ROLL NO. _____

Code: **DE52/DC52/DE102/DC102** **Sub: FUNDAMENTALS OF ELECTRICAL & ELECT. ENGG.**

DipIETE – ET/CS (current & New Scheme)

Time: 3 Hours DECEMBER - 2015 **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. 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)

a. Two conductors are placed parallel to each other and carry current in the same direction, they will _____

(A) Be attracted towards each other
(B) go away from each other
(C) Neither attracts nor repels
(D) May attract or repel, depends upon the magnitude of current

b. A 5 V dc is applied to a series L-R circuit, the value of X_L=3 Ohms and R=4 Ohms, a steady current of ..... amps flows into it.

(A) 1 A **(B)** 0 A
(C) 5/4 A **(D)** 5/3 A

c. A star connected load has each element of value 3 Ohms, then the equivalent branch elements of delta circuit will be _____

(A) 1 Ohms **(B)** 3 Ohms
(C) 6 Ohms **(D)** 9 Ohms

d. The speed of a field controlled dc motor is _____

(A) always constant
(B) always below the base speed
(C) always above the base speed
(D) may be above or below the base speed, depending upon the field current.

e. A 1kW, 220V, 50Hz, 4-pole induction runs at a speed of 1410 rpm, the percentage slip is _____

(A) 0.06 **(B)** 6
(C) 3 **(D)** 3.6

f. The knee voltage for a forward biased silicon p-n junction is _____

(A) 0.3V **(B)** 0.5V
(C) 0.7V **(D)** 0.9V

g. A zener diode is operated in _____

(A) breakdown region **(B)** forward region
(C) cut- off region **(D)** none of these

h. In full wave rectification, if the input frequency is 50Hz, then the output frequency is _____

(A) 25Hz **(B)** 50Hz
(C) 100Hz **(D)** 200Hz

i. The intersection of the dc load line of a transistor with the base current curve gives the

(A) thermal runaway point
(B) operating point
(C) cut off point
(D) amplification point

j. An amplifier has a voltage gain of 20V and a current gain of 5A, the power gain of the amplifier will be _____

(A) 100 db **(B)** 80 db
(C) 40 db **(D)** 20 db

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

Q.2 a. State and explain Lenz's law and Faraday's law of electromagnetic induction. **(8)**

b. Describe qualitatively and quantitatively the force between long parallel current carrying conductors. **(8)**

Q.3 a. What are the different methods of measurement of power in 3-phase circuit? Explain the two wattmeter method in brief. **(8)**

b. State the following: **(8)**
(i) Thevenin's Theorem.
(ii) Norton's Theorem.
(iii) Maximum power transfer theorem.
(iv) Kirchoff's laws.

Q.4 a. Give reasons, why the starters are required for starting a motor? **(6)**

b. A 240V dc shunt motor has an armature resistance of 0.4 ohm and is running at the full-load speed of 600 r.p.m. with a full load current of 25A. The field current is constant. Find the speed if a resistance of 1 ohm is added in series with the armature (i) at the full-load torque and (ii) at twice the full-load torque. **(10)**

Q.5 a. Draw and explain the phasor diagram of a transformer on load, at a lagging power factor. **(8)**

b. A 400V, 4-pole, 50 Hz, 3-phase, 10 hp, star connected induction motor has a no load slip of 1% and full load slip of 4%. Find the following: (i) Synchronous speed (ii) no-load speed (iii) full-load speed and (iv) frequency of rotor current at full-load. **(8)**

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

Q.6 a. Discuss the process of doping in a switching diode. What is reverse recovery time? **(8)**

b. Distinguish between avalanche and zener breakdown in p-n junction diode. **(8)**

Q.7 a. Explain the working of a Bridge rectifier with a neat circuit diagram. **(8)**

b. Derive the expressions for rectification efficiency and ripple factor for a bridge rectifier. **(8)**

Q.8 a. Sketch the output V-I characteristic of a BJT in CE configuration. Indicate thereon, the different regions. How one can determine the value of hfe or βF with the help of these characteristics? **(8)**

b. Design a series voltage regulator using a transistor having VBE = 0.6V and β=50, which can supply 1A to a load at a constant voltage of 9V. The supply voltage to regulator is 15V±10%. The minimum zener current is 12mA. **(8)**

Q.9 a. What is the benefit of capacitive coupling? Explain a two stage RC coupled CE amplifier. **(8)**

b. Derive an expression for the frequency of oscillation, in a Hartley oscillator. **(8)**