is used in industrial applications. Stationary field and rotating armature is preferable for the alternator (True/False). (C.O.No.4) [Knowledge]
10. List out the applications of Synchronour motors in present industry. (C.O.No.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks.

(2Qx10M=20M)

11. Uttham Bharat, a transformer manufacturing company in India which produces up to 100MVA. A three phase 160kVA transformer is shown in Fig 1. When the transformer in loaded condition, it is observed that the color of silica gel in a breather has turned in to pink color.
 As an engineer, identify the reason for the same and forecast the consequences. List out the parts of a transformer. (C.O.No.2) [Comprehension]



Fig.1 Three phase 160kVA , oil cooled transformer.

12. ABB Make three-phase, 16-pole, 85,000kVA alternator is used in industrial applications. Identify the problems, if the alternator has used rotating armature and stationary filed structure and also compute the per phase induced emf, if it is star connected with 144 slots and 10 conductors per slot. The flux per pole is 0.03Wb, sinusoidal distributed and speed is 375 rpm. (Assume k_c and k_d as unity). (C.O.No.4) [Comprehension]



Fig.2. ABB make alternator

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TEN marks.

(2Qx10M=20M)

13. The open circuit characteristic of a dc shunt motor with a field resistance of 100ohms and driven at 1000 rpm is as follows.

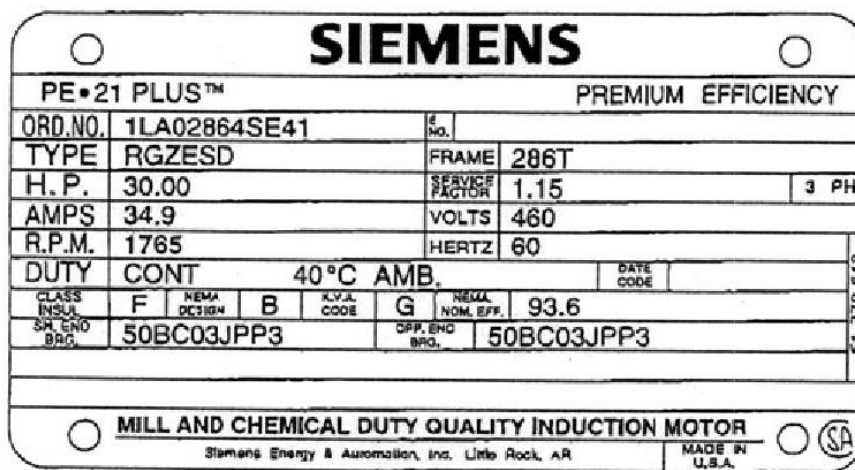
Field current(A)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6
Generated emf(V)	30	55	75	90	100	110	115	120

Compute the maximum resistance to generate the emf ?

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

14. 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]



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

Assume the required details and compute the following parameters

- Slip at a speed of 1200rpm(P=4)
- Torque at the starting if rotor resistance and reactance at standstill are 0.02ohms and 0.3 ohms.
- Comment on the maximum torque with the variation of rotor resistance.