

Registration No. :

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Total number of printed pages – 2

B. Tech
BE 2101

Special Examination – 2012

BASIC ELECTRONICS

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
- (a) What is the significance of Virtual Ground?
- (b) Explain the difference between analog, ~~digital~~ and discrete –Time Signal.
- (c) Define the following terms :
- (i) Slew Rate of an Op-Amp
- (ii) Unity gain bandwidth
- (d) What is a load line ? How it is used to calculate the operating point ?
- (e) Compare the PIVs of a half-wave rectifier and a full wave rectifier.
- (f) A signal is represented by $y = 10 \sin (628 t + 30^\circ)$. Find the frequency, amplitude and initial phase of the signal.
- (g) Why voltage series feedback is most commonly used in amplifier ?
- (h) Determine the DC resistance of a diode at $V_D = -20 \text{ V}$ if its reverse saturation current is $1 \mu \text{ A}$. (Take $V_T = 25 \text{ mV}$ at room temperature)
- (i) Compare the advantages and disadvantages between center-tapped and bridge-type full wave rectifier.
- (j) Convert the decimal number – 64 to its equivalent 1's complement and 2's complement forms.
2. (a) What is clamper circuit ? Draw the circuit diagram of positive clamper and negative clamper showing their output waveforms. 5
- (b) Explain the operation of Full Wave Rectifier (Center Tapped type) with input-output waveforms. 5

P.T.O.

3. (a) A Crystal diode having an internal resistance $r_f = 20 \Omega$ is used for full-wave rectification. If the applied voltage is $V = 50 \sin 2t$ and the load resistance is $R_L = 1000 \Omega$, determine the following : 6
- I_m, I_{dc}, I_{rms} of output.
 - AC power input and DC power output
 - Ripple factor
- (b) What are ideal Characteristics of an op-amp ? 4
4. (a) State and explain the function of the sweep signal in an oscilloscope. What is Lissajous method ? Does Lissajous method require sweep signal ? Justify answers in brief along with suitable diagram or graphs. 5
- (b) Draw the block diagram of function generator and explain its operation. 5
5. (a) Draw circuits for both inverting and non-inverting amplifiers using op-amp. Derive an expression for the gain of an inverting amplifier. 5
- (b) How the transistor can be used as an amplifier in CE configuration ? Explain with proper diagram. 5
6. (a) What is the condition of oscillation ? Derive expression of frequency of oscillation and also the condition of oscillation in a RC-phase shift oscillator. 5
- (b) Derive the condition of oscillation in a Wein-Bridge oscillator. Also derive its frequency of oscillation draw a neat sketch. 5
7. (a) Implement the following logic functions : 5
- $X = \bar{A} + BC$ using NAND gates only
 - $Y = \bar{A}B + C$ Using NOR gates only
- (b) Classify different types of RAMs. Explain the operation of SRAM. 5
8. (a) Distinguish between multiplexer and demultiplexer. Draw the logic diagram of 4-to-1 line multiplexer. 4
- (b) Convert the following SOP expression into its standard POS form and write its truth table. 6
- $AB'C + A'B' + ABC'D$

