

College of Engineering, Pune

End Semester Exam – May 2010

F. Y. B. Tech.

(ET 101)- (Basic Electronics)

Day & Date- 14th May 2010

Maximum Marks: 50

Time: - 10 am to 1 pm

Duration – 3 hrs.

Instructions:

1. Assume suitable data wherever necessary.

- | | | Marks |
|------|--|-------|
| Q. 1 | A. A half wave rectifier circuit is supplied from a 230 Volts, 50 Hz supply with a step down transformer ratio of 3:1 to a resistive load of 10 K Ω . The diode forward resistance is 75 Ω while transformer secondary resistance is 10 Ω . Calculate I_m , I_{dc} , V_{dc} , efficiency and ripple factor. | 5 |
| | B. Draw the characteristics of BJT in CE configuration. Show the three regions of operation, giving the biasing requirements and practical use of the same. | 3 |
| | C. Illustrate the functioning of capacitor filter | 2 |
| Q. 2 | A. Draw the block diagram of a typical op-amp. Explain functioning and need of each block. | 3 |
| | OR
For op-amp explain following parameters: | 3 |
| | i) Input offset voltage | |
| | ii) Input bias current | |
| | iii) Input resistance | |
| | B. Explain working of closed loop inverting summing amplifier, showing circuit arrangement.
Derive output voltage equation for summing amplifier with 3 inputs.
For the summing amplifier, if all 3 resistors used are of equal value and has value 1 k Ω and 3 inputs, v_1 , v_2 , v_3 are 2V, 3V and 4V respectively.
Find output voltage for summing amplifier if supply voltage is ± 12 V. | 4 |
| | C. What is negative feedback?
Give block schematic of following negative feedback circuits:
Voltage series feedback and current shunt feedback. | 3 |
| Q. 3 | A. What is the difference between positive and negative logic?
Illustrate DeMorgan's theorem with example. | 3 |

- B What is universal gate? 1
- C. Simplify the following Boolean equation using K map 3
- $$X = \overline{A}BCD + \overline{A}BC\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D} + \overline{A}B\overline{C}D + \overline{A}B\overline{C}\overline{D}$$
- D Draw a diagram of JK flipflop using NAND gates and explain its working. 3
- Q.4 A Explain in brief functional diagram of monostable multivibrator using 555 timer 4
- OR
- Draw the practical circuit and explain functioning of Astable multivibrator using 555 timer, 4
- B For the Astable multivibrator circuit, calculate a) t_{ON} , b) t_{OFF} , c) Free running frequency, d) duty cycle D 2
- Given: $R_A = 6.8 \text{ k}\Omega$, $R_B = 3.3 \text{ k}\Omega$ & $C = 0.1 \mu\text{F}$
- C (i) What is Barkhausen Criterion for Oscillations? 1
- (ii) Explain the circuit of RC phase shift Oscillator 2
- (iii) Calculate the values of R & R_F , in the RC phase shift Oscillator. 1
- Given: Frequency of oscillation = 100Hz, $C = 0.1 \mu\text{F}$, $R_1 = 10R$
- Q.5 A. What is modulation? Why is modulation necessary in communication system? 2
- B. Explain amplitude modulation with waveform. Derive the voltage equation of an AM wave. 3
- OR
- A frequency modulated signal is represented by the voltage equation as $s(t) = 20 \sin(2 \times 10^8 t + 5 \sin 1000 t)$ find frequency of carrier signal, frequency of modulating signal and bandwidth of FM 3
- C. (i) Write short note on any one of the following 3
- a) Public address system
- b) GSM architecture
- c) Front Panel controls of CRO.
- (ii) State the working principle of strain gauge. 2
- OR
- (ii) What is transducer? State the working principle of LVDT. 2