M.Sc. Semester-II (CBCS Scheme) Examination

PHYSICS

2-PHY-4 (I) : Network Theorems and Solid State Devices

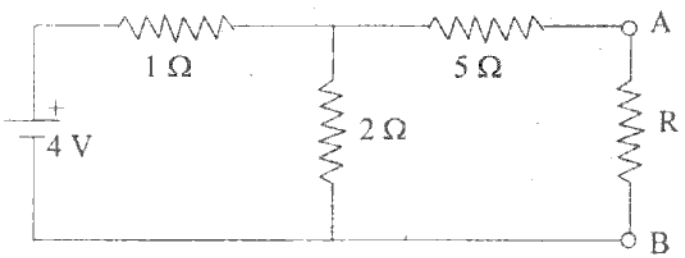
Time : Three Hours] [Maximum Marks : 80

Note :— **ALL** questions are compulsory and carry equal marks.

1. (A) Explain the functions of Capacitor and Inductor in an electrical circuit. 6

(B) Discuss the various steps involved for solving network by using Norton's theorem. 5

(C) Find the value of 'R' in the circuit given below, for maximum power transfer to it. What is the amount of this power ? 5

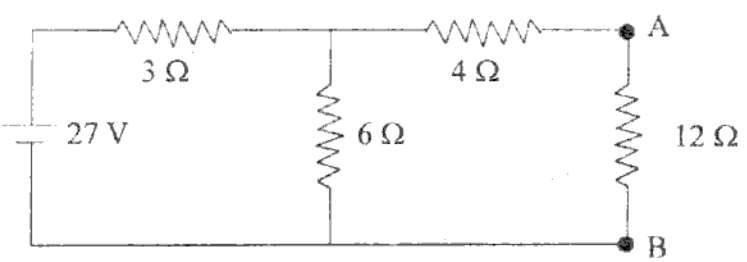


OR

(P) State and explain Kirchhoff's voltage and current law with sign convention. 6

(Q) Illustrate superposition theorem with suitable example. 5

(R) Apply Thevenin's theorem to find current through 12 Ω resistor in the following circuit. 5



2. (A) Describe the construction of n-channel JFET and explain its working. Obtain relation between FET parameters. 8

(B) Explain the formation of depletion region and potential barrier in P-n junction. What is the effect of forward bias and reverse bias on them ? 8

OR

(P) Explain construction of UJT and negative region in its characteristics. Explain the use of UJT as relaxation oscillator. 8

(Q) Give the construction and working of ED-MOSFET (Dual mode MOSFET). 8

3. (A) Explain working of full wave rectifier using two diodes. Show that maximum rectification efficiency of this rectifier is 81.2%. 8

(B) Explain the construction and characteristics of SCR. Give any one application in detail. 8

OR

(P) Draw block diagram of regulated power supply. Discuss in detail working of zener regulator circuit with respect to line voltage and load variations. 8

(Q) Explain the use of IC-317 as adjustable voltage regulator. Design adjustable voltage regulator using IC-317 for output voltage V_o = 5 V to 12 V. Given : current limiting resistor R = 240 Ω, V_{ref} = 1.25 V. 8

4. (A) Explain the action of n-p-n transistor. 4

(B) Explain the different regions of output characteristics of CE-transistor. 6

(C) Draw circuit diagram of two stage RC-coupled amplifier and discuss its gain-frequency response. 6

OR

(P) Explain the concept of current feedback and voltage feedback. Discuss the effect of negative feedback on input impedance. 6

(Q) What are different types of noise ? Explain thermal noise. 5

(R) Obtain the values of collector current and collector voltage of CE-transistor if V_{CC} = 12 V, R_B = 300 kΩ, R_L = 2 kΩ, B_{dc} = 100. 5

5. (A) Describe the construction and working of LVDT. 5

(B) Explain with suitable example, the use of NTC thermistor for temperature measurement. 5

(C) Explain with suitable example, the action of capacitive transducer. 6

OR

(P) Explain the working of phototransistor. 5

(Q) Explain the use of saw tooth waveform signal in CRO. 3

(R) What is microphone ? Explain working of condenser microphone. 5

(S) Draw block diagram of function generator. 3

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