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Total Number of Pages: 03

B.TECH
PEN2B101

2nd Semester Regular Examination 2016-17
ELECTRICAL & ELECTRONICS ENGINEERING

BRANCH: ALL

Time: 3 Hours

Max Marks: 100

Q.CODE: Z777

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.

Part – A (Answer all the questions)

Q1 Answer the following questions: *multiple type or dash fill up type* (2 x 10)

- a) In a series RLC circuit, at resonance the voltage across resistor is 10V, then the voltage across Inductor will be _____ times the voltage across capacitor.
- b) An ideal current source of 5A has _____ internal resistance.
- c) In a 3-phase star connection circuit, live voltage is _____ the phase voltage.
- d) An alternating current varying sinusoidally with a frequency of 50Hz has a rms value of 10A. The instantaneous value of the current after 0.0025sec is _____ and after 0.0125 sec is _____ .
- e) The coefficient of magnetic coupling between two circuits can have a maximum value of _____ .
- f) The knee voltage (cut in voltage) of Si diode is
(a) 0.2V (b) 0.7V (c) 0.8V (d) 1.0V
- g) Avalanche breakdown in a diode occurs when
(a) Potential barrier is reduced to zero.
(b) Forward current exceeds to certain value.
(c) Reverse bias exceeds a certain value.
(d) None of these.
- h) A common emitter amplifier produces a phase reversal of _____ degrees in the input signal.
- i) A zener diode operates in the _____ region.
- j) A LED consists of a _____ biased P-N junction.

Q2 Answer the following questions: *Short answer type* (2 x 10)

- a) Convert the following decimal number to its corresponding binary number.
(i)(235)₁₀ (ii) (179)₁₀
- b) State De-Morgan's Theorem.
- c) Show that dual of EX-OR gate is equal to its complement.
- d) Name the universal gates and why it is called so?
- e) Write down the difference between intrinsic semiconductor and extrinsic semiconductor.
- f) Write in brief, the working principle of a single phase transformer.

- g) Write five different sources of generation of electricity.
- h) What are the time dependent signal sources?
- i) Justify, how a wattmeter can measure active power.
- j) Write four different parts of a DC Machine.

Part – B (Answer any four questions)

Q3 a) Three alternating currents are given by **(3+3.5+3.5)**

$$i_1 = 141\sin(\omega t + \frac{\pi}{4}); \quad i_2 = 30\sin(\omega t + \frac{\pi}{2}); \quad i_3 = 20\sin(\omega t - \frac{\pi}{6});$$

are fed into a common conductor. Draw all the current waveform (approximate) in a single figure. Find the equation of the resultant current and its r.m.s value.

b) An iron ring with a circular cross section of 2cm diameter and a mean circumference of 100cm is wound with a coil of 1000turns. For an exciting current of 2A in the coil, the flux is found to be 1.2mWb. Calculate the relative permeability of iron by assuming that the permeability of free space is $4\pi \times 10^{-7}$ H/m. **(5)**

Q4 a) In a circuit given in figure.1, determine the voltage across node (i) 'a' and 'b' (ii) 'a' and 'e'. **(2.5+2.5)**

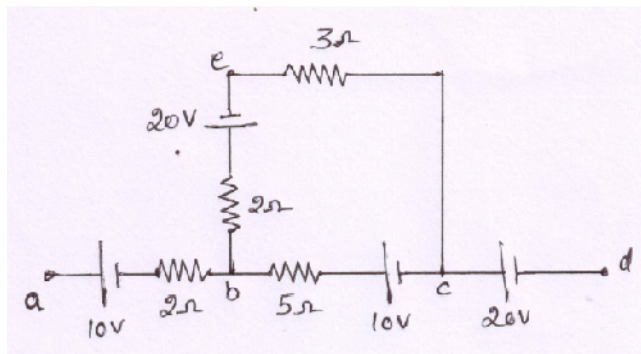


Figure.1

b) In the circuit given in figure.2, Solve the network given in figure.2 using (i) Mesh analysis and (ii) Node analysis. And determine the voltage across node 'a' and 'b' **(5+5)**

