R13

Code: 13A99101

B.Tech I Year (R13) Regular Examinations June/July 2014

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to CSE & IT)

Time: 3 hours Max. Marks: 70

Part – A
(Basic Electrical Engineering)
Answer all the questions (35 Marks)

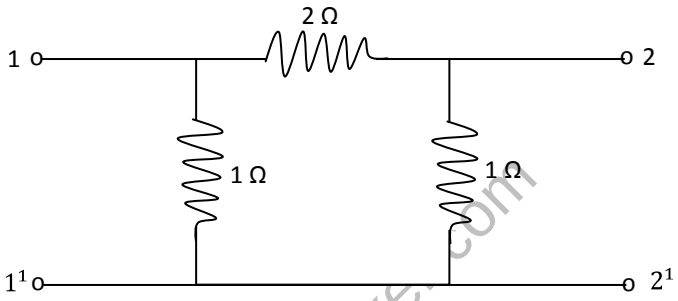
*****

1 (a) (i) Explain the types of sources in detail. [12M]
(ii) A resistance of 20 Ω and an inductance of 0.2 H and a capacitance of 100 μF are connected in series across 220 V, 50 Hz mains. Determine: (i) Impedance of the circuit (ii) Current taken from the mains and (iii) Power and power factor of the circuit.

OR

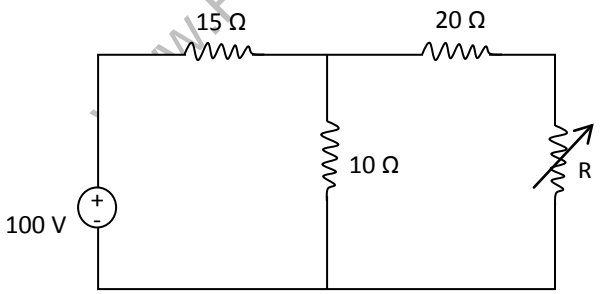
(b) (i) Define and explain average value, RMS value, form factor and peak factor. Also derive the expression for form factor of a sinusoidal wave.

2 (a) (i) State and explain maximum power transfer theorem. [12M]
(ii) Find the Z parameters for the resistance network shown in figure given below.



OR

(b) (i) State and explain the impedance parameters. Derive the formulae.
(ii) In the circuit shown in figure given below, find the value of adjustable resistor R for maximum power transfer to R. Also calculate the maximum power.



3 (a) (i) Explain the constructional details of DC machine. [11M]
(ii) Explain the slip-torque characteristics of three phase induction motor.

OR

(b) (i) Explain the principle of operation of DC generator.
(ii) Derive the torque equation of DC motor.

Contd. in page 2

Code: 13A99101

R13

Part – B
(Basic Electronics Engineering)
Answer all the questions (35 Marks)

4 (a) (i) What do you understand by depletion region at p-n junction? What is the effect of forward and reverse biasing of p-n junction on the depletion region? Explain with necessary diagrams. [12M]
(ii) Distinguish between drift current and diffusion current.
(iii) A full wave rectifier (FWR) supplies a load requiring 300 V at 200 mA. Calculate the transformer secondary voltage for a capacitor input filter using a capacitor of 10 μF.

OR

(b) (i) The current voltage characteristic of a PN junction diode is given by $I = I_o\ (e^{V/3VT} - 1)$. The diode current is 0.5 mA at V = 340 mV and 15 mA at V = 440 mV. Find whether the diode is germanium or silicon. Assume $V_T = 0.026$ V.
(ii) Compare the performance of series inductor, L-section and π –section filters.
(iii) Explain avalanche break down and zener break down and explain how zener diode can be used as voltage regulator.

5 (a) (i) Given an NPN transistor for which $\alpha = 0.98$, $I_{CO} = 2\ \mu A$ and $I_{EO} = 1.6\ \mu A$. A common emitter connection is used and V_{CC} = 12 V and R_L = 4 KΩ. What is the minimum base current required in order that transistor enter into saturation region. [12M]
(ii) Draw the transistor biasing circuit using fixed bias arrangement and explain its principle with suitable analysis.
(iii) Draw a diagram showing the structural details of N-channel depletion and enhancement MOSFET device.

OR

(b) (i) What is early effect? Explain the input and output characteristics of the transistor in CB configuration.
(ii) Draw the circuit diagram of common drain amplifier and derive expressions for voltage gain and input resistance. Compare EMOSFET and DMOSFET.

6 (a) (i) Draw the frequency response of an amplifier with and without feedback and show the bandwidth for each case and how these two curves are related to gain bandwidth product. [11M]
(ii) Explain how integrator can be implemented using an op-amp. What are the deficiencies of a simple integrator circuit? Explain how they can be overcome in a practical circuit.

OR

(b) (i) Derive closed loop voltage gain, input resistance, output resistance and band width for an op-amp non-inverting amplifier with feedback arrangement.
(ii) Define the DC and AC characteristics of an op-amp.

*****