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First/Second Semester B.E. Degree Examination, Dec.2013/Jan.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 on 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) The knee voltage of a silicon diode is
 A) 0.3V B) 0.5V C) 0.7V D) None of these
- ii) The efficiency of full waves rectifier is about _____ %
 A) 40.6 B) 0.46 C) 1.21 D) 81.2
- iii) The missing terms in the forward diode current is $I_f = I_s [e^{V/V_s} - 1]$
 A) V_R B) η C) V_s D) e
- iv) The zener diode is mainly used in
 A) Comparator B) Regulator C) Multivibrator D) None of these
- b. Discuss the behaviour of p-n junctions under:
 i) No bias; ii) Forward bias; iii) Reverse bias. (06 Marks)
- c. Explain the operation of full wave bridge rectifier with neat circuit diagram and waveforms. (06 Marks)
- d. A zener diode has a breakdown voltage of 10V. It is supplied from a voltage source varying between 20-40V in series with resistance of 820Ω , using an ideal zener diode model obtain minimum and maximum zener currents. (04 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- i) When transistor operated in cut off and saturation, it acts like
 A) a linear amplifier B) a switch
 C) a variable capacitor D) a variable resistor
- ii) If the base emitter junction is open, what is the collector current
 A) 1 mA B) 2mA C) 10mA D) 0
- iii) The _____ transistor is used for impedance matching
 A) C-B B) C-E C) C-C D) None of these
- iv) α of a transistor is 0.99 calculate β
 A) $\beta = 0.9$ B) $\beta = 90$ C) $\beta = 99$ D) $\beta = 0.09$
- b. Draw the common emitter circuit and sketch the output characteristics, explain active region, cutoff region and saturation region by indicating them on the characteristic curve. (08 Marks)
- c. With a neat circuit diagram explain the working of transistor used as voltage amplifier. (04 Marks)
- d. For a certain transistor, 99.6% of the carriers injected into the base cross the collector-base junction. If the leakage current is $5\mu A$ and the collector current is 20mA, calculate: i) The value of α ; ii) the emitter current. (04 Marks)

- 3 a. Choose the correct answers for the following : (04 Marks)
- The best biasing stability is achieved by using _____ biasing method.
 A) Fixed
 B) Collector to base
 C) Voltage divider
 D) None of these
 - In self bias or emitter bias circuit _____ is connected between emitter and ground.
 A) Inductor
 B) Capacitor
 C) Resistor
 D) Zener diode
 - The stability factor is given by
 A) $\frac{dI_{CO}}{dI_E}$
 B) $\frac{dI_B}{dI_{CO}}$
 C) $\frac{dI_E}{dI_{CO}}$
 D) $\frac{dI_C}{dI_{CO}}$
 - The operating point must be _____ for the proper operation of transistor
 A) High
 B) Stable
 C) Increasing
 D) Decreasing
- b. With a neat circuit diagram, explain the working of an collector-to-base bias circuit using an npn transistor and derive the equation for I_B . (06 Marks)
- c. Determine the operating point for a silicon transistor biased by base bias method with $\beta = 100$, $R_B = 500K\Omega$, $R_C = 2.5K\Omega$ and $V_{CC} = 20V$. Also draw the load line. (06 Marks)
- d. Derive the stability factor S for base bias circuit. (04 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- With gate open, if the supply voltage exceeds the break over voltage of SCR, then SCR will conduct
 A) False
 B) True
 C) Only for D.C
 D) Only for A.C
 - The SCR is a _____ device
 A) NPN
 B) PNP
 C) PNP
 D) PNN
 - A relaxation oscillator uses _____
 A) MOSFET
 B) SCR
 C) UJT
 D) BJT
 - FET is a _____ controlled device
 A) Voltage
 B) Current
 C) Power
 D) None of these
- b. Explain the construction of n-channel JFET and give its symbol. (06 Marks)
- c. Write and explain the equivalent circuit of UJT. (05 Marks)
- d. Explain the two transistor model of SCR. (05 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) None of these
 - The total phase shift around a loop must be ____ for the sustained oscillations