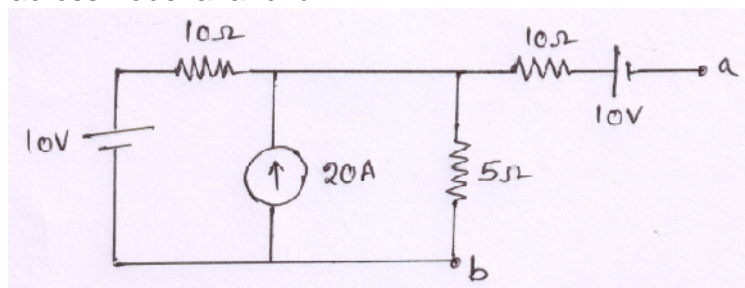


Figure.2

Q5 a) Explain with suitable diagram, how to measure three phase power using two wattmeter method? **(10)**

b) Write a short notes on B-H Curve used in Magnetic circuit. **(5)**

Q6 a) (i) Prove that sum of all minterms of a Boolean function of n variable is one. **(5+5)**

(ii) Explain the operation of Half wave rectifier.

- b) Establish the following identities of Boolean algebra: (2.5+2.5)
- (i) $A+AB=A$
- (ii) $(A+B)(A+C)=A+BC$

Q7 a) Design half adder circuit using NAND gate only. (7.5)

- b) Minimize the following expression using Boolean Algebra. (7.5)
- $F(A,B,C,D)= \sum m(1,3,5,7,8,9,10,11)$

Q8 In a given network as shown in figure.3, determine the current flowing through the 4Ω resistor connected between the node 'a' and 'b' using (i) Thevenin's theorem (ii) Norton's Theorem (iii) Superposition theorem. (5+5+5)

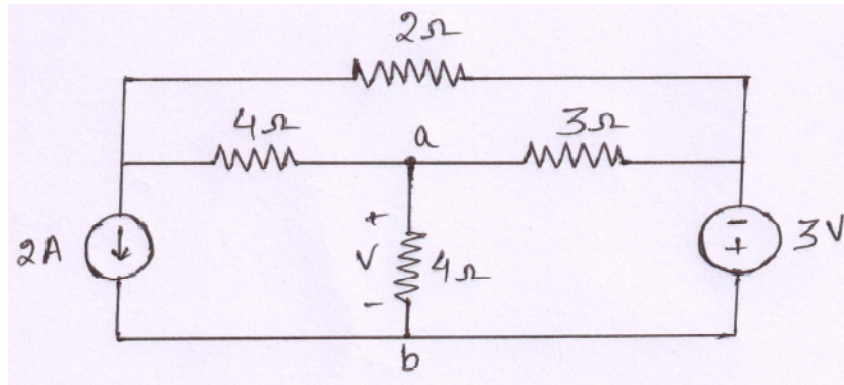
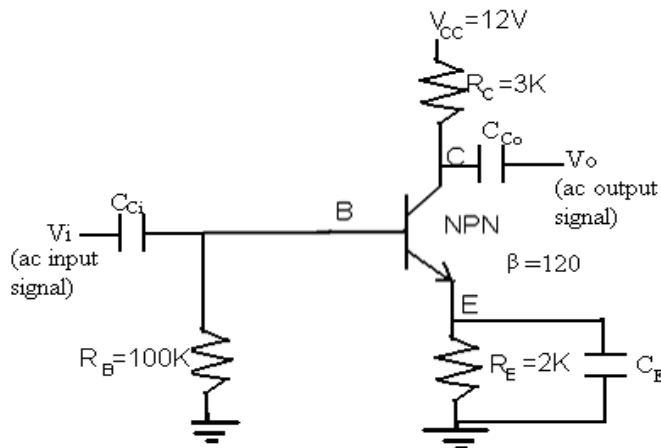


Figure.3

Q9 a) Determine the I_{BQ} , I_{CQ} and I_{EQ} of the given biasing Amplifier Circuit (8) as shown in the figure below and also determine V_{CEQ} , V_{EQ} , V_{CQ} , V_{BQ} and V_{BC} .



b) Analyze a transistor amplifier using simplified hybrid- π model. (7)