

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) :  $2 \times 7 = 14$

(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  $Y = A\bar{B} + B\bar{A}$ . 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

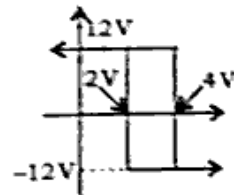
- ~~(i) NAND gate~~
- (ii) OR gate
- (iii) NOT gate
- (iv) None of the above

- (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

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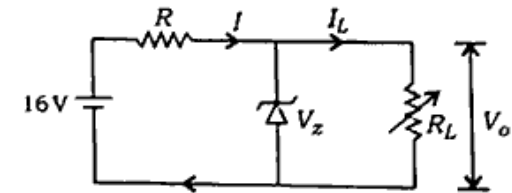
6. (a) Realize the following function with the help of NAND gates : 8  
 $F(A, B, C, D) = \sum m(0, 1, 4, 12) + d(2, 3, 8)$
- (b) Draw a full-adder circuit and explain its operation. 6
7. (a) Design a comparator that has the following transfer characteristics. You have available resistor, d.c. power 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

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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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