Roll No												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 1

Winter Semester: 2021 - 22
Course Code: EEE2006
Course Name: Electrical Machines
Program & Sem:EEE & IV Sem

Date: 25th April 2022
Time: 3.00 PM to 4.00 PM
Max Marks: 30
Weightage: 15%

Instructions:
(i) Read the all questions carefully and answer accordingly.
(ii) Use scientific calculator only

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries ONE mark. (6Qx 1M= 06M)

1. A d.c generator 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 to control the wiper in car. Mention the rule to understand the motion of the shaft. (C.O.No.1) [Knowledge]
4. The voltage build up process of an electrical d.c generator is
   a) difficult
   b) delayed
   c) cumulative
   d) infinite (C.O.No.1) [Knowledge]
5. A d.c shunt motor used in stone cutting application. The rated armature current of the motor is 50A, during the operation, it is required to operate at 3/4th rated torque, what would be the value of armature current? (C.O.No.1) [Knowledge]
6. List out a few applications of d.c shunt motor (C.O.No.1) [Knowledge]

Part B [Thought Provoking Questions]

Answer the Question. Question carries TEN marks. (1Qx10M=10M)

7. HATZ 1B50 diesel make, A shunt wound separately excited dc generator is used for the battery charging as shown in Fig.1. The generator develops a voltage of 48 volts at a field current of 0.9 A. At the time of charging the battery, it is observed that the machine has failed to develop the voltage. As an engineer, mention the technical reasons for the same and suggest the methods of trouble shooting. (C.O.No.1) [Comprehension]

Fig.1 d.c shunt generator for battery charging.

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries SEVEN marks. (2Qx7M=14M)

8. The open circuit characteristic of a dc shunt motor with a filed 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]

9. Z Series make Shunt Wound motor DC Motor is used for rolling mill applications. The specifications are 750V dc, 1500KW, 600RPM, 50A and shown in Fig 2.. The armature and shunt field resistances are 0.5 and 400 ohms respectively. In the process of rolling the sheet, the motor torque is reduced to half. What would be the new speed of the motor?
(C.O.No.1) [Comprehension]

Fig.2. Z Series rolling mill motor Shunt Wound motor

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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST-2

Winter Semester: 2021 - 22
Course Code: EEE 2006
Course Name: Electrical Machines
Program & Sem:EEE & IV

Date: 31st May 2022
Time: 3.00 PM to 4.00 PM
Max Marks: 30
Weightage: 15%

Instructions:
(iii) Read the all questions carefully and answer accordingly.
(iv) Use scientific calculator only

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. (5Qx 2M= 10M)

1. The efficiency of a transformer is reflected in power (wattage) loss between the primary (input) and secondary (output) windings. The efficiency of the transformer can be computed if the known parameters are _____

(C.O.No.2) [Knowledge]

a) Rated Output b) Iron losses c) Copper losses d) All of the above

2. 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 in between 80% to 90%. (True/False)

(C.O.No.2) [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.2) [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. List out a few applications of Transformers (C.O.No.2) [Knowledge]

Part B [Thought Provoking Questions]

Answer the Question. The question carries TEN marks. (1Qx10M=10M)

6. 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 colour. As an engineer, identify the reason for the same and forecast the consequences. List out the parts of a transformer.

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

Part C [Problem Solving Questions]

Answer the Question. The question carries TEN marks. (1Qx10M=10M)

7. The primary and secondary winding resistances of 30kVA, 6600/250V, Single phase transformer are 8Ω and 0.15Ω respectively. The equivalent reactance referred to primary is 30Ω. Compute the full load voltage regulation at 0.8pf lagging load and comment on it.
(C.O.No.2) [Comprehension]

Roll No												

PRESIDENCY UNIVERSITY
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SCHOOL OF ENGINEERING

END TERM EXAMINATION

Winter Semester: 2021 - 22
Course Code: EEE 2006
Course Name: Electrical Machines
Program & Sem: B. Tech & IV Sem

Date: 28th June 2022
Time: 9:30 AM to 12:30 PM
Max Marks: 60
Weightage: 30%

Instructions:
(v) Read the all the questions carefully and answer accordingly.
(vi) Use scientific calculator only.

Part A [Memory Recall Questions]

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

8. A d.c generator 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]
9. 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]
10. A d.c motor is used to control the wiper in car. Mention the rule to understand the motion of the shaft. (C.O.No.1) [Knowledge]
11. 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 a normal efficiency (True/False) (C.O.No.2) [Knowledge]
12. A d.c motor is used in stone cutting application, suitable method to control the speed of the motor at below rated speed is _____ (C.O.No.2) [Knowledge]
13. 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]
14. 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
15. 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]

16. 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]
17. List out the applications of Synchronour motors in present industry. (C.O.No.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries TEN marks. (2Qx10M=20M)

18. HATZ 1B50 diesel make, A shunt wound separately excited dc generator is used for the battery charging as shown in Fig.1. The generator develops a voltage of 48 volts at a field current of 0.9 A. At the time of charging the battery, it is observed that the machine has failed to develop the voltage. As an engineer, mention the technical reasons for the same and suggest the methods of trouble shooting. (C.O.No.1) [Comprehension]
19. 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.1 d.c shunt generator for battery charging.

Fig.2. ABB make alternator

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries TEN marks. (2Qx10M=20M)

20. The primary and secondary winding resistances of 30kVA, 6600/250V, Single phase transformer are 8Ω and 0.15Ω respectively. The equivalent reactance referred to primary is 30Ω. Assume the required data and compute the full load voltage regulation at 0.8pf lagging load. (C.O.No.2) [Comprehension]
21. Two tests are conducted on a three phase, 200V induction motor and produced following test results
    Test 1: 200V, 350W, 5A
    Test 2: 100V, 1750,26A
    Assume the data which required and construct the circle diagram to compute the full load input current and power factor, if the normal rating is 3.7kW. (C.O.No.3) [Comprehension]