2007-JADAVPUR UNIVERSITY
I B.E II SEMESTER MODEL EXAMINATION
ELECTRONICS
(MECHANICAL ENGINEERING)

TIME-3HOUR
MARKS-100

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS

1.
Answer Question no.1 and any other four from the rest. Write short notes on the following (answer any four):

a). Metal, Insulator and semiconductor – on the basis of bond structure.

b). light emitting and Photo Diode.

c). Merits and demerits of Bridge rectifier over ordinary full-wave rectifier.

d). Various regions of output characteristics of a transistor operation.

e). The relationship between small – signal short-circuit current gains of a transistor in CB and CE modes.

f). Transistor biasing

g). capacitor filter

2.
a). Using suitable schematic diagram, – discuss the mobile charge distribution, space–charge concentration and barrier field, potential & energy patterns for on unbiased p-n junction.

b). A p-n junction Ge diode has a reverse saturation current of 1.5 µA at 300ºK. Obtain the static and dynamic resistances of the diode at that temp. For on applied forward bios of 0.3 volt.

c). Explain with a suitable diagram the application of zener–diode as a voltage regulator.

d). State the characteristics difference between avalanche breakdown and zener breakdown of zener diode.

3. a). Explain with suitable diagram the operation of a half–wave rectifier taking sinusoidal input.

b). Deduce the expression for average current, ripple factor and conversion efficiency in case of a full–wave rectifier circuit.

c). A bridge rectifier circuit has a load of 2.5 kO and is fed from 100 v (rms) supply. Each diode has a forward resistance of 100 O. calculate the dc. load voltage, the ripple voltage and the percentage regulation.

a). Explain the operation of a bridge rectifier with the help of a circuit diagram. Draw the waveforms of the diode current and load voltage (For sinusoidal input voltage) Is it necessary for all diodes of a bridge rectifier to be identical? Justify your answer.

b). What do you mean by intrinsic and extrinsic semiconductors? 2+3+1 How p–type semiconductor can be formed? Is a p–type semiconductor positively charged?

c). Calculate the ripple of a capacitor filter for peak rectified voltage of 30 volts, capacitor c = 50 µF and a load current of 50 mA.

d). A dc. power supply has an output voltage of 60 volts in no–load condition when connected to a load, the output voltage drops to 58 volts. Calculate the value of voltage regulation factor. What should be value of voltage regulation for ideal power supply?

5. a). Explain the operation of transistor action of BJT and discuss about its current components.

b). Draw the circuit for fixed–bios arrangement for an n–p–n transistor operating in CE mode and explain its operation. Also deduce the expressions for stability factors.

c). State and discuss the input and output distortions in case of BJT operation.

6 a). Analyse the operation of transistor amplifier using h–parameters and deduce the expressions for current gain, voltage gain and

b). Explain the operation of a cascaded RC–coupled amplifier using a suitable circuit diagram. Deduce the expression for its mid–frequency gain.

a). State the effects of negative feedback in an amplifier.

b). With the help of a suitable diagram, derive an expression for the transfer gain of a feedback amplifier.

c). What is an Oscillator? Define relaxation oscillator, negative resistance oscillator and feedback oscillator.