Code.No: 07A40405 | R07 | SET-1

**II B.TECH – II SEM EXAMINATIONS, DECEMBER - 2010**
**BASIC ELECTRONICS**
**(METALLURGY AND MATERIAL TECHNOLOGY)**

**Time: 3hours** **Max.Marks:80**

**Answer any FIVE questions**
**All questions carry equal marks**

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1.a) A center-tapped transformer has a 220V primary winding and a secondary winding rated at 12-0-12V and is used in a full-wave rectifier circuit with a load of 100 Ω. What is the dc output voltage, dc load current and the PIV rating required for diodes?
b) What is the purpose of bleeder resistance in a rectifier circuit using L-C filter?
c) Differentiate between drift current and diffusion current. [9+4+3]

2.a) A JFET have $V_P$ = -4.5V, $I_{DSS}$ = 10mA and $I_{DS}$ = 2.5mA. Determine the transconductance.
b) Compare CB, CE and CC configurations of a transistor with respect to input impedance, output impedance, current gain, voltage gain and applications. For CE configuration, prove that $I_C = \beta I_B + (\beta+1) I_{CO}$.
c) What are the advantages of the FET over a conventional BJT? Explain with the help of circuit diagram how an FET is used as a voltage dependent resistor. [3+8+5]

3.a) List out five normal operating conditions of an SCR.
b) Enumerate the basic differences between a triac and thyristor. Draw and explain V-I characteristics of a triac. Also, explain about full-wave triac phase control circuit. [5+11]

4.a) Distinguish between voltage feedback and current feedback in amplifier circuits. State the merits of each and for each case derive the expression for the net output impedance of the amplifier showing the influence of feedback.
b) An amplifier has an input of 10mV and a gain of 200 without feedback. The distortion produced at the output of the amplifier is 10%. It is desired to reduce the distortion by 1% by using negative feedback. Calculate the gain, input voltage and output voltage with feedback. [13+3]

5.a) Draw a neat circuit diagram of a colpitt's Oscillator using an N-P-N transistor. Give its equivalent circuit. Derive the expressions for the following:
i) The frequency of oscillations. ii) The minimum gain for sustained oscillations.
b) List out the factors required for selection of an oscillator. [13+3]

6.a) Discuss about various salient features of Energy Storage Welding.
b) Describe in detail about welding control and resistance welding. [8+8]

7.a) Explain how frequency, phase difference of two wave forms and dc voltage are measured using cathode ray oscilloscope.
b) Bring out the differences between indication and dielectric heating. [8+8]

8.a) Describe the architecture of 8085 microprocessor with a neat diagram.
b) What are the various applications of D to A converter? [12+4]

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**BASIC ELECTRONICS**
**(METALLURGY AND MATERIAL TECHNOLOGY)**

**Time: 3hours** **Max.Marks:80**

**Answer any FIVE questions**
**All questions carry equal marks**

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1.a) A half-ware rectifier uses a diode with a forward resistance of 100 Ω. If the input ac voltage is 220V(rms) and the load resistance is of 2K Ω, determine
i) $I_{max}$, $I_{dc}$ and $I_{rms}$ ii) Peak inverse voltage when the diode is ideal
iii) Load output voltage iv) dc output power and ac input power
v) Ripple factor vi) Tuf and vii) Rectification efficiency
b) 'N type semiconductor exhibit larger conductivity than p-type semiconductor for same order of doping'. Explain with reasons.
c) Explain about the static resistance and dynamic resistance of a junction diode? [8+4+4]

2.a) Discuss about the following in detail.
i) Early effect ii) Punch through effect.
b) An N-Channel JFET has a pinch-off voltage of -4.5V and $I_{DSS}$ = 9mA. At what value of $V_{as}$ will $I_{DS}$ equal to 3mA? What is its $g_m$ at this $I_{DS}$?
c) Prove that the transconductance $g_m$ of a JFET is given by $g_m = \frac{2}{|Vp|}\sqrt{I_{DS} \cdot I_{DSS}}$. [6+5+5]

3.a) With neat diagram explain the constructional features of a triac. Sketch its V-I characteristics and explain its operation. Also mention its applications.
b) Explain how the forced turn-off of an SCR is different from natural turn-off?
c) Describe the operation of a thyristor with the help of its characteristics. [8+3+5]

4.a) An amplifier with an open-loop voltage gain of 1,000 delivers 10W of output Power at 10% second harmonic distortion, when the input signal is 10mW, determine
i) The required input signal voltage
ii) Percentage second harmonic distortion and
iii) Closed loop voltage gain.
b) Differentiate between voltage series, voltage shunt, current series and current current shunt feedbacks with neat diagrams. [4+12]

5.a) Draw the circuit diagram of an Hartley oscillator. Explain how Barkhausen conditions are satisfied? Design the oscillator to produce $10MH_Z$ sinusoidal output using a BJT. Assume any parameter of relevance.
b) Explain how does Hartley oscillator differ from colpitt's oscillator. [10+6]

6.a) Discuss about the various salient features of basic timer circuits.
b) Describe in detail about energy storage welding. [8+8]

7.a) Calculate the maximum velocity of electrons in a CRT having a cathode anode Voltage of 1,000V. Assume the electrons to leave the cathode with zero velocity. Charge of electronic $=1.6\times10^{-19}C$ and mass of electron $=9.1\times10^{-31}kg$.

b) Explain briefly about the ultrasonic generations and list out their applications.

[8+8]

8.a) List out various types of A to D converter circuits and explain any one of them in detail with a neat diagram.

b) What are the features of a 8085 micro processor? Explain briefly its architecture.

