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Code No.: 11017 O

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (CBCS) I-Semester Backlog Examinations, December-2017

Basic Electrical Engineering
(CSE, ECE & IT)

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. State Ohm's law with assumptions.
2. Define Lenz's law.
3. Write power factor for pure resistive, pure capacitive and pure inductive circuits.
4. Two magnetically coupled coils have self-inductances $L_1 = 100\text{mH}$ and $L_2 = 200\text{mH}$. If the coefficient of coupling is 0.86, calculate mutual inductance between coils and also find maximum possible mutual inductance between coils.
5. List the types of excitations of DC generators.
6. Write the speed control methods for DC shunt motor to control the speed below and above rated speed.
7. Distinguish between slip-ring and squirrel cage three phase induction motors.
8. Define regulation of single phase transformer.
9. Write the function of penstock pipes in Hydro power plant.
10. Write the applications of capacitor type single phase induction motors.

Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) Define and explain Norton's theorem.
b) Two batteries A and B having EMFs of 12 V and 8 V and their internal resistances are 2 Ohms and 1 Ohm respectively. When they are connected in parallel across 10 Ohms resistance find
 - i) Current in each battery and external resistance
 - ii) Potential drop across external resistor.
12. a) Define Self-inductance, Mutual inductance of an electromagnetic circuit. And also derive the coefficient of coupling.
b) A 3-phase AC circuit is connected in delta with 3Ω of resistance and 4Ω of reactance in each phase with 415V, 50 Hz between lines. Find the power factor, active power and reactive drawn by this circuit.
13. a) Discuss the constructional features and explain various parts of a DC generator with neat sketch.
b) A 220V DC shunt motor having an armature resistance of 0.5 Ohms carries an armature current of 25A and runs at 500 RPM. If the flux is reduced by 5% by field regulator, find the speed assuming load torque remains the same.

Contd... 2

14. a) Derive the EMF equation of an Alternator.

b) A 30 KVA, 2200/200 V, single phase 50 Hz Transformer has a primary resistance of 4 Ohms and reactance of 5 Ohms. The secondary resistance and reactance are 0.01 Ohms and 0.02 Ohms respectively. Find

- i) the equivalent resistance, reactance, impedance referred to the primary side
- ii) total copper loss in the transformer.

15. a) Explain the working of nuclear power plant with a neat schematic.

b) Explain the working of Capacitor start and run single phase induction motor.

16. a) Explain the procedure to find current in a circuit using Kirchhoff's Voltage law.

b) Derive RMS and Average voltages for the given sinusoidal supply voltage $V_m \sin(\omega t)$.

17. Answer any *two* of the following:

- a) Derive torque equation of DC motor.
- b) Explain about rotating magnetic field theory in three phase induction motor.
- c) Explain the working principle and applications of Stepper motor.

