National Institute of Technology, Delhi

Name of the Examination: B. Tech.

End-Semester Examination December, 2019

Branch	: ECE & EEE.	Semester	: 1st
Title of the Course	: Introduction to Electrical & Electronics Engineering	Course Code	: EEB100

Time: 3 Hours   Maximum Marks: 50

Note : 1. Do not write anything on the question paper except Roll number

2. Assume any data suitably if found missing

Section A: Answer all 10 multiple choice questions. Each question carries 01 mark. [10×1=10]

A1. A piece of aluminium wire is stretched to reduce its diameter to half of its original value. Its resistance will become

(a) 2 times   (b) 4 times   (c) 8 times   (d) 16 times

A2. The value of α_0 of a conductor is 1/236 per ^{0}C. The value of α_{18} will be ____

(a) 1/218 per ^{0}C   (b) 1/254 per ^{0}C   (c) 1/272 per ^{0}C   (d) 1/216 per ^{0}C

A3. Two similar cells whether joined in series or parallel have the same current through an external resistance of 2Ω. The internal resistance of each cell is___

(a) 0.5Ω (b) 1.0Ω (c) 1.5Ω (d) 2Ω

A4. In a series resonance circuit

(a) L = C   (b) L = R   (c) $X_L = X_C$ (d) R = L = C

A5. A wire has a resistance of 12Ω. It is bent in the form of a circle. The effective resistance between two points on any diameter of the circle is

(a) 3Ω (b) 6Ω (c) 12Ω (d) 24Ω

A6. The open circuit voltage at the terminals of a load is 30V. Under the condition of maximum power transfer, the load voltage will be _____

(a) 30V   (b) 10V   (c) 15V   (d) 5V

A7. A 6-pole lap wound generator has 300 conductors. The emf induced per conductor is 5V. The generated voltage of the generator is_____

(a) 60V   (b) 1500V   (c) 360V   (d) 250V

A8. A sine wave has a maximum value of 20V. Its value at 135^0 will be

(a) 10V   (b) 14.14V   (c) 15V   (d) 5V

A9. If the doping level of a crystal diode is increased, the width of depletion layer

(a) Remains same   (b) is increased   (c) is decreased   (d) none of these

A10. The emitter of a transistor is _____ doped

(a) lightly   (b) moderately   (c) heavily   (d) none of these

P.T.O

Section B: Answer any 4 questions. Each question carries 5 marks. [4×5=20]

B1. Minimize the following function with the help of K-map $F(w,x,y,z) = \sum m(0,1,2,4,5,6,8,9,12,13,14)$.

B2. In an n-p-n transistor in the common emitter configuration, an ac input signal of $\pm 40mV$ is applied as shown in Fig.1. The dc current gain and ac current gain are given as 80 and 100 respectively. Calculate the voltage amplification of the amplifier. The I_B Versus V_{BE} characteristic is such that for $V_B = 0.7V, I_B = 12\mu A$ and for $V_i = \pm 40mV, I_B = \pm 4\mu A$. Also calculate the dc collector voltage.
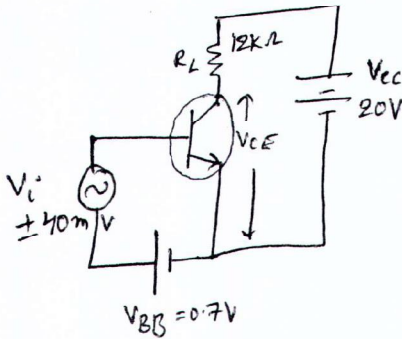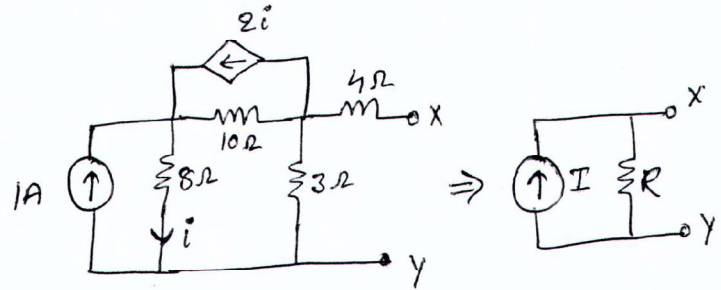

Fig 1

Fig 2

B3. Calculate the values of I and R in the circuit given in Fig 2.

B4. Explain how 3 phase power can be measurement using 2 wattmeter's with the help of phasor diagram.

B5. Derive the equation for resonant frequency, Q-factor and dynamic impedance of parallel resonant circuit.

Section C: Answer any 2 questions. Each question carries 10 marks. [2×10=20]

C1. An unbalanced four wire star connected load has a balanced voltage of 400V. The loads are $Z_1 = (4+j8)\Omega$, $Z_2 = (3+j4)\Omega, Z_3 = (15+j20)\Omega$. Calculate (i) line currents, (ii) current in the neutral wire (iii) total power.

C2. (a) What is JK Flip Flop? Explain the working with the help of characteristic Table.

    (b) A single phase transformer with a ratio of 6600/600V has a load impedance of $(4+j3)\Omega$ connected across the terminals of low voltage winding. Calculate the kW delivered to the load. Neglecting the losses in the transformer, find the current taken by it from the supply lines.

C3. (a) Explain the working of full wave bridge rectifier with the help of neat circuit diagram. What are its advantages and disadvantages?

    (b) A 4-pole shunt generator with lap connected armature has armature and field resistances of 0.2 Ω and 50 Ω, respectively. It supplies power to 100 lamps, each of 60 W, 200 V. Calculate the total armature current, the current per path and the generated emf. Allow a brush drop of 1 V at each brush.