

[Total No. of Questions - 9] [Total No. of Printed Pages - 4]  
(2063)

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B.Tech 2nd Semester Examination

Basic Electronics

EC-1001

Time : 3 Hours

Max. Marks : 100

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/ continuation sheet will be issued.*

**Note :** Attempt five questions in all selecting one question each from sections A, B, C and D. Section - E is compulsory.

**SECTION - A**

1. (a) Explain semiconductor? Derive the relation for Drift velocity, mobility and conductivity of intrinsic semiconductor. What is the effect of temperature on the resistance of intrinsic and extrinsic semiconductors?  
(b) Explain the characteristics of pn junction diode. Write the mathematical equation describing the current- voltage behavior of diode. **(10, 10)**
2. (a) Explain working of center tapped type full wave rectifier. What are its limitations over bridge type full wave rectifier?  
(b) Derive an expression of output voltage, load current, rectification efficiency and ripple factor in case of half wave and full wave rectifier. **(10, 10)**

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**[P.T.O.]**

**SECTION - B**

3. (a) Explain various current components in a transistor during transistor action. Find the expression for output current and current gains in all three transistor configuration.
- (b) What are various modes of operation of transistor? Sketch and explain the input and output characteristics of CE configuration of NPN transistor. **(10, 10)**
4. (a) Find out voltage gain, current gain, input impedance and output impedance of a bipolar junction transistor in terms of h-parameters. If  $R_L=10k$  and  $R_S=1k$ , find the various gains and the input and output impedances, h-parameter for the transistor are given below:
- $h_{fe}=50$ ,  $h_{oe}=25\mu A/V$ ,  $h_{re} = 2.5 \times 10^{-4}$  and  $h_{ie}=1000$  ohm.
- (b) Explain the n-channel depletion MOSFETs. Describe the relation among various parameters associated with MOSFETs. **(10, 10)**

**SECTION - C**

5. (a) What is the need of biasing? Explain voltage divider biasing circuit in detail. What are the advantages of this circuit?
- (b) Find the effect of negative feedback on gain, input impedance, bandwidth, lower cut off and higher cut off frequency for an amplifier. **(10, 10)**

6. (a) Draw and explain the circuit of single stage amplifier circuit. Also define lower cut off frequency, upper cut off frequency and bandwidth of the amplifier.
- (b) What do you mean by cascading of amplifiers? Explain the capacitive coupled two stage amplifiers. **(10, 10)**

**SECTION - D**

7. (a) Explain the ideal characteristics and block diagram of operational amplifier. Draw and explain the integrator circuit using op-amp.
- (b) Explain the characteristics of photo transistor. **(10, 10)**
8. Explain the following:
- (a) Subtractor using 741.
- (b) Semiconductor processing.
- (c) Adder using operational amplifier.
- (d) Capacitor fabrication in IC. **(5-each)**

**SECTION - E**

9. (a) In a n-type semiconductor a large number of electrons are present still it remain electrically neutral, why?
- (b) Why the effective mass of hole is greater than electron

- (c) Explain negative resistance phenomena in UJT.
- (d) Describe voltage regulator using zener diode.
- (e) What is thermal runaway? Why it exists in transistors.
- (f) Plot energy band diagram of pn junction diode.
- (g) What are uni-polar transistors.
- (h) Explain the Fermi energy level for n-type semiconductor.
- (i) What do you mean by decibel?
- (j) Define load line and operating point. **(2×10=20)**