

First Year B. Tech. (All Branches)

Winter – 2016

Course Code: ETU101

Course Name: Basic Electronics Engineering

Time: 2 Hrs.

Max. Marks: 30

Instructions to Candidate

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

1. Solve any two (2)

a) Explain the working of Zener diode as a voltage regulator circuit. 4

b) Contrast between Half wave, Center tapped and Bridge rectifiers. 4

c) Discuss the constructional details of an LED. 4

2. a) Explain in brief the working of FET-CS amplifier and define the terms Transconductance and Amplification factor of FET. 4

b) Explain the working of a Direct coupled transistor amplifier. 4

3. Solve any two (2)

a) Draw and explain the block diagram of OpAmp. 4

b) Explain the constructional details of SCR and define the terms I_L and I_H . 4

c) Draw and explain the working of OpAmp as an Inverting amplifier in closed loop configuration and derive the equation for gain. 4

4. a) Explain the working of TRIAC in first and third quadrant. 3

b) Define α and β of transistor and obtain the relation between them. 3

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1 Solve ANY THREE from following questions 09

- (a) Explain the fabrication and operation of LED, discuss its parameters, and design LED circuits.
- (b) Sketch Zener diode voltage regulator circuits, and explain their operation.
- (c) Sketch the circuit diagram for diode AND gate and OR gate with two input terminals and briefly explain circuit operation.
- (d) Sketch a two diode full wave rectifier circuit for producing a positive output voltage. Sketch the input and output waveforms after using shunt filter and explain the circuit operation.

2 Solve ANY THREE from the following questions 09

- (a) Draw a block diagram of an unbiased NPN bipolar junction transistor. Identify each part of device and show the depletion region and barrier voltage and briefly explain it.

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Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)

First Semester B. Tech. (All branches)

Winter - 2012

Course Code: ETU101

Course Name: Basic Electronics Engineering

Time: 2 Hrs.

Max. Marks: 30

Instructions to Candidate

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- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

1. Solve any THREE 9

- a) What is PIV? What should be the PIV rating of diode in HWR, FWR and bridge type FWR?
- b) Determine V_L , V_R , I_Z and P_Z for zener diode network given below fig. $R = 1k\Omega$, $V = 16V$, $V_Z = 10V$, $P_{ZM} = 30mw$ and $R_L = 1.2 k\Omega$

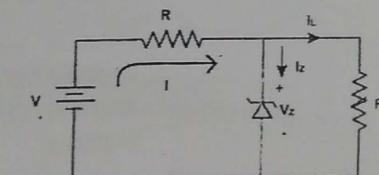


Fig. 1

Contd..

- c) What is avalanche breakdown? How it differs from zener breakdown? Justify "Avalanche breakdown voltage increases with increased temperature".
- d) Compare the LED and photodiode with its construction, working principle and applications?
2. Solve any THREE
- a) Explain common emitter NPN configuration with collector and base characteristics and show three region of operation on it.
- b) Write down Shockley's equation and Justify "After pinch-off, as V_{ds} is increased, then effective length of channel is increases".
- c) Sketch cross section of P channel enhancement MOSFET and explain working of it with drain transfer characteristics.
- d) Explain in brief charge recombination and pinch off process in FET.
3. a) Explain construction and VI characteristics of 04 TRIAC, state its any two applications.
- b) Design Differential amplifier and briefly explain it. What are the important parameters of OP-AMP and give ideal values of them?
- c) What is virtual ground concept in inverting amplifier? Why it is not possible in non-inverting amplifier? Find out voltage gain of non-inverting amplifier.

9

Triple A

Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)

First Sem. B. Tech.

Winter - 2011

Course Code: ETU101

Course Name: Basic Electronics Engineering

Time: 2 Hrs.

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Instructions to Candidate

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- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

1. Solve any THREE

9

- a) Define TUF? What is meant by the statement "A transformers utilization factor is 0.28 when used in a HWR circuit".
- b) What is transition and diffusion capacitance in p-n junction diode and Explain reverse recovery time?
- c) Explain with reference to a zener diode characteristics curve, What you understand by I_{ZK} , I_{ZT} and Z_Z .

