USN | | | | | | | | | | |

10ELN15/25

First/Second Semester B.E. Degree Examination, January 2013
Basic Electronics

Time: 3 hrs. Max. Marks:100

Note: *1. Answer 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. Answers to objective type questions on sheets other than OMR will not be valued.

PART - A

1 a. Choose the correct answer : **(04 Marks)**

i) A device which allows the current flow in one direction but does not allow it in the opposite direction is called ____.
(A) Transistor (B) Filter (C) Regulator (D) Rectifier.

ii) The capacitance of a forward biased p – n function is called _____
(A) Diffusion (B) Conventional (C) Drift (D) Transition

iii) The zener power dissipation is given by the product of _____
(A) V_R , I_Z (B) V_F , I_Z (C) V_Z , I_Z (D) None of these

iv) The maximum efficiency of full wave rectifier is _____.
(A) 40.6% (B) 60.4% (C) 78.5% (D) 81.2%.

b. Explain the forward and reverse characteristics for a Ge – diode, with a neat figure. **(05 Marks)**

c. With a circuit diagram, explain the working of a full wave rectifier. Draw relevant waveforms. **(06 Marks)**

d. A 9V reference source is to be designed using a zener diode and a resistor connected in series to a 30V supply. Select suitable components and calculate the circuit current when the supply voltage drops to 27V. Assume I_{ZT} = 200mA. **(05 Marks)**

2 a. Choose the correct answer : **(04 Marks)**

i) A transistor is cutoff when _____
(A) Both emitter and collector function reverse biased
(B) The emitter function is reversed biased but the collector function is forward biased.
(C) Both emitter and collector function are forward biased.
(D) The emitter function is forward biased but the collector function is reversed biased.

ii) If α = 0.95, than the value of β of the transistor is ____
(A) 0.05 (B) 19 (C) 100 (D) 120

iii) The output characteristics of a CE configuration is a graph between _____.
(A) V_{BE}, I_B (B) V_{BE}, V_{CE} (C) V_{CE}, I_C (D) V_{BE}, I_E

iv) The Q – point is also known as _____
(A) Open point (B) Operating point (C) D.C. point (D) A.C point.

b. Explain the working of a current amplification using transistor. **(05 Marks)**

c. Explain with the help of circuit diagram the working of input and output characteristics of transistor in CB configuration. **(07 Marks)**

d. For a certain transistor circuit, I_C = 12.42mA and I_B = 200μA, find i) IE ii) α and β of transistor. **(04 Marks)**

3 a. Choose the correct answer : **(04 Marks)**

i) In the biasing circuit, the one which gives most stable operating point.
(A) Base bias (B) Collector to base bias (C) Voltage divider bias (D) None of these.

ii) Stability factor S for base bias circuit is _____
(A) $S = 1 + \beta$ (B) $S = 1 - \beta$ (C) $S = 1/(1 - \beta)$ (D) $S = 1/(1+\beta)$

iii) Diode can be used for compensation of _____ changes in voltage divider bias circuit
(A) V_{BE} (B) V_{CE} (C) V_{CC} (D) V_E

iv) In emitter bias circuit ____ is connected between emitter and ground.
(A) Inductor (B) Capacitor (C) Resistor (D) Diode

b. With a circuit diagram, explain the operation of collector – to base bias circuit. **(08 Marks)**

c. The voltage divider bias circuit has V_{CC} = 15V , R_1 = 6.8kΩ , R_2 = 3.3kΩ , R_C = 900Ω , R_E = 900Ω and h_{FE} = 50, V_{BE} = 0.7V. Find the levels of V_E, I_B, I_C, V_{CE} and V_C. Draw the DC load line and mark the Q point on that. **(08 Marks)**

4 a. Choose the correct answer : **(04 Marks)**

i) SCR is a ____ device
(A) NPN (B) PNP (C) PNPN (D) PNN

ii) SCR crow bar circuit is used for protection against
(A) under voltage (B) over current (C) under current (D) over voltage.

