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First/Second Semester B.E. Degree Examination, June/July 2014

Basic Electronics

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, choosing at least two from each part.
 2. Answer all objective type questions only in OMR sheet page 5 of the answer booklet.
 3. Answer to objective type questions on sheets other than OMR will not be valued.

PART – A

- 1 a. Choose the correct answers for the following : (04 Marks)
- i) Zener diode can be used for rectification. This statement is _____.
 A) true B) false
 C) neither true nor false D) none of these
- ii) The maximum efficiency of full wave rectifier is _____.
 A) 40.6% B) 60.4% C) 78.5% D) 81.2%
- iii) The knee voltage of a silicon diode is _____.
 A) 0.3V B) 0.5V C) 0.7V D) none of these
- iv) If f Hz is the frequency of the input given to a half wave rectifier, the output frequency will be _____.
 A) $2f$ Hz B) f Hz C) $3f$ Hz D) $0.5f$ Hz
- b. Draw and explain the VI – characteristics of a Si-diode and Ge-diode. (06 Marks)
- c. With a neat circuit diagram, explain the working principles of full wave bridge rectifier and show that the ripple factor = 0.48, and efficiency = 81.2%. (10 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- i) The current conduction in BJT is because of _____.
 A) electrons B) holes
 C) both electrons and holes D) none of these
- ii) If $\alpha = 0.95$, then the value of β of transistor is _____.
 A) 0.05 B) 19 C) 100 D) 120
- iii) Common collector arrangement is generally used for _____.
 A) impedance matching B) voltage amplification
 C) current amplifier D) none of these
- iv) The current relationship between two current gain in a transistor is _____.
 A) $\beta = \frac{\alpha}{1-\alpha}$ B) $\beta = \frac{1+\alpha}{1-\alpha}$ C) $\beta = \frac{1-\alpha}{1+\alpha}$ D) $\beta = \frac{1+\beta}{\beta}$
- b. Draw input and output characteristics of an NPN transistor in common base configuration and explain. (10 Marks)
- c. For a Silicon transistor $\alpha_{dc} = 0.995$, emitter current is 10 mA and leakage current I_{co} is $0.5\mu A$. Find I_C , I_B , β and I_{CEO} . (06 Marks)

- 3 a. Choose the correct answers for the following : (04 Marks)
- Which of the following factor affects the Q-point stability?
A) I_{co} B) coupling capacitor
C) emitter resistor D) bypass capacitor
 - The inter section of the dc load line with given base current curve is the
A) h-point B) D-point C) Q-point D) none of these
 - For an emitter follower, the voltage gain is _____.
A) unity B) greater than unity C) less than unity D) zero
 - The best biasing stability is achieved by using _____ biasing method.
A) fixed B) collector to base C) voltage divider D) none of these
- b. Explain the working of collector-to-base bias circuit using an NPN transistor and derive the equation for I_B . (08 Marks)
- c. Define stability factor and discuss the factors that cause instability of biasing circuits. (08 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- FET is a _____ controlled device.
A) voltage B) current C) pulse D) power
 - PNPN device is an _____.
A) UJT B) SCR C) MOSFET D) MODFET
 - _____ used as a relaxation oscillator.
A) MOSFET B) SCR C) BJT D) UJT
 - The intrinsic standoff ratio of UJT _____.
A) equal to one B) must be less than unity
C) must be greater than unity D) must be zero
- b. Explain the working of two transistor model of an SCR and obtain the expression for the anode current. (08 Marks)
- c. Draw the equivalent circuit and VI-characteristic of UJT and explain it. (08 Marks)

PART – B

- 5 a. Choose the correct answers for the following : (04 Marks)
- Oscillator uses _____ type of feedback.
A) positive B) negative C) reverse D) both A and B
 - The frequency of oscillations in an oscillator is given by _____.
A) $\frac{1}{2\pi LC}$ B) $2\pi LC$ C) $2\pi\sqrt{LC}$ D) $\frac{1}{2\pi\sqrt{LC}}$
 - With negative feedback, the bandwidth of an amplifier _____.
A) decreases B) increases C) both A and B D) constant
 - The magnitude voltage gain at half power frequencies of an RC coupled amplifier is _____ times maximum voltage gain.
A) 0.707 B) 7.07 C) 10 D) 17.06
- b. Draw the frequency response of an RC-coupled amplifier and explain it. Mention its advantages and disadvantages. (08 Marks)
- c. Explain with the help of circuit diagram the working of an RC phase shift oscillator using transistor. (06 Marks)
- d. In a transistor colpitts oscillator having tank circuit parameters as $c_1 = 0.001 \mu\text{F}$ and $c_2 = 0.01 \mu\text{F}$ if $L = 5\mu\text{H}$, calculate the frequency of oscillations. (02 Marks)

- 6 a. Choose the correct answers for the following : (04 Marks)
- The gain of the voltage follower is _____.
A) zero B) infinite C) negative D) unity
 - Ideally open loop gain of op-amp is _____.
A) 0 B) 1 C) ∞ D) positive
 - The CMRR is given by _____.
A) $A_d \times A_c$ B) A_c/A_d C) A_d/A_c D) none of these
 - Maximum rate of change of output voltage with time is called _____.
A) CMRR B) slew rate C) over rate D) none of these
- b. List the characteristics of an ideal-op-amp and draw the three input inverting summer circuit using an op-amp and derive an expression for output voltage. (08 Marks)
- c. Draw the basic block diagram of a cathode ray tube and explain its working. (08 Marks)
- 7 a. Choose the correct answers for the following : (04 Marks)
- Two's complement of $(1001)_2$ is _____.
A) 1001 B) 0010 C) 0111 D) 1010
 - To represent 35 in binary, number of bits required is _____.
A) 6 B) 5 C) 4 D) 33
 - Decimal number 37 is represented in BCD by _____.
A) 100111 B) 00111011 C) 00110111 D) 111100
 - Over modulation exists when modulation index is _____.
A) 1 B) 0 C) >1 D) <1
- b. Explain the need for modulation. (06 Marks)
- c. Convert $(A3B)_{16} = (\quad)_{10}$, and $(247.75)_{10} = (\quad)_2$. (04 Marks)
- d. i) Perform $(FC02A)_{16} - (D052)_{16}$ using 16's complement. (06 Marks)
ii) Subtract $(4317.64)_8$ from $(42.345)_8$ using 8's complement.
- 8 a. Choose the correct answers for the following : (04 Marks)
- The expression for half adder carry with input A and B is given by _____.
A) $A + B$ B) AB C) $\overline{A} \overline{B}$ D) none of these
 - The complement of $A + B + 1$ is _____.
A) 0 B) $A + 1$ C) $AB + 1$ D) 1
 - $ABCD + ABD$ is equal to _____.
A) ABC B) \overline{ABC} C) \overline{ABD} D) ABD
 - $A + (B + C) = (A + B) + C$ is _____ law.
A) associative B) commutative C) distributive D) none of these
- b. Design a full adder circuit and realize, using two half adders. (08 Marks)
- c. Simplify the following expressions and implement using only NAND gates : (08 Marks)
- $Y = ABC + A\overline{B}C + AB\overline{C} + \overline{A}BC$
 - $Y = \overline{AB} + \overline{AC}$
 - $Y = A + \overline{AB}$.

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