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Contd.

Government College of Engineering, Amravati
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First Year B. Tech. (All Branches)

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Instructions to Candidate

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1. Solve any two (2)

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b) Contrast between Half wave, Center tapped and Bridge rectifiers. 4

c) Discuss the constructional details of an LED. 4

2. a) Explain in brief the working of FET-CS amplifier and define the terms Transconductance and Amplification factor of FET. 4

b) Explain the working of a Direct coupled transistor amplifier. 4

2
d) Compare the LED and photodiode with its construction, working principle and applications? 9

Solve the following

a) What is need of biasing? Explain voltage divider biasing method for CE configuration.
b) Explain pinch-off in FET? Write down drain current equations for enhancement and depletion type MOSFET?

c) Sketch and explain cross section of N channel depletion MOSFET with drain transfer characteristics?

3
Solve any THREE

a) Why UJT is referred as negative resistance region device? State it's any two applications.

b) Draw the block diagram of op-amp and explain each block.

c) (i) Define: input offset voltage and CMRR with reference to op-amp. Also write their ideal values for IC741.

(ii) What is virtual ground concept in operational Amplifier?

d) Draw the circuit diagram of non inverting amplifier and derive expression for its voltage gain. How it can be used as voltage follower.

2011

3. Solve any two (2)

- a) Draw and explain the block diagram of OpAmp. 4
- b) Explain the constructional details of SCR and define the terms I_L and I_H . 4
- c) Draw and explain the working of OpAmp as an Inverting amplifier in closed loop configuration and derive the equation for gain. 4
4. (a) Explain the working of TRIAC in first and third quadrant. 3
- b) Define α and β of transistor and obtain the relation between them. 3

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Government College of Engineering, Amravati
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First Semester B. Tech. (All Branches)
Winter 2015

Course Code: ETU 101

Course Name: Basic Electronics Engineering

Time: 2 hrs.

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- 5) Figures to the right indicate full marks.

1. (a) Why zener diode is preferred over PN junction diode to use it as a voltage regulator and hence explain its working with circuit diagram. 3

OR

(b) What is a PN junction diode? Explain its V-I characteristics in detail. Hence state what will happen to the depletion region if doping goes on increasing? 3

(c) Explain bridge type of full wave rectifier with its circuit diagram and waveforms. 3

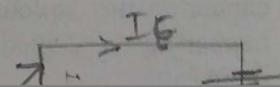
(d) Differentiate between LED and photodiode on the basis of following points. 4

1. Working principle 2. Symbol

3. Material used for construction 4. Applications

Contd.

2. (a) What is transistor? Explain different modes of working of transistor.
- OR**
- (b) Draw PNP and NPN transistors. Label all the currents and show the direction of flow. How are the currents of a transistor related?
- (c) Explain transistor RC coupled amplifier with its advantages and disadvantages.
- (d) Differentiate CE, CB, and CC configurations used for transistor on the basis of following points.
1. Circuit diagram 2. Voltage gain 3. Current gain
4. Applications
3. (a) What is Opamp? Explain the different blocks used in designing Opamp.
- (b) Show that voltage gain for non-inverting amplifier is $A_v = (1 + (R_f/R_{in}))$ where R_f = feedback resistance and R_{in} = input resistance.
- OR**
- (c) Define the following terms.
1. CMRR 2. SVRR 3. Slew rate 4. Bandwidth product 5. Input bias current 6. Offset voltage
- (d) Draw two transistor analogy diagram for SCR and explain its V-I characteristics.



