BASIC ELECTRONICS ENGINEERING (SEMESTER - 2)

CS/B.Tech/SEM-2/EC-201/09

1. ....
Signature of Invigilator

2. ....
Signature of the Officer-in-Charge

Reg. No.

Roll No. of the Candidate

CS/B.Tech/SEM-2/EC-201/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

BASIC ELECTRONICS ENGINEERING (SEMESTER - 2)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **36 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

Group – A **Group – B** **Group – C**

Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

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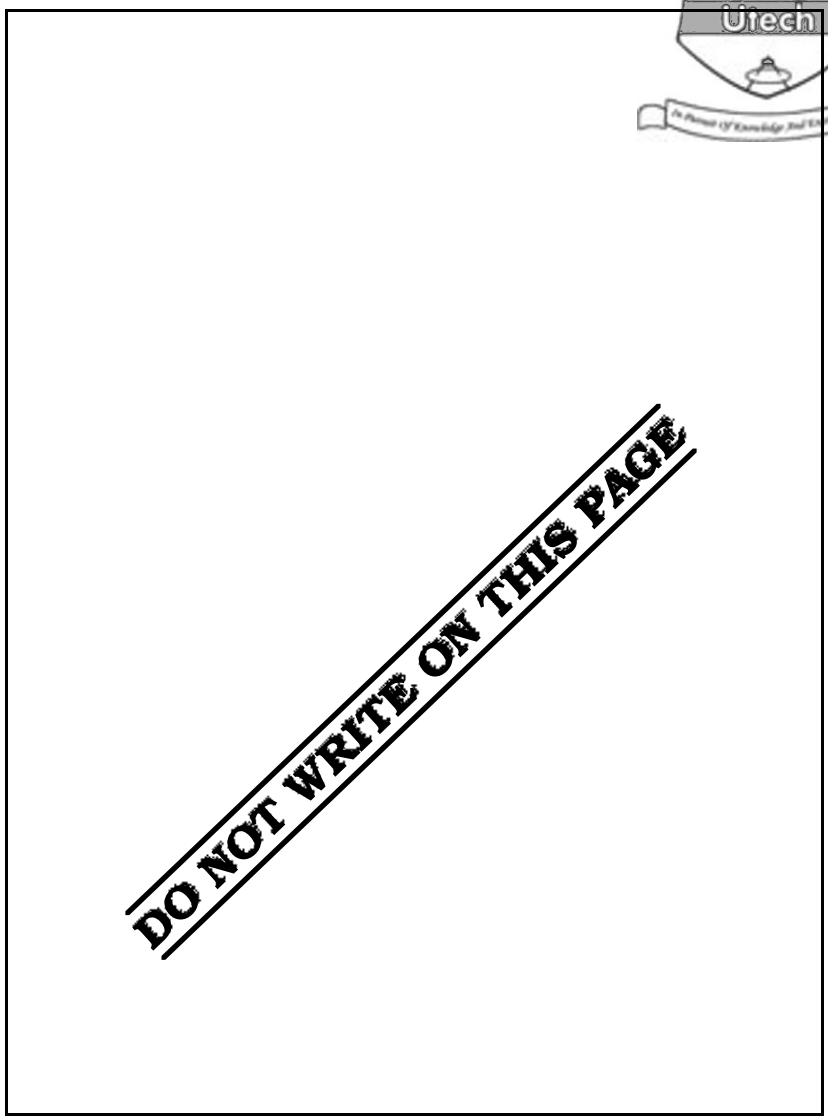
Head-Examiner/Co-Ordinator/Scrutineer

