

NEW SCHEME

USN 1 M S 0 4 C S 0 6 6

**First/Second Semester B.E Degree Examination,  
July/August 2005**

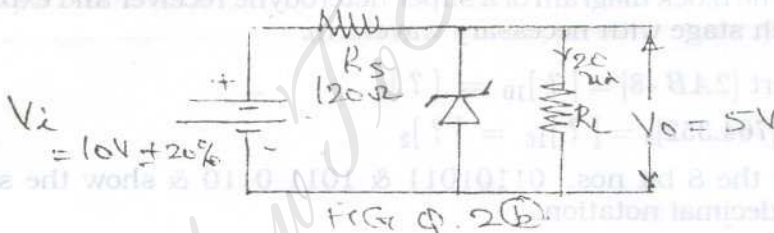
**Common to All Branches  
Basic Electronics**

Time: 3 hrs.]

[Max.Marks : 100

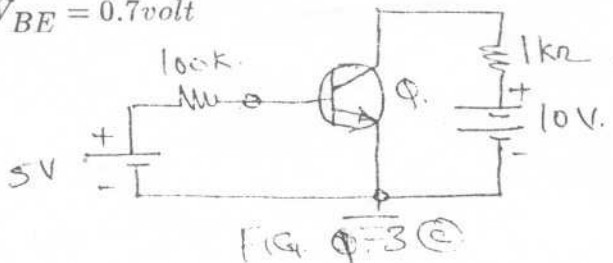
**Note:** 1. Answer any FIVE full questions.  
2. All questions carry equal marks.

1. (a) Explain the mechanism of conduction in P and N type semi conduction using energy band diagrams. (8 Marks)
- (b) With the help of diode equation, explain the VI characteristics of a PN junction. (8 Marks)
- (c) The saturation current density of a PN junction Ge diode is  $250mA/m^2$  at  $300^0K$ . Find the voltage that must be applied across junction to cause a forward current density of  $10^5 Amp/m^2$  to flow. (4 Marks)
2. (a) Distinguish clearly between Ovalanche breakdown and Zener break down. (5 Marks)
- (b) In a Zener diode regulator, the input DC is  $10V \pm 20\%$ . The output requirement are  $5V$  and  $20mA$ . Assuming  $I_2$  min &  $I_2$  max as  $5mA$  &  $80mA$ , design the zener diode regulator.



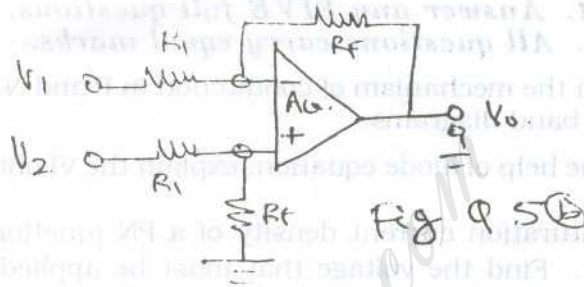
(7 Marks)

- (c) A full base rectifier has a load of  $2k\Omega$ . The AC voltage applied to the diodes is  $200 - 0 - 200V$ . Assuming ideal diodes, calculate i) average DC current ii) average DC voltage & iii) Ripple voltage. If a capacitor of value  $500\mu F$  is connected across the load, what is the new value of the ripple voltage. Assume  $f = 50Hz$ . (8 Marks)
3. (a) Draw the sketch of the output characteristics of a transistor in common emitter configuration? Indicate the various region of operation and account for the shape of characteristics qualitatively. (7 Marks)
- (b) Discuss the causes of instability in a transistor. (6 Marks)
- (c) For the circuit shown below a silicon transistor with  $\beta_{DC} = 100$  is used. Find  $I_C$  and  $V_{CE}$ . Draw the DC load line on the output characteristics and indicate "Q" point. Assume  $V_{BE} = 0.7volt$  (7 Marks)



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4. (a) What are the causes of distortion in amplifiers ? Discuss the various types of distortion in amplifiers ? How can they be minimized? (8 Marks)
- (b) Explain the need for coupling in amplifier ? Mention the different type of coupling in amplifiers. (4 Marks)
- (c) With a neat diagram, explain the operation of an RC phase shift oscillator. Indicate Trans Barkhausen's criterion is satisfied in this case ? (8 Marks)
5. (a) Define and mention the importance of the following terms w.r.t an Op. amp -  
 i) CMRR ii) SCEW base iii) PSRR iv) I/P offset voltage (10 Marks)
- (b) Show that the op-amp circuit shown below can work as a subtractor.



(5 Marks)

- (c) Design an adder circuit using an op ramp, to obtain an output expression  $V_0 = 2(0.1V_1 + 0.5V_2 + 20V_3)$  where  $V_1, V_2$  &  $V_3$  are the inputs. (5 Marks)
6. (a) Explain the need for modulation in communication systems. (4 Marks)
- (b) Explain the principle of frequency modulation, Draw the frequency spectrum of FM wave. (6 Marks)
- (c) Draw the block diagram of a super heterodyne receiver and explain the function of each stage with necessary waveform. (10 Marks)

7. (a) Convert  $[2AB \cdot 8] = [?]_{10} = [?]_8$   
 $[764.352]_8 = [?]_{16} = [?]_2$  (4 Marks)
- (b) i) Add the 8 bit nos. 01101011 & 1011 0110 & show the same number in hexa decimal notation.  
 ii) Subtract the decimal nos. +28 & -19 using two's compliment method. (5 Marks)
- (c) Realize Ex-OR gate using NOT, OR and AND gates only. (5 Marks)

- (d) Simplify the following Boolean expressions and realize using only NAND gates.  
 i)  $XYZ + XYZ + YZ + \bar{Z}$   
 ii)  $(A + \bar{B}C) (\bar{A} + B + \bar{C}) (A + \bar{B})$  (6 Marks)

8. (a) Draw the circuit of a DTC Nand gate and explain its working. (7 Marks)
- (b) Distinguish clearly between combinational logic circuit and sequential logic circuits. (5 Marks)
- (c) Explain the working of a CRT. (8 Marks)

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