This question paper contains 4 printed pages.]

8453 *Your Roll No.* .....

B. Tech. (M) / II A

Paper EME-202–ELECTRONICS

Time : 3 Hours *Maximum Marks : 70*

(Write your Roll No. on the top immediately on receipt of this question paper.)

*Question No. 1 is compulsory. Answer any **four** questions from the rest. Assume any missing data suitably.*

1. (a) Differentiate between Intrinsic and Extrinsic semi-conductor materials. 2×7=14

(b) Differentiate between Zener and Avalanche breakdown in a *p-n* Junction diode.

(c) Explain recombination process in a *p-n* Junction diode.

(d) Explain cause of drift and diffusion current in a *p-n* Junction diode.

(e) Explain uses of clipping and clamping circuits.

(f) What is 'Base width' modulation in BJT ?

(g) What is Logic Gate ? Give the truth table of NAND & NOR Gate.

[P.T.O.

2. (a) A silicon diode has reverse saturation current at 300°K is 5 μA. Determine the voltage to be applied across the Junction to obtain a for ward current of 50 MA.

(b) Give the diode current equation and show that this equation is valid for forward and reverse biased diode. 7×2=14

3. (a) Determine the current flowing through 1KΩ resistance in the figure No. 1 7×2=14

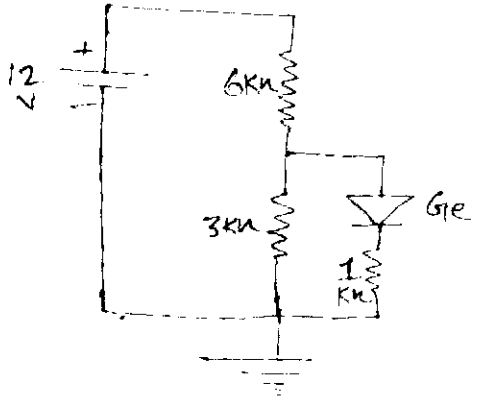

Figure No. 1

(b) The *p-n* Junction diode given in figure No. 2 has cut in voltage of 0.6V and a forward resistance of 150Ω. If the diode can dissipate a maximum power of 150 MW, Determine the maximum permissible value of the battery voltage V_B.

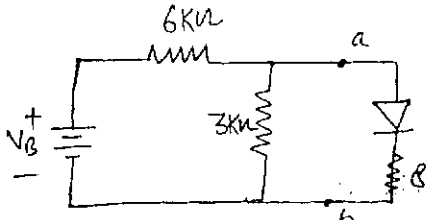

Figure No·2

4. An AC supply of 230 V is applied to a half-wave rectifier circuit through a transformer of turn ratio 10:1. Determine. 2×7=14

   (a) Im, Ide Irms

   (b) AC power input

   (c) DC power output

   (d) Efficiency (n)

   (e) DC voltage

   (f) PIV

   (g) Ripple factor

5. (a) Explain with the help of a neat diagram, the input and output characteristics of common base configuration of BJT. 4

   (b) Derive the relationship between α and β in a BJT. 5

   (c) A Germanion transistor with $\alpha = 0.98$ gives a reverse saturation current Ico = 10μA in common base configuration. When transistor is used in common emitter configuration with base current of 0.22 μA, determine the collector current. 5

6. (a) Explain the working principle of a Junction Field Effect Transistor (JFET). 4

(b) An n-channel JFET has I_{DSS} =12 MA and pinch-off voltage V_P = -4V. 10

(i) Determine drain current for VGS = – 2V.

(ii) If the transconductance gmo of a JFET with the same I_{DSS} at VGs = 0 is 4 millimho, find the pinch-off voltage

7. (a) What is universal gates? And explain its uses. 4

(b) Simplify the expression 4

$$Y = A\bar{B} + A\bar{B}(\overline{\bar{A}\,\bar{C}})$$

(c) Simplify the following three variable expression using K-map method.

$Y = \sum M\,(1, 3, 5, 7)$ 6

8. Write short notes on any two : 7×2=14

(a) Hall effect and application

(b) Power amplifiers

(c) Master-slave flip/flop.

(d) Transistor as an amplifier