Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY
Summer Examination-2016

Subject Name:Applied Physics

Subject Code: 4TE02APH1 Branch: B.Tech(All)

Semester: 2 Date: 11/05/2016 Time: 10:30 To 1:30 Marks: 70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Which type of impurity is added in intrinsic semiconductor to form an n-type semiconductor?

b) Which are the majority and minority charge carriers in P-type semiconductor?

c) In a diode circuit, the voltage drop across diode is $0.5\,V$ in its on condition and current passing through diode is $2\,mA$. Determine static resistance of the diode.

d) Determine the forward voltage drop and forward resistance across an ideal diode.

e) If the reverse bias voltage across diode increases, transition capacitance of a diode increases Determine whether given statement is true or false.

f) Draw the symbol of photo diode and its characteristics.

g) A half wave rectifier is supplied from a$V_s = V_m \sin \omega t$, $50\,Hz$supply connected with a step down transformer. IfV_m is the maximum voltage across the transformer secondary. Determine peak inverse voltage (PIV) across the diode.

h) Draw the symbol of npn and pnp transistor and indicate various current directions.

i) A transistor has a current gain (β) of 175. If the base current is 0.1 mA, what is the collector current?

j) A BJT is a current controlled device and JFET is also a current controlled device.

Determine whether given statement is true or false.

k) If a BJT is used for amplification purpose, the operating point (Q-point) of BJT must be adjusted in _____ region of the output characteristics.

l) Draw the symbol of n-channel depletion type MOSFET and n-channel enhancement type MOSFET.

m) List the characteristics of laser.

n) Give any four advantages of fiber optic communication.

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

(a) Explain the formation of N- type semiconductors. Draw itsenergy band diagram. **07**

(b) Discuss the process of avalanche breakdown and zener breakdown with the help of p-n junction theory. **07**

Q-3 **Attempt all questions** **(14)**

(a) The voltage across a silicon diode at room temperature of $310°\ K$is $0.68\ V$, when $2.2\ mA$ current flows through it. If the voltage is increased to $0.72\ V$, calculate the diode current at room temperature. Consider ideality factor $\eta = 2$, Boltzman constant $k = 1.38\ \times 10^{-23} J/°K$. **07**

(b) Classify the materials based on energy band theory. Draw the energy band diagram for each material. **07**

Q-4 **Attempt all questions** **(14)**

(a) Draw the circuit diagram and waveforms for full wave center tap rectifier and explain its operation. **07**

(b) Draw the circuit diagram and waveforms for below circuits. **07**

i) Parallel Positive Clipper Circuit

ii) Series Negative Clipper Circuit

Q-5 **Attempt all questions** **(14)**

(a) Explain the voltage divider biasing technique for BJT. **07**

(b) A half wave rectifier circuit is supplied from a $110\ V, 50\ Hz$ supply with a step down ratio of $3:1$ to a resistive load of $1\ k\Omega$. The diode forward resistance **07**

is 50 Ω, while transformer secondary resistance is 15 Ω. Calculate,

i) Maximum value of load current

ii) Average value of load current

iii) RMS value of load current

iv) DC output power

v) Rectifier efficiency

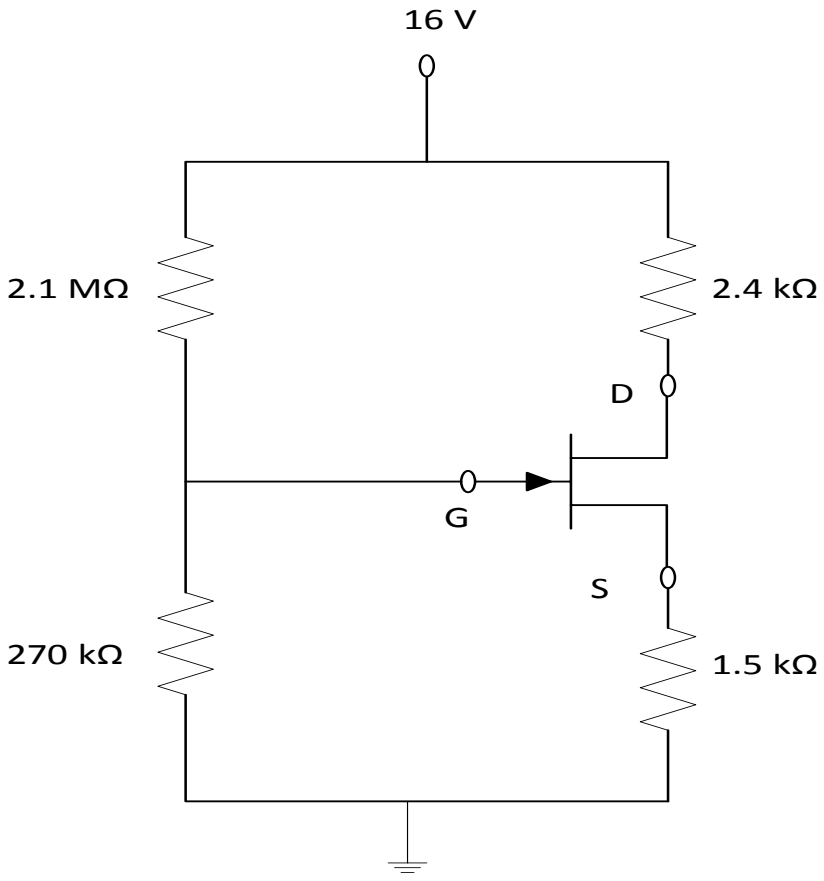
Q-6 **Attempt all questions** **(14)**

(a) Draw the circuit of common emitter configuration for BJT. Draw its input and output characteristics and only explain regions of output characteristics. **07**

(b) Determine the following parameters for the below network. **07**

i) I_{D_Q} *and* V_{GS_Q}

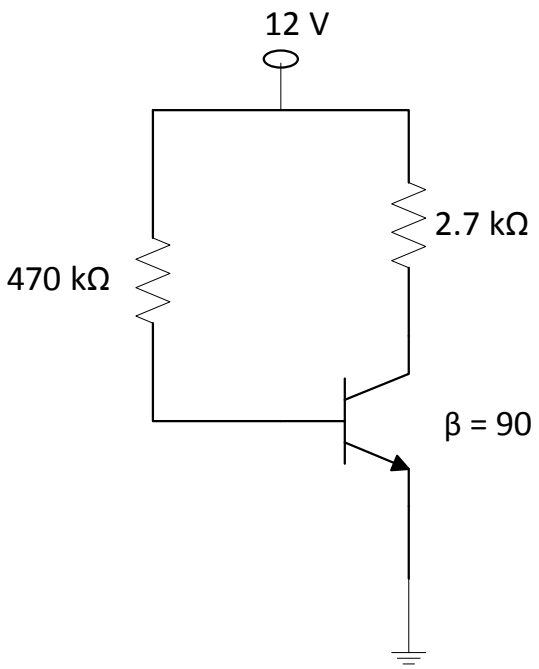
ii) V_{DS}



Q-7 **Attempt all questions** **(14)**

(a) Draw the construction of n-channel depletion type MOSFET and explain its operation. Draw its V-I characteristics and transfer characteristics. **07**

(b) Determine the value of I_B, I_C and V_{CE} for β= 90 for the below circuit. **07**



Q-8 **Attempt all questions** **(14)**

(a) Compare spontaneous emission and stimulated emission for LASER. **07**

(b) Explain various types of optical fiber configuration. **07**