iii) The intrinsic stand – off ration of UJT_____
(A) must be less than unity (B) must be greater than unity (C) must be zero (D) must be negative

iv) FET is a _____controlled device.
(A) Voltage (B) Current (C) Power (D) None of these

b. Explain the working of two transistor model of SCR. **(06 Marks)**

c. Explain with a neat figure the construction of a P – channel JFET. **(06 Marks)**

d. Give the equivalent circuit of UJT. **(04 Marks)**

PART – B

5 a. Choose the correct answer : **(04 Marks)**

i) In an oscillator we use ____ feedback.
(A) Positive (B) Negative (C) Neither (D) Unity gain

ii) The two Barkhausen conditions to be satisfied by oscillator are _____
(A) $|A\beta| \leq 1$, shift = 0^0 (B) $|A\beta| \geq 1$, shift = 0^0 (C) $|A\beta| \geq 1$, shift = 90^0 (D) $|A\beta| \geq$, shift = 180^0

iii) 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

iv) $f_1(f_L)$ and $f_2(f_H)$ are known as _____ frequencies
(A) half (B) half power (C) decibel (D) mid band

b. With the help of circuit diagram, explain the working of a RC coupled single state CE amplifier. **(06 Marks)**

c. List the advantages of negative feedback. **(05 Marks)**

d. Calculate the value of an inductor to be used in Colpitt's oscillator to generate a frequency of 10MHz. Assume the values of C_1 = 100 pf and C_2 = 50 pf. **(05 Marks)**

6 a. Choose the correct answer : **(04 Marks)**

i) The ideal value of CMRR is _____
(A) 90dB (B) 2×10^5 (C) 0 (D) ∞

ii) The PSRR is generally measured in _____
(A) dB (B) mV/V (C) μV/V (D) V/μS

iii) The gain of voltage follower is _____
(A) zero (B) infinite (C) negative (D) unity

iv) If we apply a square waveform to a differentiator, then we get _____at the output
(A) cosine wave (B) ramp (C) sine wave (D) train of impulses

b. Give the ideal op-amp characteristics. **(05 Marks)**

c. With the help of circuit diagram, explain the working of an op-amp used as integrator. **(06 Marks)**

d. Design an adder circuit using op – amp to obtain an output expression $V_0 = -(0.1V_1 + 0.5V_2 + 20V_3)$, where V_1, V_2 and V_3 are the inputs. Select $R_f = 10k\Omega$ **(05 Marks)**

7 a. Choose the correct answer : **(04 Marks)**

i) Over modulation exists when modulation index is _____
(A) 1 (B) 0 (C) > 1 (D) < 1.

ii) The relation between carrier power and total power in an AM wave is _____
(A) $P_C = P_T(1+(m^2/4))$ (B) $P_C = P_T(1+(m^2/2))$ (C) $P_T = P_C(1+(m^2/4))$ (D) $P_T = P_C(1+(m^2/2))$

iii) The amplitude of both the side bands in an AM wave is _____
(A) $E_C^2/2m$ (B) $m^2E_C/2$ (C) $mE_C/2$ (D) $m^2E_C^2/4$

iv) Hexadecimal and octal numbering systems are similar for the first
(A) 9 digits (B) 8 digits (C) 7 digits (D) 6 digits.

b. Explain the need for modulation. **(06 Marks)**

c. With the help of block diagram, explain the working of super heterodyne receiver. **(06 Marks)**

d. Perform the following decimal subtraction using 9's complement method : i) 49 – 24 ii) 321 - 579. **(04 Marks)**

8 a. Choose the correct answer : **(04 Marks)**

i) For EX – NOR gate the output is 1 if_____.
(A) even number of inputs is 0 (B) even number of inputs is 1
(C) odd number of inputs is 0 (D) odd number of inputs is 1.

ii) Which of these are universal gates?
(A) only NOR (B) only NANS (C) Both NOR & NAND (D) NOT, AND, OR

iii) The result of binary addition 1 + 1 + 1 is ____
(A) carry 0, sum 0 (B) carry 0, sum 1 (C) carry 1, sum 0 (D) carry 1, sum 1

iv) A half adder has _____inputs and ____outputs.
(A) 1, 1 (B) 1, 2 (C) 2, 1 (D) 2, 2

b. State Define Morgan's theorems. **(04 Marks)**

c. Simplify the following Boolean expressions : i) $Y = AB + \overline{A}C + BC$ ii) $Y = (A + \overline{B} + \overline{C})(A + \overline{B} + C)$
iii) $Y = C(B + C)(A + B + C)$. **(06 Marks)**

d. What is full adder? Give its truth – table. Implement the full adder using logic gates. **(06 Marks)**

*****