1108
B.E. (Electrical and Electronics 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. I which is compulsory and selecting two questions from each Part.*

x-x-x

I.
   a) Discuss the applications of Electronics in different areas. (2)
   b) State the law of mass action. (2)
   c) Draw V-I characteristics of a Zener diode. (2)
   d) Discuss Slew Rate of an Operational Amplifier. (2)
   e) Compare Amplitude modulation with Frequency Modulation. (2)

Part A

II.
   a) A Silicon diode has I_D=20nA operating at 35 degree Celsius.Calculate I_D for a forward bias of 0.5Volt. (2)
   b) Discuss the terms static and dynamic resistance of a diode.Draw V-I characteristics of PN junction diode. (3)
   c) Define ripple factor of a diode rectifier?Derive the expression for RMS value of current for Half wave and Full wave rectifier. (5)

III.
   a) When the emitter current of a transistor is changed by 1 mA,its collector current changes by 0.995mA.Calculate (a) its common base short circuit current gain α and (b)its common emitter short circuit current gain β. (2)
   b) Why is base layer of BJT made very thin compared to emitter and collector layer?In the three regions of operation,how are the BJT junctions biased?What is Reverse saturation current in BJT?How can this be observed independently? (8)

IV.
   a) State De Morgan's Law.For the NAND-NAND circuit shown in Figure, write the truth table if the change from each step of truth table needs 2μ second time. Explain with help.of.timing.diagram. (4)
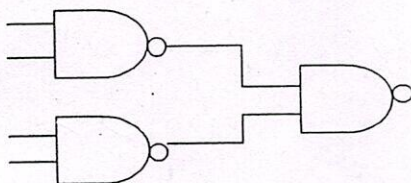
   b) Convert $(972.625)_{10}$ to its hexadecimal equivalent (2)
   c) Reduce using K-map the expression $\Pi M(2,8,9,10,11,12,14)$ and implement it in universal logic. (4)

Part B

V.
   a) Draw and explain with excitation table the RS,JK,D and T flip flop. (4)
   b) Explain the operation of a 4-bit shift register.Draw the logic diagram of 74LS91 8 bit shift register. (3)
   c) Design a Mod-3 counter (non-linear). (3)

VI.
   a) An 8 bit A/D converter type inverter has 250 Khz clock. Find maximum conversion time, maximum conversion rate. (2)
   b) Discuss the measurement of Operational Amplifier parameters in terms of Open loop Differential voltage gain, Input offset voltage, Differential input resistance and Common mode rejection ratio. (4)
   c) Describe the working of op-amp as summing amplifier, difference amplifier, 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_t=1.5P_c.Explain the significance of modulation index. (4)
   b) Draw and explain the schematic diagram of digital communication system. Compare analog and digital communication system. (3)
   c) Compare AM and FM in terms of efficiency, Bandwidth and area of reception. (3)

x-x-x