2201 (03/06)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GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : 10 × 1 = 10

i) Avalanche breakdown is primarily depends on the phenomenon of

a) particle collision

b) impurity doping

c) ionization

d) direct rupture of covalent bond. ☐

ii) Compared to avalanche diode Zener diode has

a) less doping concentration b) less barrier field intensity

c) higher barrier field intensity d) higher depletion width. ☐

iii) In cut-off region the collector to emitter voltage (V_{CE}) of a common emitter amplifier is

a) 0V b) minimum

c) maximum d) equal to VCC. ☐

iv) SCR is used as

a) an emplifier

b) a rectifier

c) a voltage variable resistor. ☐

v) Lissajous figure is used for measurement of

a) amplitude b) phase

c) time period d) frequency. ☐

vi) A JFET

a) is a voltage controlled device

b) is a current controlled device

c) has a low input resistance

d) has a very large output resistance. ☐

vii) When a transistor is used as an amplifier, it is in

a) CB configuration b) CC configuration

c) CE configuraton d) Cut-off region. ☐

viii) In an amplifier

a) we apply a degenerative feedback

b) we apply a regenerative feedback

c) bandwidth decreases due to feedback. ☐

ix) Feedback in an amplifier always helps to

a) control its output

b) increase its gain

c) decrease its input impedance

d) stabilize its gain. [ ]

x) An ideal Op-Amp has

a) infinite AV b) zero R_o

c) infinite R_i d) all of these. [ ]

xi) Op-Amp comparator circuit uses

a) positive feedback

b) negative feedback

c) regenerative feedback

d) no feedback. [ ]

xii) The ripple factor for a half-wave recififier is

a) 0·482 b) 0·41

c) 1·21 d) 1·11. [ ]

xiii) The horizontal plates of a CRO are supplied with

a) sinusoidal wave b) triangular wave

c) sawtooth wave d) pulse. [ ]

xiv) When the temperature changes the Q-point is shifted due to

a) change in I_{CBO}

b) change in V_{CC}

c) change in the value of circuit resistance

d) none of these. [ ]

xv) The phase difference between the input and output voltages in a common base arrangement is

a) 180° b) 90°

c) 0° d) 270°. [ ]

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. a) Why does a pure semiconductor behave like an insulator at absolute zero ? 3

b) Define Fermi-level in a semi-conductor. 2

3. a) What is your idea about an ideal diode ? How does it differ from an actual one ? 2

b) Calculate the maximum conversion efficiency of a half-wave rectifier. 3

4. Sketch the circuit of summer using Op-Amp to get

$V_0 = -V_1 + 2V_2 - 3V_3$. 5

5. a) What are the essential components of a CRT ? 2

b) Why are vertical and horizontal plates provided in a CRO ? 1

c) Why is the grid in a CRO provided with a hole in it ? 1

d) What is meant by the deflection sensitivity of a CRO ? 1

6. Explain Ebers Moll model for an ideal P-N-P transistor. 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) State the assumptions made for analysing ideal Op-Amp. 4

   b) What do you mean by virtual ground in Op-Amp circuits ? 2

   c) Draw and explain the operation of an Op-Amp integrator circuit. 2 + 7

8. a) What is feedback in amplifier ? 2

   b) Derive an expression for the closed-loop gain of the amplifier with feedback. 6

   c) State the assumptions made in your derivation. 3

   d) Write down the effect of negative feedback in an amplifier in terms of gain, bandwidth, input resistance and output resistance with respect to voltage series configuration. 4

9. a) What is *Q*-point ? 2

   b) For the *CE* amplifier circuit shown below, find the percentage in collector current if the transistor with $\beta = 50$ is replaced by another transistor with $\beta = 150$. Assume $V_{BE} = 0{\cdot}6$ V : 8

Dia.

c) Draw a small signal *h*-parameter equivalent circuit for analysis of the amplifier and find the expression for AVS : 5

Dia.

10. a) What are the properties of an Op-Amp ? 3

b) How can a scale changer and a phase shifter be obtained with an Op-Amp ? 4

c) Define the following : 4

i) Slew rate

ii) Input bias current

iii) Input offset current

iv) Input offset voltage.

d) Calculate the output volatage using the circuit of fig. shown below for resistor components of value : R_f = 470 kΩ, R_1 = 4·3 kΩ, R_2 = 33 kΩ and R_3 = 33 kΩ for an input of 80 μV : 4

Dia.

11. Write short notes on any *three* of the following : 3 × 5 = 15

a) Zener diode used as a regulated DC supply

b) Fermi energy level

c) IGBT

d) CRO

e) Diffusion current in *p-n* junction

f) Continuity equation for hole.

END