CBCS Scheme

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

15ELN15/25

First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electronics

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Explain the i) Ideal-diode approximation ii) Practical diode approximation iii) Piece-wise linear approximation of diode. **(06 Marks)**

b. Draw the circuit of full-wave rectifier and derive the expression for average dc current I_{DC}, RMS load current I_{RMS}. **(08 Marks)**

c. Calculate the output voltage V_0 in the following circuit:

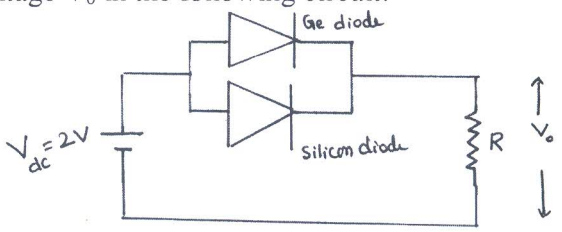

Fig.Q.1(c)

Assume V_r (breakdown V_g of G_e) = 0.7V
Assume V_r (breakdown V_g of silicon) = 0.3V. **(02 Marks)**

OR

2 a. Draw the common Emitter circuit and sketch the output characteristics, explain active region, cut off region and saturation region by indicating them on the characteristic curve. **(08 Marks)**

b. A transistor has $I_B = 100\mu A$ and $I_C = 2mA$. Find: i) β of the transistor ii) α of the transistor iii) Emitter current I_E iv) If I_B changes by $+2s\mu A$ and I_C changes by +0.6mA. Find the new value of β. **(08 Marks)**

Module-2

3 a. Sketch a base-bias circuit and write equations for I_B, I_C and V_{CE}. **(04 Marks)**

b. A voltage divider bias circuit with a 25V supply has $R_C = 4.7\ K\Omega$, $R_E = 3.3\ K\Omega$, $R_1 = 33K\Omega$, $R_2 = 12K\Omega$ and $h_{FE} = 50$. Use the approximate analysis method to calculate the V_{CE} level. **(08 Marks)**

c. Derive the output equation for non-inverting amplifier using op-amp. **(04 Marks)**

OR

4 a. Define the terms: i) Slew rate ii) CMRR iii) Common mode gain A_C. **(06 Marks)**

b. 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 $R_f = 10K\Omega$. **(06 Marks)**

c. Write any four Ideal-opamp characteristics. **(04 Marks)**

Module-3

5 a. Convert the following binary numbers to octal number system:
i) 1 0 1 1 . 1 1 1 1 ii) 1 1 1 1 0 0 1 1 . 1 1 1 0 0 0 1. **(04 Marks)**

b. With a neat diagram, explain the concept of digital waveform. **(06 Marks)**

c. Subtract $(1000.01)_2$ from $(1011.10)_2$ using 1's and 2's complement method. **(06 Marks)**

OR

6 a. State and prove De-Morgan's theorem. **(04 Marks)**

b. Simplify the following Boolean expressions:

i) $AB + \overline{AC} + A\overline{B}C(\overline{AB} + C)$

ii) $\overline{\overline{A\overline{B} + ABC + A(B + A\overline{B})}}$. **(06 Marks)**

c. Realize full adder circuit using NAND gate. **(06 Marks)**

Module-4

7 a. Explain the working of clocked R-S flip flop with a suitable circuit, symbol, truth-table, input-output waveforms considering positive edge triggered RS flip-flop. **(08 Marks)**

b. With a neat block diagram, explain how stepper motor is interfaced to 8051 microcontroller. **(08 Marks)**

OR

8 a. With a neat diagram, explain flag register of 8051 microcontroller. **(06 Marks)**

b. Differentiate between latches and flip-flops. **(04 Marks)**

c. Draw the TMOD register and explain how it control the modes of operation of a timer in 8051 microcontroller. **(06 Marks)**

Module-5

9 a. Define amplitude modulation and derive the expression for standard amplitude modulation. Also define modulation index. **(06 Marks)**

b. A broadcast transmitter radiates 20kW when the modulation percentage is 75. How much of this is carrier power? Also calculate the power of each sideband. **(06 Marks)**

c. Distinguish between frequency modulation and amplitude modulation. **(04 Marks)**

OR

10 a. With a neat diagram, explain the construction and operation of LVDT. Also mention its advantages and disadvantages. **(10 Marks)**

b. An FM signal is given as $V = 12 \sin(5 \times 10^3 t + 5\sin 1250t)$. Calculate: i) Carrier frequency ii) Modulating frequency iii) Frequency deviation. **(06 Marks)**

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