Government College of Engineering, Amravati
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First Semester B. Tech. (All branches)

Winter - 2012

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Instructions to Candidate

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1. Solve any THREE

9

a) What is PIV? What should be the PIV rating of diode in HWR, FWR and bridge type FWR?

b) Determine V_L , V_R , I_Z and P_Z for zener diode network given below fig. $R = 1\text{k}\Omega$, $V = 16\text{V}$, $V_Z = 10\text{V}$, $P_{ZM} = 30\text{mw}$ and $R_L = 1.2\text{k}\Omega$

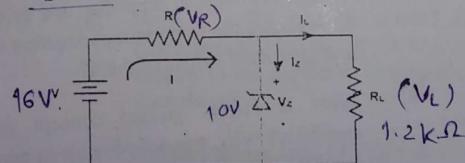


Fig 1

$$\begin{aligned} Z &= \log \frac{V_R}{V_L} \\ &= \log [100] \\ &= \log 10^2 + \log 10^{-2} \\ &\approx 20 \end{aligned}$$

Contd..

- c) What is avalanche breakdown? How it differs from zener breakdown? Justify "Avalanche breakdown voltage increases with increased temperature".
- d) Compare the LED and photodiode with its construction, working principle and applications?
2. Solve any THREE 9
- a) Explain common emitter NPN configuration with collector and base characteristics and show three region of operation on it.
- b) Write down Shockley's equation and Justify "After pinch-off, as V_{ds} is increased, then effective length of channel is increases".
- c) Sketch cross section of P channel enhancement MOSFET and explain working of it with drain transfer characteristics.
- d) Explain in brief charge recombination and pinch off process in FET.
3. a) Explain construction and VI characteristics of TRIAC, state its any two applications. 04
- b) Design Differential amplifier and briefly explain it. What are the important parameters of OP-AMP and give ideal values of them? 04
- c) What is virtual ground concept in inverting amplifier? Why it is not possible in non-inverting amplifier? Find out voltage gain of non-inverting amplifier. 04

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1. (a) Why zener diode is preferred over PN junction diode to use it as a voltage regulator and hence explain its working with circuit diagram. 3

OR

(b) What is a PN junction diode? Explain its V-I characteristics in detail. Hence state what will happen to the depletion region if doping goes on increasing? 3

(c) Explain bridge type of full wave rectifier with its circuit diagram and waveforms. 3

(d) Differentiate between LED and photodiode on the basis of following points.
1. Working principle 2. Symbol
3. Material used for construction 4. Applications 4

Contd..

Government College of Engineering, Amravati
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Winter - 2014

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09

- 1 **Solve ANY THREE from following questions**
- (a) Explain the fabrication and operation of LED, discuss its parameters, and design LED circuits.
 - (b) Sketch Zener diode voltage regulator circuits, and explain their operation.
 - (c) Sketch the circuit diagram for diode AND gate and OR gate with two input terminals and briefly explain circuit operation.
 - (d) Sketch a two diode full wave rectifier circuit for producing a positive output voltage. Sketch the input and output waveforms after using shunt filter and explain the circuit operation.

09

- 2 **Solve ANY THREE from the following questions**
- (a) Draw a block diagram of an unbiased NPN bipolar junction transistor. Identify each part of device and show the depletion region and barrier voltage and briefly explain it.

Cont.

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Cont'd

2. (a) What is transistor? Explain different modes of working of transistor.

OR

- (b) Draw PNP and NPN transistors. Label all the currents and show the direction of flow. How are the currents of a transistor related?

- (c) Explain transistor RC coupled amplifier with its advantages and disadvantages.

- (d) Differentiate CE, CB, and CC configurations used for transistor on the basis of following points.

1. Circuit diagram
2. Voltage gain
3. Current gain
4. Applications

3. (a) What is Opamp? Explain the different blocks used in designing Opamp.

- (b) Show that voltage gain for non-inverting amplifier is $A_v = (1 + (R_f/R_{in}))$ where R_f = feedback resistance and R_{in} = input resistance.

