

- 5 Answer any two parts :  $2 \times 10 = 20$
- (a) What do you understand by an ideal operational amplifier? Describe its characteristics and discuss its limitations.
- In an op-amplifier, the amplifier gain is 10000. The input series resistance and feedback resistance are  $100 \text{ K } \Omega$  and  $500 \text{ k } \Omega$  respectively. If the input voltage is  $1.0 \text{ V}$ , calculate output voltage.
- (b) Describe NAND gate and NOR gate and discuss their characteristics. Explain why these are called as universal building blocks.
- (c) Describe the single variable theorem of Boolean algebra. With the help of truth tables, explain associative and distributive laws.



TEC-201

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

Roll No.									
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**B. Tech.**  
(SEM. II) EXAMINATION, 2012  
**FUNDAMENTAL OF ELECTRONICS  
ENGINEERING**

Time : 3 Hours] [Total Marks : 100

Note : Use of calculator is permitted.

4x5=20

- 1 Answer any four parts :
- (a) Explain intrinsic and extrinsic semiconductors by stating at least two examples of each.
- (b) Explain the basic concept of forbidden gap in semi conductors and discuss the effect of temperature on it.
- (c) Describe the formation of a p-n junction. Explain the depletion region and potential barrier.
- (d) Explain what do you understand by clipping circuit. Describe the working of the positive clipper.
- (e) Show that  $I_E = I_B + \alpha I_E + I_{CBO}$ . In what way  $I_{CBO}$  depend on temperature.
- (f) Explain the binary numbers. Taking 125.525 as an example, describe decimal to binary conversion.

2

Answer any four parts :

4×5=20

- (a) Explain with the help of suitable diagram, how free electrons and holes contribute towards the electric current in a semiconductor.
- (b) Describe how n-type and p-type semi conductors are produced. State the main difference between them.
- (c) What do you understand by dc and ac resistance of a crystal diode. How will you find them using V-I characteristic.
- (d) Describe the various rating of Zener diode supplied by manufacturers.
- (e) Calculate ac drain resistance, transconductance and amplification factor of a JFET with the help of following experimentally obtained data.

$V_{GS}$	0V	0V	-0.2V
$V_{DS}$	7V	15V	15V
$I_D$	10mA	10.25mA	9.65mA

- (d) Draw the circuit of a practical single stage transistor amplifier. Explain the function of each components.

3 Answer any two parts :

2×10=20

- (a) Describe a half-wave rectifier and obtain an expression for the rectification efficiency of the half-wave rectifier. A half-wave rectifier is used to supply 12V dc to a resistive load  $R_L=500\ \Omega$ . If the forward resistance of diode  $r_f$  is  $25\ \Omega$ , find the rms value of ac voltage supplied to the circuit.

4

Answer any two parts :

2×10=20

- (b) Explain the CB configuration of a transistor and draw its input and output characteristics. Describe current amplification factor  $\alpha$  collector current  $I_C$ , input resistance  $r_i$  and output resistance  $r_o$ .
- (c) Draw the equivalent circuit of an ideal and actual zener diode. Explain V-I characteristics of a zener diode. Describe how it can be used as a shunt regulator.
- (a) Describe the construction and operating principle of JFET. State the advantages of JFET. A JFET has a drain current 5mA. If  $I_{DSS} = 10\ \text{mA}$  and  $V_{GS(0F)} = -6\ \text{V}$ , calculate the value of  $V_{GS}$  and pinch off voltage  $V_p$ .
- (b) Explain the need of transistor biasing circuit and state its essential requirements. Obtain the expression for the stability factor S for CE configuration.
- (c) Draw an ac equivalent circuit of a single stage common emitter transistor amplifier and expressions for the voltage gain and power gain. An amplifier has an open circuit gain of 1000, an output resistance of  $15\ \Omega$  and an input resistance of  $7\ \text{K}\ \Omega$ . It is supplied from a signal source of e.m.f. 10 mV and internal resistance  $3\ \text{K}\ \Omega$ . The amplifier feeds a load of  $35\ \Omega$ . Calculate the output voltage and power gain.