

C 60703

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Name.....

Reg. No.....

**COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)
DEGREE EXAMINATION, APRIL 2014**

(2009 Scheme)

EN 09 107—BASICS OF ELECTRICAL, ELECTRONICS AND COMMUNICATION
ENGINEERING

Time : Three Hours

Maximum : 70 Marks

Section I (Basics of Electrical Engineering)

Part A

Answer all questions.

1. State and explain Lenz's law. (2 marks)
2. Give the concept of rotating magnetic field. (2 marks)
3. What is a transformer ? (1 mark)

Part B

Answer any two questions.

4. Derive an expression for average value of a.c. and r.m.s. value of a.c. (5 marks)
 5. The maximum values of the alternating voltage and current are 400 V and 20 A respectively in a circuit connected to 50 Hz supply and these quantities are sinusoidal. The instantaneous values of the voltage and current are 283 V and 10 A respectively at $t = 0$ both increasing positively.
 - (a) Write down the expression for voltage and current at time t .
 - (b) Determine the power consumed in the circuit. (5 marks)
 6. Three resistance R_{ab} , R_{bc} and R_{ca} are connected in delta. Obtain their equivalent star resistance. (5 marks)
- [2 × 15 = 30 marks]

Part C

Answer all questions.

7. (a) (i) Explain Faradays laws of electromagnetic induction. Compare and contrast magnetic circuit and electric circuit. (6 marks)
- (ii) An alternating e.m.f. is applied to (i) a pure inductance. Investigate the phase relationship of the current with the e.m.f. Draw the phasor diagram. (4 marks)

Or

Turn over

- (b) (i) Describe the principle and working of an electric D.C. motor. (6 marks)
- (ii) A 200 volt D.C. motor draws 4 ampere current at start. Calculate the power wasted as heat when the motor makes 10 revolutions per second and draw a 3 ampere current. Calculate the e.m.f. and the current when the motor makes 20 revolutions per second. (4 marks)
8. (a) (i) An alternating e.m.f. is applied to a circuit containing capacitance and resistance in series. Derive an expression for the impedance and the current in the circuit. (5 marks)
- (ii) If a 5 ohm resistance and 0.01 Henry inductance are connected in series and an alternating e.m.f. with 200 volts r.m.s. voltage at 50 Hz is applied. What is (1) the current in the circuit ; and (2) power factor of the circuit ? (5 marks)

Or

- (b) (i) Explain the theory of transformer and discuss its working. Describe the various losses occurring in a transformer. (6 marks)
- (ii) A step up transformer operates on a 220 V line and supplies a current of 2 A. The ratio of primary and secondary windings is 1 : 25. Determine the secondary voltage, primary current and power output. Assume 100% efficiency. (4 marks)

[2 × 10 = 20 marks]

Section II (Basics of Electronics and Communication Engineering)

Part A

Answer all questions.

1. What is noise in amplifier ? (2 marks)
2. Give the concept of negative feedback in amplifier. (2 marks)
3. Give the principle of optical fibre. (1 mark)

Part B

Answer any two questions.

4. Derive an expression for gain of an amplifier with feedback and find under what condition an amplifier becomes an oscillator ? (5 marks)
5. With help of block diagram, explain the function of super heterodyne receiver. (5 marks)
6. With a neat block diagram, explain optical communication. (5 marks)

[2 × 5 = 10 marks]

Part C

Answer all questions.

7. (a) (i) How amplifiers are classified ? Draw the frequency response of an amplifier and discuss its shape. (7 marks)
- (ii) An amplifier has a voltage gain of 200, before negative feedback is applied. When negative feedback with $\beta = 0.25$ is applied, the nominal gain changes by 10%. Find the percentage change in the overall gain. (3 marks)

Or

- (b) (i) With a neat block diagram, explain the principle and working of CRO. (6 marks)
- (ii) The vertical gain control of a CRO is set at a deflection sensitivity of 5 V/cm. An unknown a.c. voltage is applied to the Y-input. A 10 cm long straight-line trace is observed on the screen. Determine the a.c. voltage. (4 marks)
8. (a) (i) What is RADAR ? With a neat sketch, explain the operation of RADAR. What are its application ? (6 marks)
- (ii) Give brief introduction of navigational aids. (4 marks)

Or

- (b) Give a short note on : (i) GSM ; (ii) CDMA ; and (iii) GPRS.

(10 marks)

[2 × 10 = 20 marks]