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Total No. of Questions : 6]   [Total No. of Printed Pages : 10

EX-85

B.Tech. IInd Semester (CSE, IT & Elect.)
Examination, 2022-23
Basic Electronics Engineering
Paper – BE-202

Time : 3 Hours]   [Maximum Marks : 60

Note :- Scientific calculator is required. All parts in question no. 1 are compulsory, internal choice is given in other questions. All parts of a question/section should be answered at one place.

1. Choose any one :

(i) Identify the passive elements among the following

(a) Voltage Source

(b) Current Source

(c) Inductor

(d) Transistor

(ii) The Reciprocity Theorem is applicable for ___

(a) Single-source networks

(b) Multi-source networks

(c) Both single and Multi-source networks

(d) Neither single nor multi-source networks

(iii) A circuit of a resistance R in series with a capacitive reactance of $60\,\Omega$. Determine the value of R for which the power factor of the circuit is 0.8.

(a) $45\,\Omega$

(b) $60\,\Omega$

(c) $80\,\Omega$

(d) $75\,\Omega$

(iv) In a delta connected system, the expression of power (P) is ?

(a) $V_L I_L \cos\varphi\,W$

(b) $\sqrt{3}\, V_L I_L \cos\varphi\,W$

(c) $3 V_L I_L \cos\varphi\,W$

(d) $3\sqrt{3}\, V_L I_L \cos\varphi\,W$

(v) The inductive reactance of a transformer depends on

(a) Electromotive force

(b) Magnetomotive force

(c) Magnetic flux

(d) Leakage flux

(vi) The unit of magnetic flux is -

(a) Henry

(b) Weber

(c) Ampere turn/mT

(d) Ampere/meter

(vii) The speed of a 4-pole, 60Hz synchronous machine wil be

(a) 1800 rpm

(b) 2400 rpm

(c) 3000 rpm

(d) 3600 rpm

(viii) The slip of an induction motor does not depend on -

(a) Rotor speed

(b) Synchronous speed

(c) Shaft torque

(d) Core loss component

(ix) For a 6-pole wave wound DC generator the number of parallel path will be -

(a) 12

(b) 6

(c) 4

(d) 2

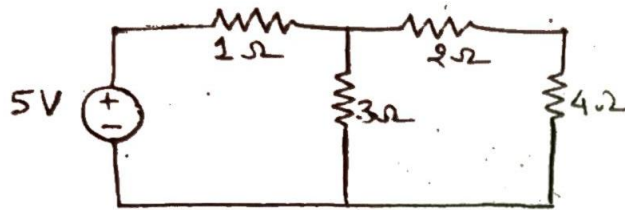(x) The segments of the commutator of a DC machine are made of

(a) Brass

(b) Copper

(c) Carbon

(d) Silicon steel

2. (a) Determine the current through each branch using Maxwell's loop method in Fig. 1.

(b) State and explain Thevenin's Theorem.

OR

(a) Develop the relation for star-delta conversion.

(b) Explain the Structure of Electrical Power System.

3. (a) A coil of resistance 40 Ω and inductance 0.75 H form part of a series circuit for which the resonant frequency is 55 Hz. If the supply voltage is 250 V, 50 Hz, find the following-

(i) the line current,

(ii) the power factor,

(iii) the voltage across the coil.

(b) Derive the expression for current and power in pure resistive and pure inductive circuits.

OR

(a) Two wattmeters are used for measuring the power input and power factor of an over-excited synchronous motor. If the readings of meters are -2.0 kW and 7.0 kW respectively, calculate the input and power factor of motor.

(b) What is an admittance triangle ? Define all the three components along with formulas involved.

4. (a) Two coils are wound on a magnetic circuit of 50 sq.cm. cross section and mean length of 100 cm. One coil has

80 turns and other has 700 turns. Calculate the mutual inductance of the coils, if the relative permeability of iron path is 1500.

(b) Derive the expression for dynamically induced emf.

OR

(a) Define efficiency and voltage regulation of transformer.

(b) A 200 kVA, 2500/250V, 50 Hz single phase transformer gave the following results -

OC test (LV side) : 250 V, 1.5 Amp, 105 W

SC test (HV test) : 104 V, 8 Amp, 320 W.

Calculate the parameters of equivalent circuit of transformer to LV side, and draw the equivalent circuit.

5. (a) Derive an expression for generated emf in DC generator.

(b) Calculate the no load terminal voltage of a 3-phase, 4 pole, star connected alternator running at 1500 rpm, having flux per pole of 66 m Wb. The machine has 72 armature slots, 10 conductors per slot. The winding factor is 0.96.

OR

(a) Develop an equivalent circuit of a 3-phase induction motor.

(b) The power input to a 230 V, DC shunt motor is 8.477 kW. The field resistance is $230\,\Omega$ and armature resistance is $0.28\,\Omega$. Find the input current, armature current and back emf.

6. (a) Explain the operating principle of circuit breaker.

(b) What do you understand by fault in a power system, explain ?

OR

(a) What is the requirement of Power Grid ?

(b) Explain the principle of Buchholz relay, also write its limitation.

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