(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3301   Roll No. ☐☐☐☐☐☐☐☐☐☐

B.Tech.

(SEM. I) ODD SEMESTER THEORY

EXAMINATION 2013-14

ELECTRONICS ENGINEERING

Time : 3 Hours   *Total Marks : 100*

Note :— The question paper contains **three** sections, Section A, Section B and Section C with the weightage of **20, 30** and **50** marks respectively. Follow the instruction as given in each section. Be precise and to the point in your answer.

SECTION—A

This section contains **ten** questions of short answer type (50-75 words). Attempt **all** parts of this section.   (2×10=20)

1.   (i)   Explain the effect of temperature on diode characteristics.

     (ii)   Write the diode current equation and describe its variable.

     (iii)   Discuss doping profile and physical appearance of emitter, base and collector in a transistor.

     (iv)   How transistor can be defined as current operated device ?

     (v)   How electric field in a FET controls the drain current ?

     (vi)   Differentiate depletion and enhancement type MOSFET.

     (vii)   Enlist the characteristics of an ideal OPAMP.

     (viii)   Convert $F = X + YZ$ to canonical SOP.

     (ix)   State DeMorgan's Theorem.

     (x)   What are the main components of CRT ?
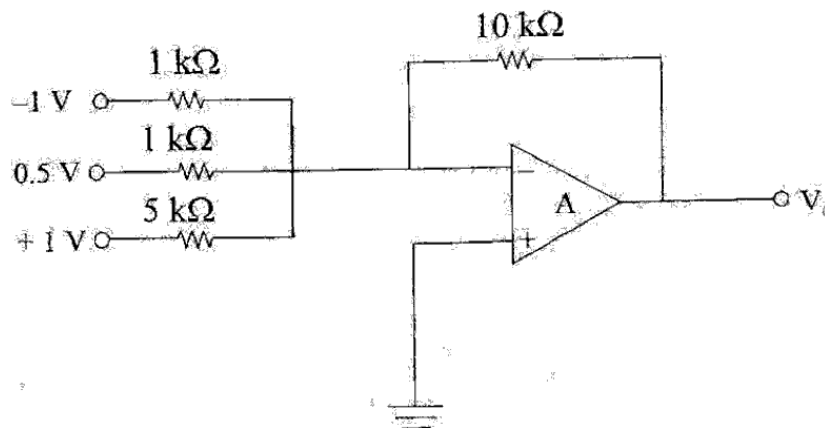
SECTION—B

Attempt any **three** questions of this section. All questions carry equal marks.   (10×3=30)

2.   (a)   (i)   Using illustration, explain how the depletion region and barrier voltage are produced at a PN junction. Discuss the resistance of forward biased and reverse biased PN junction.

(ii) What do you mean by transition and diffusion capacitance of diode ? Does it depend upon the depletion layer width and the applied voltage ?

(b) (i) Derive the relationship $I_C = \beta I_B + (1 + \beta)I_{CO}$.

(ii) A transistor having $\alpha = 0.975$ and reverse saturation current $I_{CO} = 10 \ \mu A$ is operated in CE mode. What is the β for this configuration ? If the base current is 250 μA, calculate I_E and I_C.

(c) Write short notes on the following :—

(i) Non Inverting Amplifier

(ii) OPAMP Subtracter.

Calculate output voltage for the circuit shown below :

(d) (i) Simplify $(A + B + C)(A + \bar{B} + \bar{C})(A + B + \bar{C})$ $(A + \bar{B} + C)$ using Boolean algebra.

(ii) Design a two input EX-OR gate using minimum number of (i) NAND gates only and (ii) NOR gates only.

(e) Write short notes on :—

(i) Digital Voltmeter
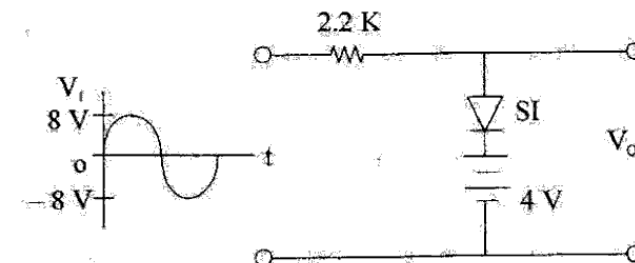
(ii) Digital Multimeter.

SECTION—C

Attempt all questions. All questions carry equal marks.

(10×5=50)

3. What do you mean by rectification ? Draw and explain centre tap full wave rectifier and calculate Ripple factor, Efficiency, and TUF.

OR

Draw and explain the circuit diagram for series clipping circuits with waveforms. Draw the output waveforms for following network :

4. Draw and label the circuit diagram of a small signal single stage transistor amplifier in CE mode using h-parameter. Obtain expression for Current Gain (A_i), Voltage Gain (A_v), Input Resistance (R_i) and Output Resistance (R_O).

