

Code: DE52/DC52/DE102/DC102

Subject: FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGINEERING

DiplETE – ET/CS (Current & New Scheme)

Time: 3 Hours

JUNE - 2017

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions, selecting at least TWO questions from each part. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- The strength of magnetic field around an infinite current carrying conductor is
 - Directly proportional to the distance
 - Same as everywhere
 - Inversely proportional to distance
 - Inversely proportional to the square of the distance
- An alternating current is represented by $i = 70.7 \sin 520 t$. The value of frequency is
 - 50 Hz
 - 73 Hz
 - 83 Hz
 - 100 Hz
- In a balanced 3 phase star connected system the relation between phase voltage (V_{ph}) and line voltage (V_L) is
 - $V_{ph} = \sqrt{3} V_L$
 - $V_L = 0.577 V_{ph}$
 - $V_{ph} = V_L/\sqrt{2}$
 - $V_{ph} = V_L/\sqrt{3}$
- On loading, the speed of dc shunt motor
 - increases
 - remains constant
 - slightly decreases
 - decreases sharply
- At start the slip of induction motor is
 - Zero
 - $\frac{1}{2}$
 - One
 - Infinite
- A zener diode has a
 - High forward voltage rating
 - Negative resistance
 - High amplification
 - Sharp breakdown voltage at low reverse voltage

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- g. In a star connected system
 (A) V_L are 30° ahead of V_{ph} (B) V_{ph} are 30° ahead of V_L
 (C) V_L are 120° ahead of V_{ph} (D) V_{ph} are 120° ahead of V_{ph}
- h. The biasing circuit which gives best stability to the Q point is
 (A) Base resistor biasing (B) Feed-back resistor biasing
 (C) Potential divider biasing (D) Emitter resistor biasing
- i. A transistor operates in the active region when
 (A) Emitter and collector both the junction are forward biased
 (B) Emitter and collector both the junctions are reverse biased
 (C) Emitter junction is forward biased and collector junction is reverse biased
 (D) Emitter junction is reverse biased and collector junction is forward biased
- j. In a BJT phase shift oscillator
 (A) only amplifier produces 180° phase shift
 (B) only phase shift network produces 180° phase shift
 (C) both amplifier and phase shift network produces 180° phase shift
 (D) None of these

PART A

Answer at least TWO questions. Each question carries 16 marks.

- Q.2** a. State and explain Coulomb's laws of electrostatics. (4)
- b. A Capacitor 'C' and Resistance 'R' are connected in series across a d.c. voltage source 'V'. Derive the expression for voltage across the capacitor after 't' seconds when the capacitor is in discharge mode. (8)
- c. An iron ring of 400cm mean circumference is made from round iron of cross section 20 cm^2 . Its permeability is 500. If it is wound with 400 turns what current would be required to produce a flux of 0.001wb? (4)
- Q.3** a. State and explain Kirchoff's Laws. (4)
- b. Derive the expression for power consumed over a cycle of a single phase sinusoidal supply delivering power to a load comprising of resistance 'R' in series with an inductance 'L'. (6)
- c. Find the total resistance between A and B terminals using delta to star conversion method in the Fig.1. (6)

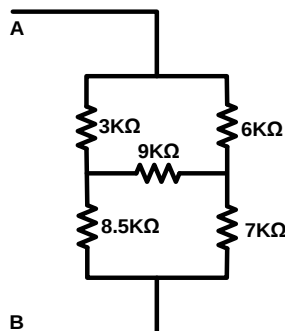


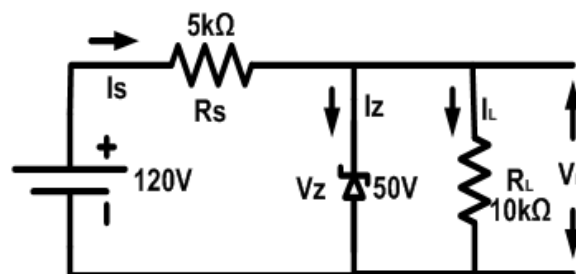
Fig.1

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- Q.4**
- Explain the principle of operation of DC Motor. (5)
 - A 250V DC Shunt motor takes 30A current while running at full load. The resistance of motor armature and field winding are 0.1Ω and 200Ω respectively. Determine the back emf generated in the motor when it runs on full-load. (6)
 - Explain the speed control method of DC Shunt motor for speeds above rated. (5)
- Q.5**
- Derive an expression for the e.m.f. induced in a transformer winding. (6)
 - Show that a rotating magnetic field is produced in stator of a 3 phase induction motor when 3 phase voltage is applied to its stator winding. (7)
 - Define slip. A 3 phase 415V, 50Hz, 4 pole induction motor is running at 1440 r.p.m. Determine (8)
 - Synchronous speed
 - Slip
 - Rotor frequency e.m.f.

PART B**Answer at least TWO questions. Each question carries 16 marks.**

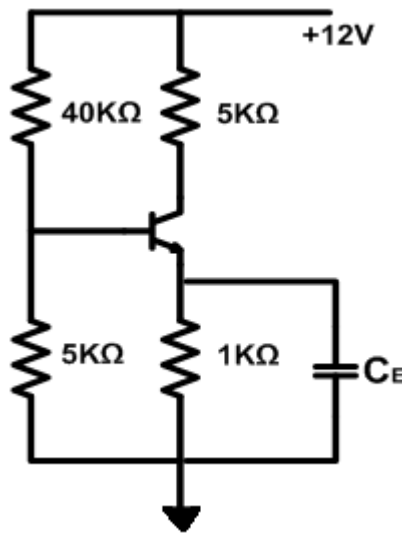
- Q.6**
- On the basis of conductivity classify the solids. Explain their behaviour on the basis of energy band phenomenon. (6)
 - With the help of neat sketch explain the working of zener diode as a voltage regulator. (4)
 - For the circuit shown in Fig. 2 below find (6)
 - Output voltage V_L
 - Voltage drop across R_S
 - Current through zener diode

**Fig.2**

- Q.7a.** Draw and explain the input and output characteristics of transistor in CB configuration. (10)
- In a CB configuration the current amplification is 0.97. If the emitter current is 1mA determine the value of base current. (6)

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- Q.8**
- With the help of neat sketch explain voltage divider bias method of biasing a transistor. (8)
 - For the circuit shown in Fig. 3 draw the dc load line and determine the operating point. Assume $V_{BE} = 0.3$ and $\beta = 60$ for the transistor used. (8)

**Fig.3**

- Q.9**
- Explain the basic principle of feedback in amplifier. (4)
 - Write and explain the various effects of negative feedback in an amplifier. (6)
 - With the help of neat sketch explain the working of Colpitts oscillator using BJT. (6)