[8+8]

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**Time: 3hours** **Max.Marks:80**

**Answer any FIVE questions**
**All questions carry equal marks**

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1.a) A full-ware rectifier produces an rms voltage of 10V from a 50Hz line source and feeds a resistive load of 1,100$\Omega$. If the filter uses a capacitance of C=50$\mu$F, find dc voltage, voltage regulation and ripple output voltage.
b) Which of the two semiconductor materials Si or Ge has larger conductivity at room temperature? Why?
c) What is an ideal diode? How can it be represented as a switch? Draw the equivalent circuit and its characteristics. [8+3+5]

2.a) Explain how does the FET be have
i) For small values of $|V_{DS}|$ and
ii) For large values of $|V_{DS}|$.
b) A germanium transistor with $\alpha$ = 0.98 gives a reverse saturation current $I_{co}$ =10$\mu$A in CB configuration. When transistor is used in CE configuration with a base current of 0.22$\mu$A, calculate the collector current.
c) Draw and explain the input and output characteristics of common collector NPN transistor. [5+5+6]

3.a) Why triac is called a double ended SCR? Explain the construction and operation of a triac with the help of a neat diagram.
b) Describe the operation of a thyristor with the help of its characteristics? [10+6]

4.a) A negative feedback of $\beta$=0.002 is applied to an amplifier gain 1000. Calculate the change in overall gain of the feedback amplifier if the internal amplifier is subjected to a gain reduction of 15%.
b) Derive the expression for the overall gain of a voltage series –feedback amplifier. Also, show that negative feedback affects the input resistance, output resistance and bandwidth of an amplifier. [6+10]

5.a) Explain how oscillations are initiated and later sustained in an oscillator. Draw the circuit diagram of an R-C phase shift oscillator and briefly explain the principle of operation.
b) Determine the oscillation frequency of a transistor Hartley oscillator with the following circuit values: $L_1$ =1 mH, $L_2$ = 100 micro H, M=50 micro H and C=100picoF. [14+2]

6.a) Describe in detail about various basic timer circuits and their applications.
b) Discuss in detail about various salient features of Resistance Welding and Energy Storage Welding. [6+10]

7.a) Derive an expression for the vertical deflection on the screen of a CRT in terms length of plates, separation distance, accelerating voltage, deflecting voltage and distance of screen from the origin.

b) Explain in detail about ultrasonic generators and list out their applications. [8+8]

8.a) Explain in detail about any one type of A to D converter with a neat diagram.

b) Discuss in detail about the architectural features of 8085 micro processor. [8+8]

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**BASIC ELECTRONICS**
**(METALLURGY AND MATERIAL TECHNOLOGY)**

**Time: 3hours** **Max.Marks:80**

**Answer any FIVE questions**
**All questions carry equal marks**

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1.a) A bridge rectifier is supplying a load of 200mA at 30V. It uses a $\pi$-section filter with a choke of 0.5H and two capacitors each of 80 $\mu$F. Assume supply frequency of 50Hz. Find
i) The input rms voltage of the secondary of the transformer and
ii) The percentage ripple in the output.
b) Explain the difference between step grade and linearly graded semiconductor P-N junctions.
c) Why pure semiconductors behave like an insulator at absolute zero? [8+4+4]

2.a) Explain in detail with necessary reasons about the input and output characteristics of a common base NPN transistor.
b) Compare the CS, CD and CG JFET configurations. For and N-channel JEET $I_{DSS}$ = 8.7Ma,$V_P$ = -3V, $V_{GS}$ = -1V. Find the values of
i) $I_D$ ii) $g_{mo}$ iii) $g_m$.
c) Explain about base-width modulation with the aid of plots of potential and minority concentration throughout the base region. [5+5+3]

3.a) An SCR has a breakover voltage of 250V, a trigger current of 12 mA and holding current of 12 mA. Explain the inferences you make from these data. What will happen if the gate current is 16mA?
b) List out any five differences between Diac and Triac.
c) Draw static V-I characteristics of a thyristor clearly labelling the various sections of the characteristics. How the current through a load can be controlled by phase control of a thyristor with ac supply? Explain with reference to an illustrative circuit and wave-forms. [3+5+8]

4.a) An amplifier with a gain of 60db has an output impedance of 10 k$\Omega$. It is required to modify its output impedance to 1 k$\Omega$. What type of feedback has to be applied? Calculate the feedback factor. Also find the percentage change in the overall gain, for a 10% change in the open-loop gain of the amplifier.
b) Compare voltage series, voltage shunt, current series and current shunt feedbacks with respect to voltage gain, Input impedance, Output impedance and Bandwidth. [8+8]

5.a) Draw the circuit diagram of an R-C phase shift oscillator using a BJT and explain how the Barkhausen conditions are satisfied. Derive the expressions for its frequency of oscillations and the minimum value of $h_{fe}$ required for the BJT for the system to oscillate.
b) List out the advantages of phase shift oscillators. [13+3]

6.a) Bring out in detail the differences between the Resistance Welding and Energy Storage Welding.

b) Explain in detail about the basic timer circuits with their applications. [10+6]

7.a) The X-deflection plates in a CRT are 20mm long and 5mm apart. The centre of the plates is 0.25 m from the screen. The accelerating voltage is 3000V. Determine the deflection sensitivity and defection factor of the CRT.

b) Explain briefly about Induction and dielectric heating. Also, list out the applications of Ultrasonic generators. [8+8]

8.a) Compare in general about various features of A to D and D to A converters.

b) Describe the operation of an 8085 microprocessors with a neat diagram. [8+8]

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