

Registration No. :

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Total number of printed pages – 3

B. Tech
BE 2101

First Semester Examination – 2012-13

BASIC ELECTRONICS

Full Marks – 70

Time : 3 Hours

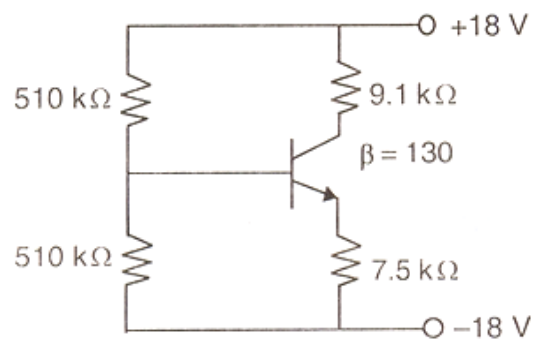
Answer Question No. 1 which is compulsory and any **five** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
- (a) What is the cause and effect of the depletion layer in a $p-n$ junction diode ?
 - (b) Explain the difference between analog, digital and discrete –Time Signal.
 - (c) What is Avalanche breakdown ?
 - (d) Determine the d.c. resistance of a diode at $V_D = -20V$ if its reverse saturation current is $1 \mu A$. (Take $V_T = 25mV$ at room temperature)
 - (e) Compare the advantages and disadvantages between center-tapped and bridge-type full-wave rectifier.
 - (f) Write down the advantages of a negative feedback amplifier.
 - (g) What is the relationship between the period of a waveform and its frequency ?
 - (h) A signal is represented by $y=5 \sin (628 t + 30^\circ)$. Find the frequency, amplitude and initial phase of the signal.

P.T.O.

- (i) What do you mean by three state gate, what is its importance in combinational circuit ?
- (j) Convert the decimal number-32 to its equivalent 1's complement and 2's complement forms.
2. (a) Explain the operation of a $p-n$ junction diode with V-I characteristics. 5
- (b) Explain the operation of Full-Wave Rectifier (Center Tapped type) with input-output waveforms. 5
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 $R_L = 800\Omega$, determine the following : 6
- (i) I_m, I_{dc}, I_{rms} of output.
- (ii) a.c. power input and d.c. power output
- (iii) Ripple factor
- (b) What are ideal characteristics of an op-amp ? 4
4. (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
5. (a) For the circuit shown below determine I_B, I_C, V_E, V_{CE} and V_B where the symbols used have their usual meaning ? 5



- (b) Draw the block diagram of function generator and explain its operation. 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) State and explain the function of the sweep signal in an oscilloscope. What is Lissajous method ? Does Lissajous method require sweep signal ? Justify the answers, in brief, along with suitable diagram or graphs. 5
7. (a) Which logical gates are considered as Universal gates ? Draw the circuit diagrams showing the universal properties of any one Universal gate. 5
- (b) Write the truth table of half-adder and full-adder. Draw their block diagrams. 5
8. (a) Implement the following logic functions : 5
- (i) $X = \bar{A} + BC$ using NAND gates only
- (ii) $Y = \bar{A}B + C$ using NOR gates only
- (b) Classify different types of RAMs. Explain the operation of SRAM. 5