

## B.E./B.TECH. DEGREE EXAMINATION, DECEMBER 2020

## Fourth Semester

**EC16451 – ELECTRONICS AND MICROCONTROLLER**

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. A simple diode rectifier has 'ripples' in the output wave which makes it unsuitable as a DC source. To overcome this one can use
  - a) A capacitor in series with a the load resistance
  - b) A capacitor in parallel to the load resistance
  - c) Both of the mentioned situations will work
  - d) None of the mentioned situations will work
2. Find the collector current for a CE configuration with a  $\beta=100$  and a base current  $I_B$  of  $30\mu\text{A}$ .
  - a)  $30\mu\text{A}$
  - b)  $0.3\mu\text{A}$
  - c)  $30\text{ mA}$
  - d)  $3\text{ mA}$
3. What is the maximum possible range of bit-count specifically in n-bit binary counter consisting of 'n' number of flip-flops?
  - a) 0 to  $2^n$
  - b) 0 to  $2^n + 1$
  - c) 0 to  $2^n - 1$
  - d) 0 to  $2^{n+1/2}$
4. Match the following:
 

|         |                                       |
|---------|---------------------------------------|
| 1) TCON | i) contains status information        |
| 2) SBUF | ii) timer / counter control register. |
| 3) TMOD | iii) idle bit, power down bit         |
| 4) PSW  | iv) serial data buffer for Tx and Rx. |
| 5) PCON | v) timer/ counter modes of operation. |

  - a) 1->ii, 2->iv, 3->v, 4->i, 5->iii.
  - b) 1->i, 2->v, 3->iv, 4->iii, 5->ii.
  - c) 1->v, 2->iii, 3->ii, 4->iv, 5->i.
  - d) 1->iii, 2->ii, 3->i, 4->v, 5->iv.

5. Justify that Zener diode can be used as Voltage regulator with relevant equations and diagram.
6. Distinguish between BJT and FET
7. Simplify the given function:  $F = A'BC + A'B'C + AB'C' + ABC' + ABC$ .
8. Compare SJMP and LJMP instructions of 8051 microcontroller with suitable example.

**PART B - (4 X16 = 64 marks)**

09. (a) (i) Illustrate how energy bands are formed and compare the Conductor, Semiconductor and Insulator with respect to energy bands. **(8)**
- (ii) Draw the circuit of PN junction diode in Forward and Reverse bias condition and explain how this circuit is used to study the silicon diodes using its V-I characteristics. **(8)**

**(OR)**

- (b) (i) A diode having internal resistance  $r_f = 20\Omega$  is used for half-wave rectification. If the applied voltage  $v = 50 \sin \omega t$  and load resistance  $R_L = 800 \Omega$ , find: **(10)**
- (i)  $I_m, I_{dc}, I_{rms}$
- (ii) a.c. power input and d.c. power output (iii) d.c. output voltage (iv) efficiency of rectification.
- (ii) Distinguish the characteristics difference between half wave rectifier and Bridge type full wave rectifier **(6)**

10. (a) Illustrate the Voltage divider bias circuit of BJT and justify with relevant evidence that it is superior than other biasing techniques **(16)**

**(OR)**

- (b) Illustrate the operation of Uni-Junction Transistor with its construction diagram and equivalent circuit. Draw its VI characteristics. Also derive the expression for its frequency of Oscillation. **(16)**
11. (a) Design a logic circuit that will accept a 4 bit binary number as input and can identify if the input is a multiple of 3. **(16)**

**(OR)**

- (b) Design a 3 bit shift register and compare the various modes of operation for storing and retrieving the data. **(16)**

12. (a) Write an 8051 ACP to continuously get 8-bit data from port P0 and send it to port P1 **(16)** while simultaneously creating a square wave of 200  $\mu$ s period on pin P2.1.  
Use timer 0 to generate the square wave. Assume that XTAL = 1 MHz.  
Comment on all the SFR's used in this program.

**(OR)**

- (b) Demonstrate how a character pressed in a 3x3 matrix key pad is displayed in an **(16)** 2x16 Alpha numeric LCD display. Write respective ALP when this job is done through 8051 microcontroller.