

Registration No. :

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Total number of printed pages – 4

B. Tech
BE 2101

Second Semester Regular Examination – 2014

BASIC ELECTRONICS

BRANCH(S) : ALL

QUESTION CODE : F 462

Full Marks – 70

Time : 3 Hours

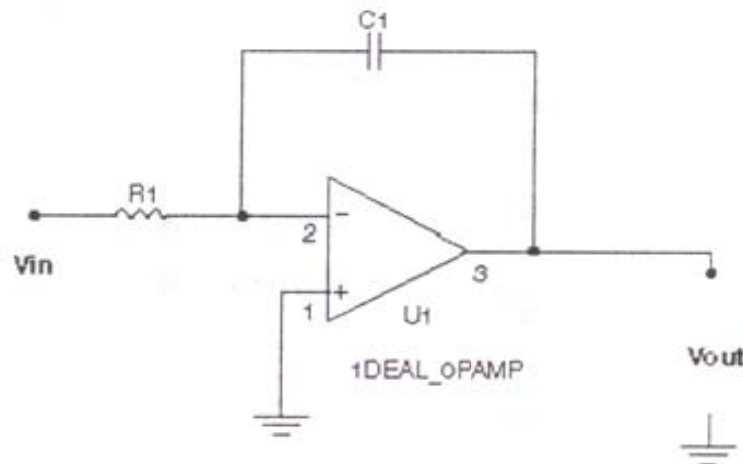
Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.



1. Answer the following questions :

2×10

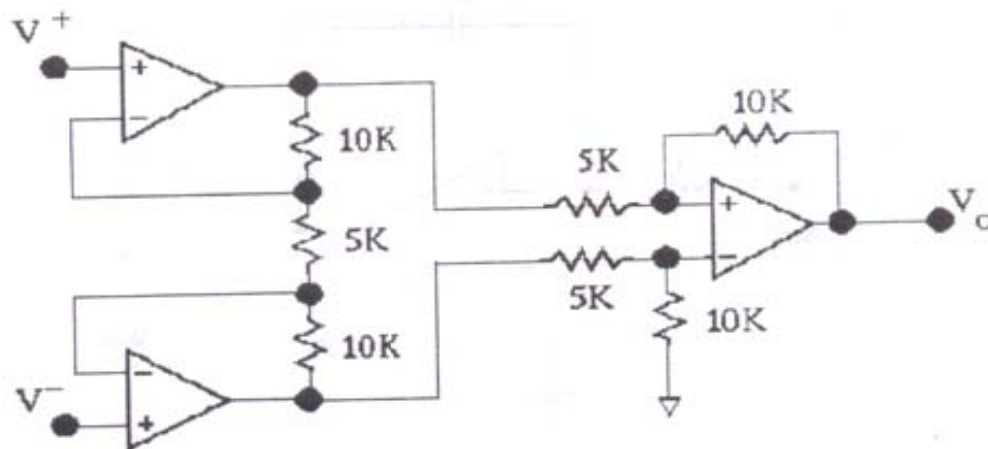
- Why the resistance of semiconductor material decreases with increases in temperature ?
- Draw the output waveform the following circuit if an unit step signal is applied at input.



- Add two numbers $(-7, +18)$ in 2^1 complement notation.
- If a non-inverting amplifier has an input resistance (R_{IN}) of 1000 ohms and an feedback resistance (R_{FB}) of 2.5 kilo ohms, what is the output voltage when 1.42 mV is applied to the correct input ?

P.T.O.

- (e) Name the various logic states in an S-R flip-flop.
- (f) In a CE transistor amplifier base current is 0.01 mA and emitter current is 1 mA. Calculate the current amplification factor α and β of the transistor.
- (g) If the overall bandwidth of three identical voltage amplifier stages connected in cascade is 1000. Find bandwidth of each stage in dB.
- (h) Realize an equality detector using logic gate which gives output $Y = 1$, if both the inputs of the combinational circuits are same and zero for other conditions.
- (i) A waveform occupies six divisions of an oscilloscope screen when the time base is switched off. The voltage gain is set to 0.25 V/div. Calculate the rms current being tested if the resistance of the circuit is known to be 19 ohm.
- (j) Under what conditions a diode circuit act as a clipper ?
2. (a) Derive the expression for the closed loop voltage gain of a -ve feedback amplifier if the open loop gain is A and feedback ratio is B. Draw the necessary diagram. 5
- (b) Find out the voltage gain of circuit shown below : 5



3. (a) With a neat block diagram explain the operation of cathode ray tube (CRT). 5
- (b) Explain the ideal characteristics of an electronics instrument. 5

4. The transistor biasing circuit is shown below. Find

(a) V_{CE} , V_B and V_E

4

(b) β_{dc}

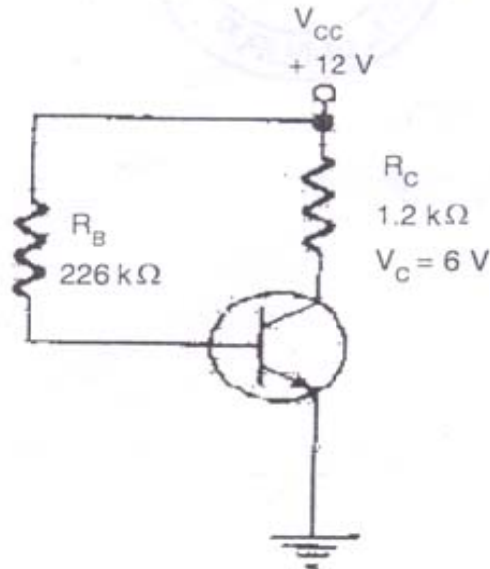
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(c) Draw the load line of the circuit.

2

(d) I_C , I_B

2



5. (a) Explain the principle of an sinusoidal oscillator.

5

(b) What are the basic requirements for oscillation in an oscillator? Also, explain the physical significance of Barkhausen criteria.

5

6. (a) Simplify the following function using Boolean algebra identity.

$$F(A, B, C, D) = \sum_m (4, 5, 6, 7, 12, 13, 14).$$

And then, write the simplified functions in SOP form.

5

(b) Implement the following function using NOR gate only.

$$F(A, B, C, D) = (A + C)(B + D).$$

5

7. A half-wave rectifier is to provide an average voltage of 50 V at its output. Find :

2×5

(a) Draw a schematic diagram of the circuit with specification and value of the components used.

(b) Sketch the output voltage wave shape showing value at each node.

- (c) Determine the peak value of the input voltage.
- (d) Sketch the input voltage wave shape.
- (e) The rms voltage at the input.

8. Write short notes on any **two**.

5×2

- (a) Frequency response of the amplifier
- (b) Diode clamper circuits
- (c) Full adder circuits
- (d) Semiconductor memory.

