

Code No: R07A1EC07

R07**Set No. 2**

I B.Tech Examinations, June 2011
BASIC ELECTRICAL ENGINEERING
Common to Information Technology, Computer Science And Engineering,
Computer Science And Systems Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. (a) A capacitor having a capacitance of $10 \mu\text{F}$ is connected in series with a non inductive resistance of 120Ω across 100V , 50Hz . Calculate the power, current and the phase difference between current and voltage.
- (b) In a R-C series circuit, voltage across the combination is given by $40 \sin(2000t+45)$, $R = 10 \Omega$. The current leads the voltage by $\pi/3$ radians. Find the value of C. Also find the expression for current. [8+8]
2. (a) Give a detailed comparison of series and parallel circuit.
- (b) What are the applications, merits and demerits of a series circuit?
- (c) What are the applications and advantages of a parallel circuit? [6+5+5]
3. What do you understand by attraction type and repulsion type instruments? Explain. [16]
4. (a) Sketch the torque - slip characteristics, and the torque - speed characteristics of three phase induction motor with relevant explanations.
- (b) A 3 phase, 6 pole 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Find [8+8]
 - i. No load speed
 - ii. Full load speed
 - iii. Frequency of rotor current on full load.
5. (a) Deduce an expression for the lifting power of a magnet.
- (b) Two coils having 50 and 400 turns respectively are wound side by side on a closed iron circuit of cross sectional area 150sq.cm and of mean length 200cm . [6+10]
6. (a) A copper wire of diameter 1cm has resistance of 0.15Ω . It was drawn under pressure so that its diameter was reduced to 50%. What is the new resistance of the wire?
- (b) State and explain Faradays law of electromagnetic induction. [10+6]
7. (a) Give the difference between the cumulative and differentially compounded DC generator.

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(b) A DC series generator has an armature resistance of 0.5Ω and series resistance of 0.03Ω . It drives a load of 50 A . It has 6 turns per coil and total 540 coils on the armature and is driven at 1500 rpm. Calculate the terminal voltage at load. Assume 4 poles lap type winding, flux per pole as 2 mWb and total brush drop is 2 V . [6+10]

8. Starting from the ideal transformer, obtain the approximate equivalent circuit of a commercial transformer in which all the constants are lumped and represented on one side.

A single phase transformer has a turn ratio of 6. The resistance and reactance of primary winding are 0.9Ω and 5Ω respectively and those of the secondary are 0.03Ω and 0.13Ω respectively. If 330 V at 50 Hz be applied to the high voltage winding with the low-voltage winding short circuited. Find the current in the low-voltage winding and its power factor. Neglect magnetizing current. [16]

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1. (a) Give a detailed comparison of series and parallel circuit.
 (b) What are the applications, merits and demerits of a series circuit?
 (c) What are the applications and advantages of a parallel circuit? [6+5+5]
2. (a) A capacitor having a capacitance of $10 \mu\text{F}$ is connected in series with a non inductive resistance of 120Ω across 100V , 50Hz . Calculate the power, current and the phase difference between current and voltage.
 (b) In a R-C series circuit, voltage across the combination is given by $40 \sin(2000t+45)$, $R = 10 \Omega$. The current leads the voltage by $\pi/3$ radians. Find the value of C. Also find the expression for current. [8+8]
3. Starting from the ideal transformer, obtain the approximate equivalent circuit of a commercial transformer in which all the constants are lumped and represented on one side.
 A single phase transformer has a turn ratio of 6. The resistance and reactance of primary winding are 0.9Ω and 5Ω respectively and those of the secondary are 0.03Ω and 0.13Ω respectively. If 330 V at 50 Hz be applied to the high voltage winding with the low-voltage winding short circuited. Find the current in the low-voltage winding and its power factor. Neglect magnetizing current. [16]
4. (a) Deduce an expression for the lifting power of a magnet.
 (b) Two coils having 50 and 400 turns respectively are wound side by side on a closed iron circuit of cross sectional area 150sq.cm and of mean length 200cm . [6+10]
5. (a) Give the difference between the cumulative and differentially compounded DC generator.
 (b) A DC series generator has an armature resistance of 0.5Ω and series resistance of 0.03Ω . It drives a load of 50 A . It has 6 turns per coil and total 540 coils on the armature and is driven at 1500 rpm . Calculate the terminal voltage at load. Assume 4 poles lap type winding, flux per pole as 2 mWb and total brush drop is 2V . [6+10]
6. (a) A copper wire of diameter 1cm has resistance of 0.15Ω . It was drawn under pressure so that its diameter was reduced to 50% . What is the new resistance of the wire?

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- (b) State and explain Faradays law of electromagnetic induction. [10+6]
7. What do you understand by attraction type and repulsion type instruments? Explain. [16]
8. (a) Sketch the torque - slip characteristics, and the torque - speed characteristics of three phase induction motor with relevant explanations.
- (b) A 3 phase, 6 pole 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Find [8+8]
- No load speed
 - Full load speed
 - Frequency of rotor current on full load.

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 (b) A 3 phase, 6 pole 50 Hz induction motor has a slip of 1% at no load and 3% at full load. Find [8+8]
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4. (a) Give the difference between the cumulative and differentially compounded DC generator.
 (b) A DC series generator has an armature resistance of 0.5Ω and series resistance of 0.03Ω . It drives a load of 50 A. It has 6 turns per coil and total 540 coils on the armature and is driven at 1500 rpm. Calculate the terminal voltage at load. Assume 4 poles lap type winding, flux per pole as 2 mWb and total brush drop is 2V. [6+10]
5. (a) Deduce an expression for the lifting power of a magnet.
 (b) Two coils having 50 and 400 turns respectively are wound side by side on a closed iron circuit of cross sectional area 150sq.cm and of mean length 200cm. [6+10]
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7. (a) Give a detailed comparison of series and parallel circuit.
(b) What are the applications, merits and demerits of a series circuit?
(c) What are the applications and advantages of a parallel circuit? [6+5+5]
8. (a) A capacitor having a capacitance of $10 \mu\text{F}$ is connected in series with a non inductive resistance of 120Ω across 100V , 50Hz . Calculate the power, current and the phase difference between current and voltage.
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- (b) Two coils having 50 and 400 turns respectively are wound side by side on a closed iron circuit of cross sectional area 150sq.cm and of mean length 200cm. [6+10]
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