



**ACE**  
Engineering College  
(with a Difference in Excellence)

An AUTONOMOUS Institution

Question Paper Code:

EE304PC

ACE-R20

**Semester Supplementary Examination**  
**II B. Tech- I Semester- SEPTEMBER-2022**  
**ELECTRICAL MACHINES-I**  
**(ELECTRICAL AND ELECTRONICS ENGINEERING )**

Time: 3 Hours

Max. Marks: 70

H. T. No

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Mark
1. a)	Distinguish between external and internal characteristics of DC Generators.	7
b)	A 10kW, 6 pole DC Generator develops an e.m.f of 200V at 1500 rpm. The armature has a lap- connected winding. The average flux density over a pole pitch is 0.9T. The length and diameter of the armature are 0.25m and 0.2m respectively. Calculate the flux/pole the torque developed by the machine.	7
2. a)	i) Explain the concept of commutation processes and write the types of commutation.	4
	ii) A commutator with a diameter of 50cm rotates at 1000rpm. For a brush width of 1.5cm, find the time of commutation.	3
b)	In a DC compound generator the armature, shunt-field winding and series field winding resistances are given by 0.6 ohm, 150 ohms and 0.3 ohms respectively. The machine is connected to a load of 15 kW, 200 V. Find the i) EMF generated ii) armature current and iii) power generated by armature when the machine is connected in Long shunt mode.	7
3. a)	Explain principle of operation of DC motor with a neat sketch.	7
b)	Explain working of 3- point starter.	4
		3
4. a)	Explain the procedure of conducting brake test on d.c. machine with a neat circuit diagram.	7
b)	A 440V DC Shunt motor takes 4A at no load. Its armature and field resistances are 0.4Ω and 220Ω respectively. Estimate the kW output and efficiency when the motor takes 60A on full load.	7
5. a)	With the help of neat sketch, explain about swinburne's test.	7
b)	A 400V d.c shunt motor takes 5A at no-load. Its armature resistance is 0.5ohm and shunt field resistance is 200ohm. Estimate the KW output and efficiency when the motor takes 50A on full load and also find the percentage change in speed from no to full load.	7
6. a)	Draw the exact equivalent circuit of a transformer and describe briefly the various parameters involved in it.	7

6.b)	<p>A 40 KVA single phase transformer has got maximum efficiency of 97 % at 80 % of full load at UPF. During the day, the load on the transformer is as follows.</p> <table border="1" data-bbox="268 235 1018 383"> <thead> <tr> <th>No. of hours</th> <th>Load</th> <th>Power factor</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>16 KW</td> <td>0.6 lag</td> </tr> <tr> <td>10</td> <td>25 KW</td> <td>0.8 lag</td> </tr> <tr> <td>7</td> <td>30 KW</td> <td>0.9 lag</td> </tr> </tbody> </table> <p>Determine the All day efficiency of the transformer.</p>	No. of hours	Load	Power factor	8	16 KW	0.6 lag	10	25 KW	0.8 lag	7	30 KW	0.9 lag	7
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8	16 KW	0.6 lag												
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7. a)	Exaplin how to perform OC and SC tests on a single phase transformer.	7												
b)	<p>The OC and SC test data of 4 kVA, 200/400V, single phase transformer when supplying full load at 0.8 lagging p.f is given below.</p> <p>OC test: 200V, 0.8A, 70W (HV open circuit)</p> <p>SC test: 20V, 10A, 60W (LV short circuit)</p> <p>Calculate efficiency at a) full load, b) ½ Full load and c) Voltage regulation at Full load.</p>	7												
8. a)	Explain the working of single phase auto transformer with neat diagrams? Derive an expression for saving of copper in it when compared to ordinary two winding transformer?	7												
b)	Give the comparison of autotransformer with two winding transformer on various aspects.	7												