Code : ESC–201 (100303)

B.Tech 3rd Semester Special Exam., 2020

(New Course)

BASIC ELECTRONIC ENGINEERING

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Choose the correct answer of the following (any *seven*) : 2×7=14

(a) In amplitude modulation, what property of carrier varies with the strength of the modulating signal?

(i) Amplitude

(ii) Frequency

(iii) Phase

(iv) None of the above

(b) The use of negative feedback

(i) reduces the voltage gain of an OP-AMP

(ii) makes the OP-AMP oscillate

(iii) makes linear operation possible

(iv) Both *(i)* and *(iii)*

(c) The given Boolean expression is $Y = A\overline{B} + B\overline{A}$. If $A = 1$ and $B = 1$, then $Y =$

(i) 1

(ii) 0

(iii) Either 1 or 0

(iv) None of the above

(d) The binary number 10101 is equivalent to the decimal number

(i) 19

(ii) 12

(iii) 27

(iv) 21

(e) The universal gate is

(i) NAND gate

(ii) OR gate

(iii) NOT gate

(iv) None of the above

(f) If the PIV rating of a diode is exceeded

(i) the diode conducts poorly

(ii) the diode is destroyed

(iii) the diode behaves as Zener diode

(iv) None of the above

(g) A diode is a

(i) non-linear device

(ii) bilateral device

(iii) linear device

(iv) None of the above

(h) A series resistance is connected in the Zener circuit to

(i) properly reverse bias the Zener

(ii) protect the Zener

(iii) properly forward bias the Zener

(iv) None of the above

(i) In a *p-n-p* transistor, the current carriers are

(i) acceptor ions

(ii) donor ions

(iii) free electrons

(iv) holes

(j) The emitter of a transistor is

(i) lightly doped

(ii) heavily doped

(iii) moderately doped

(iv) None of the above

2. (a) Derive the expression of efficiency for a full-wave bridge rectifier. 7

(b) Describe the operations of capacitor and choke input filter. 7

3. (a) Explain the working of BJT as an amplifier. 7

(b) How will you draw d.c. load line on the output characteristics of a transistor? What is its importance? 7

4. (a) Derive the expression of frequency of oscillation for Wien bridge oscillator. 8

(b) Explain the operation of IC-555 as monostable multivibrator using proper diagram. 6

5. (a) What are the merits and limitations of FM? 7

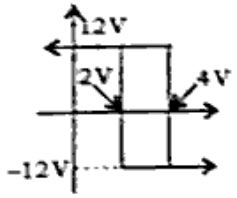
(b) Describe cellular concept in GSM system. 7

6. (a) Realize the following function with the help of NAND gates : 8

$F(A, B, C, D) = \Sigma m(0, 1, 4, 12) + d(2, 3, 8)$

(b) Draw a full-adder circuit and explain its operation. 6

7. (a) Design a comparator that has the following transfer characteristics. You have available resistor, d.c. power supplies and OP-AMP for your design : 8

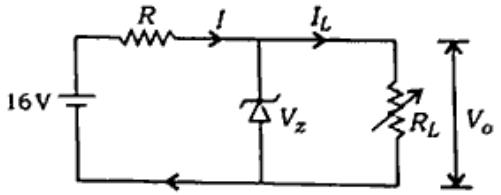


(b) Derive the gain expression of an integrator and a differentiator using OP-AMP. 6

8. (a) Convert *J-K* flip-flop into *D* flip-flop. Explain with the help of excitation table, characteristic equation and block diagram. 8

(b) Explain the operation of shift register and differentiate between left-shift register and right-shift register. 6

9. (a) In the circuit shown below, the voltage across the load is to be maintained at 12 V as load current varies from 0 to 200 mA. Design the regulator. Also find the maximum wattage rating of the Zener diode : 8



(b) Explain the block diagram of regulated power supply. 6

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