OR

Determine I_C, I_B, V_C and V_B for the following network :
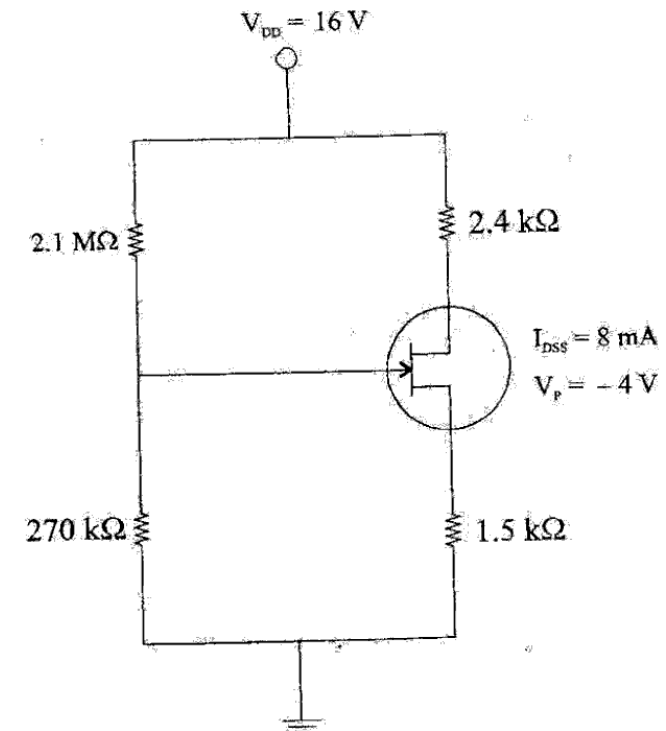
$V_{cc} = 20\ V$

8.2 kΩ 2.7 kΩ V_C

V_B β = 120

2.2 kΩ 1.8 kΩ
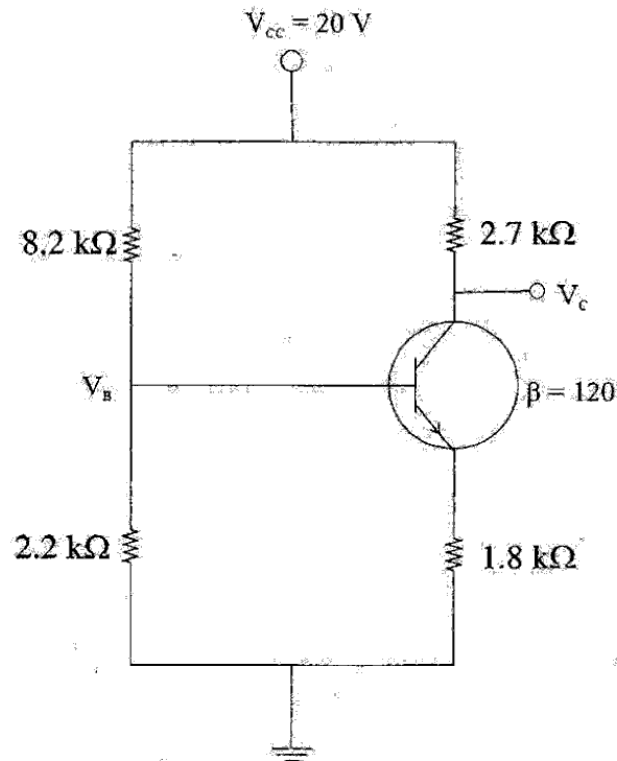
5. Give a sketch of the basic structure of n-channel enhancement type MOSFET. Explain its operation and characteristics. Discuss threshold voltage.

OR

Determine I_D, V_{GS}, V_D, V_S, V_{DS} for the following network.

$V_{DD} = 16\ V$

2.1 MΩ 2.4 kΩ

$I_{DSS} = 8\ mA$
$V_P = -4\ V$

270 kΩ 1.5 kΩ

6. (i) Simplify the following expression using K-Map and realize using NOR gates only.

$$F(A,\ B,\ C,\ D) = \overline{A}\,\overline{B}\,\overline{C} + A\,\overline{C}\,\overline{D} + A\,\overline{B} + ABC\overline{D} + \overline{A}\,\overline{B}\,C$$

(ii) Minimize using K-map and realize using NAND gates only.

F(A, B, C, D) = ΠM(3, 4, 5, 7, 9, 13, 14, 15) . d(0, 2, 8)

7. What is CRO ? Explain it using block diagram. How it is used to measure the voltage and frequency ?

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