

**B.E. (Electronics and Communication Engineering)**  
**First Semester**  
**ECE-102: Introduction to Electronics**  
**(Common with ECE)**

**Time allowed: 3 Hours**

**Max. Marks: 50**

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

I.

- a) Discuss any two commercial applications of Electronics. (2)
- b) Compare active components with passive components by taking examples. (2)
- c) Discuss V-I characteristics of Zener Diode. (2)
- d) Discuss the clipper and clamper circuits with help of PN Junction. (2)
- e) Describe the different frequency bands used in communication systems. (2)

**Part A**

II.

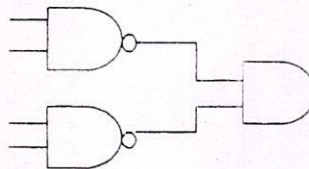
- a) A Silicon diode has  $I_D = 20\text{nA}$  operating at 15 degree Celsius. Calculate  $I_D$  for a forward bias of 0.6 Volt. (2)
- b) Derive the Relationship  $I_D = I_S(e^{V_D/kT} - 1)$  for a PN Junction diode. (3)
- c) What is the ripple factor of a diode rectifier? Derive its expression for Full wave Rectifier. Will the ripple factor be more or less than this value for a half wave rectifier? (5)

III.

- a) Explain why CE configuration is most popular in amplifier circuits. (3)
- b) Draw the ac equivalent circuit of CE transistor amplifier and derive the expressions for voltage gain, current gain, input impedance, output impedance of amplifier in terms of h-parameters. (7)

IV.

- a) Prove De Morgan's Theorem. For the circuit shown in Figure below, write down the truth table if the change from each step of truth table needs  $5\mu$  second time. Draw the timing diagram. (5)



- b) Convert  $(394.6875)_{10}$  into octal. (2)
- c) Given the Boolean Function  $F = (A+B)(CD+E)$ . Obtain AND-OR Implementation and also its implementation using NAND gates only. (3)

**Part B**

V.

- a) Draw and explain with excitation table the RS and JK flip flop. (4)
- b) Name the commercially available TTL MSI/LSI Registers. Explain the working of 8bit shift register. (3)
- c) Convert Mod-3 counter to a Mod-6 counter. (3)

VI.

- a) An 8 bit A/D converter type inverter has 300 KHz clock. Find maximum conversion time, average conversion time and maximum conversion rate. (3)
- b) For Operational Amplifier-IC741/351, draw its frequency response. Discuss the effect of slew rate for  $V_o = V_m \sin \omega t$ . (3)
- c) Compare the working of op-amp as Integrator and Differentiator. (4)

VII.

- a) Define Modulation Process in Communication system. For Amplitude Modulation, prove that the spectrum power when  $m=1$ , is  $P_r = 1.5P_c$ . Explain the importance of modulation index. (4)
- b) Explain with the help of diagram the digital communication system. Prove how digital communication is better than its analog counterpart? (3)
- c) Compare AM and FM in terms of efficiency, Bandwidth and area of reception. Explain how Phase-Locked Loop concept helps in accomplishing Frequency-Modulation. (3)