



Printed Pages : 7

EEE101

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2301

Roll No.

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B.Tech

**(SEM I) ODD SEMESTER THEORY EXAMINATION 2009-10
ELECTRICAL ENGINEERING**

Time : 3 Hours]

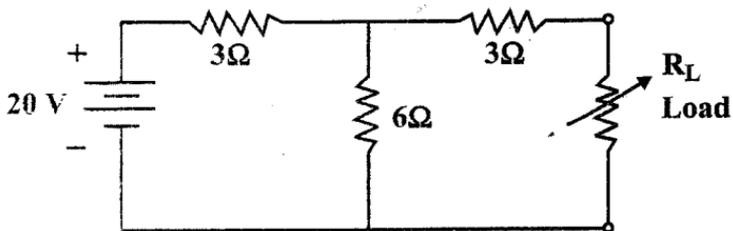
[Total Marks : 100

SECTION - A

1 Attempt all parts of the following : 10×2=20

(Fill in the blanks/choose/match)

- (i) The maximum power that can be supplied to the load in the following circuit is



- (a) 10 W
 (b) 20 W
 (c) 30 W
 (d) 40 W

- (ii) The coupling between two magnetically coupled coils is said to be the ideal if the coefficient of coupling is
- (a) Zero
 - (b) 0.5
 - (c) 0.75
 - (d) 1
- (iii) A sinusoidal current having rms value of $8 \angle 0^\circ$ A is added to another sinusoidal current of rms value $6 \angle 90^\circ$ A. The rms value of the resultant current is _____
- (iv) Which of the following conditions is common to both series and parallel resonance?
- (a) current is maximum
 - (b) power is low
 - (c) impedance is minimum
 - (d) power factor is unity
- (v) Which of the following formulae is used to express active power in a balanced three-phase circuit?
- (a) $V_L I_L \cos \phi$
 - (b) $\sqrt{3} V_L I_L \cos \phi$
 - (c) $V_{ph} I_{ph} \cos \phi$
 - (d) $\sqrt{3} V_{ph} I_{ph} \cos \phi$



- (vi) A moving coil instrument gives full scale deflection with 20 mA. The resistance of coil is 4 ohm. The value of series resistance needed for the instrument to read upto 30 V is _____.
- (vii) A 100 kVA single phase transformer operating at 0.9 power factor has 90% maximum efficiency. The iron loss will be _____.
- (viii) A 4-pole lap wound dc generator generates 200 V at 1000 rpm. If this generator is now wave wound and runs at 500 rpm, the generated voltage will be _____.
- ~~(ix)~~ A 3-phase induction motor connected from a 3-phase, 50 Hz ac supply runs at 720 rpm and has 4% slip. The number of poles in the motor are :
- (a) 4
(b) 6
(c) 8
(d) 16
- (x) Match the following (marks will be awarded if all matching are correct) :

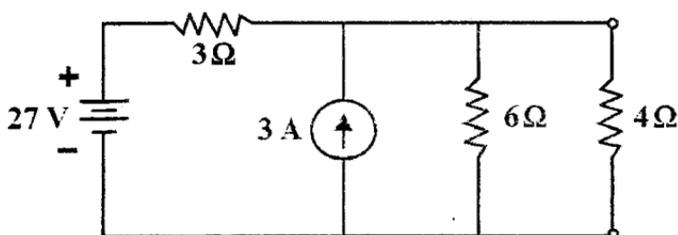
| Type of Motor | Application |
|---|-----------------------|
| (i) dc series motor | (a) Centrifugal pumps |
| (ii) Synchronous motor | (b) Cranes |
| (iii) 3-phase squirrel cage induction motor | (c) Hair dryer |
| (iv) Single phase shaded pole motor | (d) Condenser |



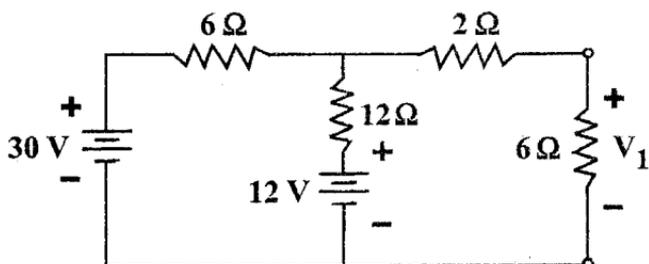
SECTION - B

2 Attempt any three parts of the following : $10 \times 3 = 30$

- (a) (i) Determine current in 4 ohm resistance using Thevenin's theorem in the following circuit :



- (ii) Find voltage V_1 across 6 ohm resistance in the following circuit using loop analysis method :



- (b) A coil having a resistance of 6 ohm and an inductance of 0.0255 H is connected across a 230 V, 50 Hz ac supply. Calculate
- current
 - power factor
 - active power



- (iv) reactive power
- (v) apparent power
- (vi) It is desired to improve power factor to 0.8. What value of capacitance to be connected in series R and what is reduction in reactive power?
- (c) A balanced star connected inductive load is connected to a 400 V, 50 Hz ac supply. Two wattmeters used to measure supply power indicate 8000 W and 4000 W respectively. Determine
- line current
 - impedance of each phase
 - resistance and inductance of each phase.
- (d) A 20 kVA, 2000 V/200 V, single phase 50 Hz transformer has a primary resistance of 1.5 ohm and a reactance of 2 ohm. The secondary resistance and reactance are 0.015 ohm and 0.02 ohm respectively. The no load current of transformer is 1 A at 0.2 power factor. Determine
- equivalent resistance, reactance and impedance referred to primary
 - supply current
 - total copper loss.
- Draw approximate equivalent circuit.
- (e) A dc shunt generator delivers 50 kW at 250 V when running at 500 r.p.m. The armature and field resistances are 0.05 ohm and 125 ohm respectively. Calculate the speed of the same machine and developed torque when running as a shunt motor and taking 50 kW at 250 V. Allow 1 volt per brush for contact drop.



SECTION - C

Note : Attempt all questions of this section. **10×5=50**

3 Attempt any two parts of the following :

- (a) State and explain superposition theorem.
- (b) Discuss different types of voltage and current sources.
- (c) Explain star-delta transformation.

4 Attempt any two parts of the following :

- (a) Explain parallel resonance and draw graphs of α , β and γ against frequency.
- (b) What is meant by power factor? What is its significance? How will you obtain power factor from kVA triangle?
- (c) For two phasors $A = a_1 + jb_1$ and $B = a_2 - jb_2$, obtain their multiplication and division using polar form of representation.

5 Explain construction and working principle of a single phase induction type energy meter. How is energy measured?

OR

What is a three phase system? Give its necessity and advantages. What is meaning of phase sequence and how can it be changed?



- 6 Attempt any two parts of the following :
- (a) Draw and explain hysteresis loop. What is its significance?
 - (b) Explain single phase autotransformer and give its application.
 - (c) Derive e.m.f. equation of a single phase transformer and obtain relation for secondary to primary winding voltages.
- 7 Attempt any two parts of the following :
- (a) Derive an equation for generated torque in dc motor.
 - (b) Draw slip-torque characteristics of a three phase induction motor and explain its various regions of operation.
 - (c) Explain principle of operation of a synchronous motor and give its applications.
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