

**COLLEGE OF ENGINEERING, PUNE.**  
(An Autonomous Institute of Government of Maharashtra)  
**End Semester Examination**  
**Basic Electronics**

Program: First Year B. Tech.

Year: 2008-09

Duration: 3 hrs

Semester: Spring

Max. Marks: 50

20.04.09

**Instructions:**

1. Attempt ANY TWO sub-questions from each question.
2. Figures to the right indicate full marks.
3. Assume suitable data wherever necessary.
4. Draw neat figures wherever required.

- Q 1 a)** Draw a neat block diagram of DC regulated power supply. Show the waveforms at the output of each block.  
A DC power supply is known to have a ripple of 10%. If the DC output voltage is 10 V, what is the rms value of ripple voltage in the output? Assuming this ripple to be sinusoidal in nature, what is the peak-to-peak ripple voltage? (5)
- b)** An unloaded zener regulator has a source voltage of 20 V, a series resistance of 330  $\Omega$  and a zener voltage of 12 V, what is the zener current? If the source voltage here varies from 20 to 40 V, what is the maximum zener current? Also explain the zener breakdown mechanism. (5)
- c)** Compare CE and CB configurations of BJT on the basis of following points:  
i) Circuit diagram.  
ii) Current gain  
iii) Voltage gain  
iv) Input and output characteristics  
v) Applications (5)
- Q 2 a)** State and prove DeMorgan's two theorems.  
Simplify the following expression using k-map technique:  
 $F(A, B, C, D) = \sum m(1, 3, 5, 7, 9, 11, 12, 14)$  (5)
- b)** State and explain the difference in the truth-tables of S-R and J-K flip-flops. Show the conversions of i) S-R flip-flop to J-K flip-flop ii) J-K flip-flop to D flip-flop and iii) J-K flip-flop to T flip-flop. Write the truth-tables of D and T flip-flops. (5)

- c) Draw a neat schematic of a ripple counter for counting 8 pulses using JK flip-flops. Write its count-table and draw the output waveforms in synchronization with the clock. How many flip-flops are required to build a counter for counting 512 pulses? (5)
- Q 3 a) Draw a neat circuit diagram of a summing amplifier and a difference amplifier using op-amp. Derive the expressions for the output voltage of both these circuits. (5)
- b) Draw the circuit diagrams of an RC phase shift oscillator and Wien bridge oscillator using op-amp. Explain how Barkhausen's criteria are satisfied in these circuits. Write the expressions for their frequency of oscillations. (5)
- c) Draw the internal functional diagram of IC 555. Explain the operation of monostable mode of IC 555. State the application of monostable mode. (5)
- Q. 4 a) Explain the concept of active and passive transducers. Explain the principle of operation of strain gauge and LVDT. (5)
- b) With the help of a block schematic, explain the operation of CRO. State the important front panel controls to be used in order to observe a neat and stable display of waveform on CRO. (5)
- c) An astable multivibrator is required to generate rectangular waveform with  $t_{ON} = 0.75 \text{ mS}$  and total time period  $T = 1 \text{ mS}$ . If selected value of capacitor is  $C = 0.1 \mu\text{F}$ , calculate the values of  $R_A$  and  $R_B$ . Calculate its frequency of oscillations and duty cycle. Also show the circuit diagram along with component values. (5)
- Q.5 a) Define the modulation index of AM. If the modulating signal is composed of multiple sinusoids, what is the resultant modulation index? If such a decomposition is not available, how to measure modulation index? (5)
- b) With the help of waveforms, explain frequency modulation (FM). Define modulation index and bandwidth requirement for the FM signal. (5)
- c) What are the various sub-systems present in GSM? State the function of each sub-system and explain how they interact with each other so as to achieve overall functionality of GSM system. (5)

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