A) 180°	B) 360°
C) 90°	D) 270°
 - The frequency response is a graph of ____

A) frequency v_s current gain	B) frequency v_s voltage gain
C) frequency v_s output voltage	D) frequency v_s input voltage
 - In RC coupled amplifier the d.c component is blocked by ____

A) Load resistance R_L	B) Coupling capacitor, C_C
C) R_B	D) The transistor
- b. With a neat circuit diagram, explain the working of a two stage capacitor coupled CE amplifier. (08 Marks)
- c. Explain with the help of circuit diagram the working of an RC phase shift oscillator using transistor. (06 Marks)
- d. Find the frequency of the oscillations of transistorized Colpitts oscillator having tank circuit parameters as $C_1 = 150\text{pF}$, $C_2 = 1.5\text{nF}$ and $L = 50\mu\text{H}$. (02 Marks)
- 6 a. Choose the correct answers for the following : (04 Marks)
- In an inverting amplifier there is ____ phase shift between input and output.

A) 0°	B) 90°
C) 180°	D) 360°
 - Ideally open loop gain of op-amp is ____

A) 0	B) 1
C) ∞	D) Negative
 - When op-amp used as integrator with input as square wave the output will

A) Ramp	B) Triangular wave
C) Cosine wave	D) Step
 - Lissajous figures are used to measure ____ difference between sinusoidal signals

A) Phase	B) Amplitude
C) Frequency	D) None of these
- b. Write the ideal op-amp characteristics. (06 Marks)
- c. Show with a circuit diagram how an op-amp can be used as differentiator. (06 Marks)
- d. Explain how current measurement is done using CRO. (04 Marks)

- 7 a. Choose correct answers for the following : (04 Marks)
- Which of the following is invalid BCD code?

A) 0011	B) 1101
C) 0101	D) 1001
 - Given the number $(8BF)_{16}$, what is the positional weight of the 8?

A) 16	B) 256
C) 4096	D) 8192
 - $(64)_{16} - (46)_8$ in binary is

A) 111101101	B) 111101100
C) 111110	D) 1100110
 - The relation between carrier power and total power in an AM wave ____

A) $P_c = P_r \left(1 + \frac{m^2}{4}\right)$	B) $P_c = P_r \left(1 + \frac{m^2}{2}\right)$
C) $P_r = P_c \left(1 + \frac{m^2}{4}\right)$	D) $P_r = P_c \left(1 + \frac{m^2}{2}\right)$
- b. Determine the value of base x, if i) $(225)_x = (341)_8$; ii) $(211)_x = (152)_8$. (06 Marks)
- c. Perform subtraction using 2's complement method $1101 - 1010$. (04 Marks)
- d. Draw the block diagram of super heterodyne receiver and explain the functions of each block. (06 Marks)
- 8 a. Choose the correct answers for the following : (04 Marks)
- De Morgan's theorem states that $\overline{A+B}$ is

A) $\overline{A+B}$	B) $\overline{A}.\overline{B}$
C) \overline{AB}	D) $\overline{A+B}$
 - Universal gates are ____ and _____.

A) NOT and NOR	B) AND and OR
C) NAND and NOR	D) XOR and XNOR
 - For which gate when the two inputs A and B are equal the output is zero and otherwise one?

A) NAND	B) NOR
C) EXNOR	D) EXOR
 - An half adder has two inputs and ____ outputs

A) ONE	B) TWO
C) THREE	D) None of these
- b. Implement EX-NOR gate using only NOR gates. (04 Marks)
- c. Simplify $AB + \overline{AC} + A\overline{B}C(A+B+C)$. (06 Marks)
- d. Implement full adder using two half adders and one OR gate. Write the equations for sum and C_{out} . (06 Marks)