

## GANPAT UNIVERSITY

**B. TECH. SEMESTER I (BM&I/CE/EC/IT/MR) ENGINEERING  
REGULAR EXAMINATION, NOV-DEC 2013  
2EC101 ENGINEERING SCIENCE**

[Max. Time: 3 Hrs.]

[Max. Marks: 70]

Instructions:

1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.

### SECTION-I

Que.-1 (A) Define the following terms: 6  
 (i) Lifetime (ii) Surface leakage current (iii) Doping (iv) Clamper (v) Rectifier  
 (vi) Q-point

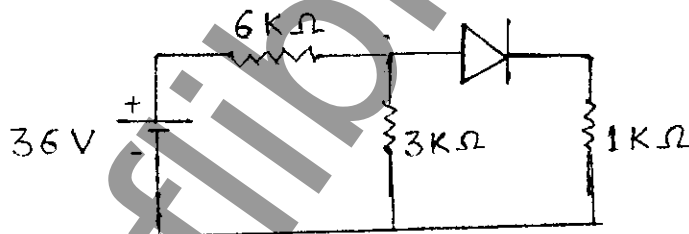
(B) Explain with neat circuit diagram, the working of a positive and a negative biased clipper. 6

OR

Que.-1 (A) Define the following terms: 6  
 (i) Recombination (ii) Reverse saturation current (iii) Transformer (iv) Valence saturation  
 (v) Hole (vi) Transistor

(B) Explain a peak to peak detector circuit. List out the applications of a Clipper circuit. 6

Que.-2 (A) Assuming an ideal diode, calculate the load current and load voltage for the circuit drawn below: 5

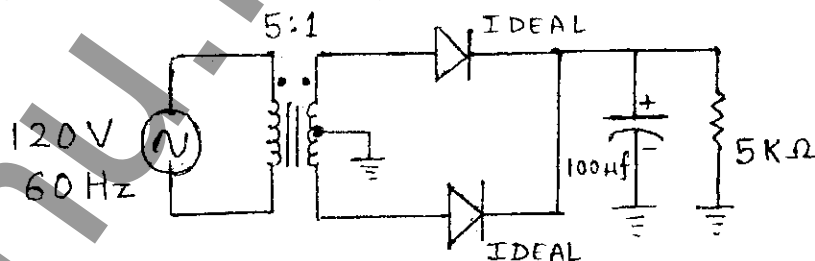


(B) Explain the mechanism of the flow of current in a forward biased p-n junction diode. 3

(C) What is Biasing? Explain a biased transistor in CE configuration. 3

OR

Que.-2 (A) Calculate the DC load voltage and the ripple voltage for the circuit drawn below: 5



(B) Explain the unbiased transistor in detail. 3

(C) Distinguish between the first and second approximation methods of a diode. 3

Que.-3 (A) Explain the concept of Energy Hill in detail. 4

(B) How does the Depletion layer and the Barrier potential forms in a p-n junction diode? 4

(C) Summarize the role of a Capacitive filter in a Full Wave Rectifier circuit. 4

## SECTION-II

- Que.-4 (A) What is Dispersion? Explain different types of Dispersion in detail.  
(B) A 19 cm long Copper rod of 0.785 square cm area of cross section which is thermally insulated is heated at one end through  $100^{\circ}\text{C}$  while the other end is kept at  $30^{\circ}\text{C}$ . Calculate the amount of heat that will flow in 10 minutes along the way.  
K of copper is  $380 \text{ W/m/K}$ .  
(C) Define the following terms:  
(1) Acceptance angle  
(2) Entropy  
(3) Mean free path

OR

- Que.-4 (A) Explain Rutherford's scattering experiment in detail.  
(B) List out the advantages of Fiber optics communication.  
(C) Explain the various modes of transmission of heat .

- Que.-5 (A) Define Doppler's principle and derive the expression for Apparent frequency for three different cases.  
(B) A step index fiber is made with a core of index 1.52, a core of diameter  $29 \mu\text{m}$  and fractional refractive index is 0.007. It is operated at wavelength of  $1.3 \mu\text{m}$ . Find  
(1) V-number (2) No. of modes supported by the fiber

OR

- Que.-5 (A) Explain the different types of Magnetic materials. List out the salient features of Paramagnetic materials.  
(B) Two observer A and B carry identical sound sources of frequency 500 Hz. If the observer A is stationary and B moves away from A at a speed of 3.6 km/hr, how many beats per second are heard by A and B respectively?  
Velocity of sound in air =  $350 \text{ m/s}$ .

- Que.-6 (A) Derive an expression for Numerical Aperture in term of Fractional Refractive index.  
(B) Explain the Thermal conductivity of materials in detail.  
(C) List out the various applications of Ultrasonic and explain any two of them.

End of Paper