

2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

II B.TECH. I SEMESTER REGULAR EXAMINATIONS

ELECTRICAL SCIENCE

(COMMON TO ELECTRONICS & COMMUNICATION ENGINEERING, CHEMICAL ENGINEERING, ELECTRONICS & INSTRUMENTATION ENGINEERING, BIO-MEDICAL ENGINEERING, INFORMATION TECHNOLOGY, ELECTRONICS & CONTROL ENGINEERING AND METALLURGY & MATERIAL TECHNOLOGY)

MAY 2005

TIME: 3 HOURS
MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Derive an expression for co-efficient of coupling.
(b) Two coils having the inductances of 0.12 milli henries and 0.072 milli henries and their mutual inductance is 1.15H. Find coupling co-efficient.
2. (a) Define peak factor, form factor.
(b) Calculate form factor for the sinusoidal wave form.
3. (a) With neat sketches, explain the construction and functions of the various parts of a d.c. machine.
(b) Calculate the emf generated by a 6 pole lap wound armature with 65 slots and 12 conductors per slot, when driven at 1000 rpm. The flux/pole is 0.02 Wb.
4. (a) Derive an expression for the torque developed in N-m and in Kg-m in a dc motor.
(b) Determine the value of torque in Kg-m developed by the armature of a 6-pole wave-wound motor having 492 conductors, 30mwb per pole when the total armature current is 40A.
5. (a) How do you classify the transformers based on constructions and why the Transformer core is laminated.
(b) A250/500V transformer gave the following test results. Short circuit test: 20V; 12A, 100Watts on HV side Open circuit test: 250V, 1A, 80Watts on LV side Calculate the efficiency when the output is 10A , 500V and 0.8 power factor lagging.
6. (a) Explain the construction of squirrel-cage, and phase- wound induction motors. Mention their applications.
(b) A 3-phase induction motor has 0.06 ohm rotor resistance, and 0.30hm standstill resistance per phase. Find the additional resistance required in the rotor circuit to make the starting torque equal to the maximum torque of the motor.
7. (a) Explain Pessimistic method of finding regulation of a given alternator.
(b) The effective resistance of a 2200V, 50Hz, 440KVA, !-phase alternator is 0.5 Ohms. On short circuit a field current of 40 Amps gives the full load current of 200Amps. The EMF on open circuit with the same field excitation is 1160V.

Calculate

- i) Synchronous impedance
- ii) Synchronous reactance

iii) % regulation at 0.707 PF leading

8. A voltmeter is connected across a circuit consisting of a milliammeter in series with an unknown resistor R. If the readings on the instruments are 0.8V and 12Ma respectively and if the resistance of the milliammeter is $6\ \Omega$, calculate

(a) The true resistance of R and

(b) The percentage error had the resistance of the milliammeter b

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