

Enrollment No. _____



**NAVACHANA
UNIVERSITY**
a UGC recognized University

School: School of Engineering and Technology
 Program/s: B.Tech EEE
 Year: 4th Semester: 8th
 Examination: End Semester Examination
 Examination year: May 2023

Course Code: EE 424 Course Name: Electrical Machine Design II
 Date: 16/5/2023
 Time: 10:00 am to 12 noon

Total Marks: 40
 Total Pages:

Instructions:

- Write each answer on a new page.
- Use of a calculator is permitted/not permitted.
- * COs=Course Outcome mapping. # BTL=Bloom's Taxonomy Level mapping

Q. No.	Attempt any Eight	Marks	COs*	BTL#
Q.1	Derive the output equation of an Alternator.	5	CO1	BT1, BT2
Q.2	Find the main dimensions of a 100 MVA, 33kV, 50 Hz, 187.5 rpm, 3 phase water wheel alternator. The average gap density is 0.60 wb/m ² and the ampere conductor per meter is 40000. The peripheral speed should not exceed 60 m/s.	5	CO4	BT2, BT3, BT4
Q.3	Define SCR and its importance in designing of synchronous machine.	5	CO2	BT3, BT4
Q.4	Determine the main dimensions and turns per phase of a 3 MVA, 11 kV, 50 Hz, 32 pole three phase star connected alternator. Assume average gap density of 0.55 wb/m ² and the ampere conductor per meter is 30000, winding factor 0.955. Use L/τ ratio of 1.2.	5	CO3, CO4	BT2, BT3, BT4
Q.5	The following data for a 1250 kVA, 0.8 p.f., 50 Hz, 3300 V, 300 rpm star connected alternator is available: Stator turns per phase 150, field turns per pole 60, effective area per pole 0.09 m ² , length of air gap 5.5 mm, field current for full load short circuit current 80 Ampere, ATs per pole for iron portion is 20 % of air gap. Estimate the value of SCR and synchronous reactance.	5	CO4	BT2, BT3, BT4
Q.6	Explain the role of damper winding in (i) synchronous machine (ii) synchronous motor with relevant equations.	5	CO3, CO4	BT1, BT2
Q.7	Discuss in steps the design of filed winding of a salient pole synchronous machine.	5	CO4	BT1, BT2
Q.8	Find the main dimensions of a 50 kW, 4 pole, 250 V, 600 rpm, DC shunt generator from the given data: Ratio of pole arc to pole pitch 0.67, average gap density 0.6 wb/m ² , specific electric loading 30000, full load voltage drop 8 volts, shunt field current 2.5 Amp, square pole shape is used.	5	CO1, CO2	BT1, BT3, BT6
Q.9	How to select number of Pole in DC machine? Mentioned merits and demerits of more number of poles.	5	CO2	BT1, BT3