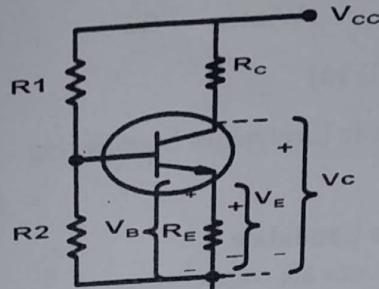
OR

- (c) Define the following terms.
1. CMRR 2. SVRR 3. Slew rate 4. Bandwidth product 5. Input bias current 6. Offset voltage

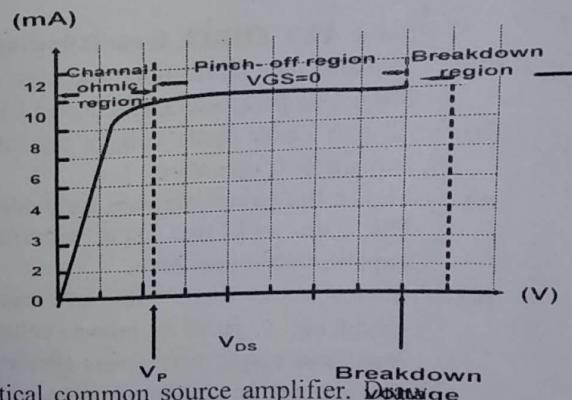
- (d) Draw two transistor analogy diagram for SCR and explain its V-I characteristics.

2015

- (b) Identify and explain the operation of circuit shown in figure and write appropriate equations for V_B , I_E , I_C , and V_{CE} .



- (c) Following figure shows the drain characteristics for n-channel JFET with $V_{GS} = 0$. Explain working of FET in each region and also explain important current and voltage levels.



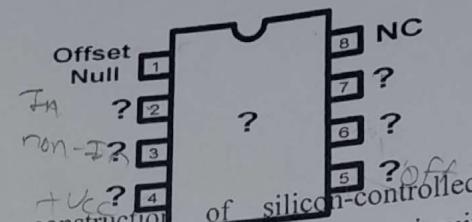
- (d) Sketch a practical common source amplifier. Draw ac voltage and current waveforms for the circuit, and explain its operation in short.

3

(a)

Solve the following questions

Identify the IC, write the name of each pin shown by question mark in following figure and redesign along with its pin configuration.



- (b) Sketch the construction of silicon-controlled rectifier. Sketch the two transistor equivalent circuit and show how it is derived from SCR construction. Some abbreviations are given below, write down expand names and also draw symbols for devices.

- UJT
- TRAIC
- DIAC

- (d) Why is operational amplifier (op-amp) called so? List six characteristics of ideal op-amp and explain anyone application of it.

2014 (3)

Triple A

Government College of Engineering, Amravati
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First Sem. B. Tech.

Winter - 2011

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b) What is transition and diffusion capacitance in p-n junction diode and Explain reverse recovery time?

c) Explain with reference to a zener diode characteristics curve, What you understand by I_{ZK} , I_{ZT} and Z_z .

Contd.



$$(1010)_2 = (10)_{10}$$

$$= 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$$

$$= 8 + 0 + 2 + 0 = 10$$

$$V_o = 8x_1 + 5x_2 + 2x_3 + 1x_4$$

d) Compare the LED and photodiode with its construction, working principle and applications?

2

Solve the following

9

a) What is need of biasing? Explain voltage divider biasing method for CE configuration.

b) Explain pinch-off in FET? Write down drain current equations for enhancement and depletion type MOSFET?

c) Sketch and explain cross section of N channel depletion MOSFET with drain transfer characteristics?

3

Solve any THREE

12

a) Why UJT is referred as negative resistance region device? State it's any two applications.

b) Draw the block diagram of op-amp and explain each block.

c) (i) Define: input offset voltage and CMRR with reference to op-amp. Also write their ideal values for IC741.
 (ii) What is virtual ground concept in operational Amplifier?

d)

Draw the circuit diagram of non inverting amplifier and derive expression for its voltage gain. How it can be used as voltage follower.

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- b) Contrast between Half wave, Center tapped and Bridge rectifiers. 4

- c) Discuss the constructional details of an LED. 4

2. a) Explain in brief the working of FET-CS amplifier and define the terms Transconductance and Amplification factor of FET. 4

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Contd.

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- b) Define α and β of transistor and obtain the relation between them. 3

V_o
R_f/*R₁*

Government College of Engineering, Amravati
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Second Semester B. Tech. (All Branches)

Summer – 2017

Course Code: EEU201

Course Name: Basic Electrical Engineering

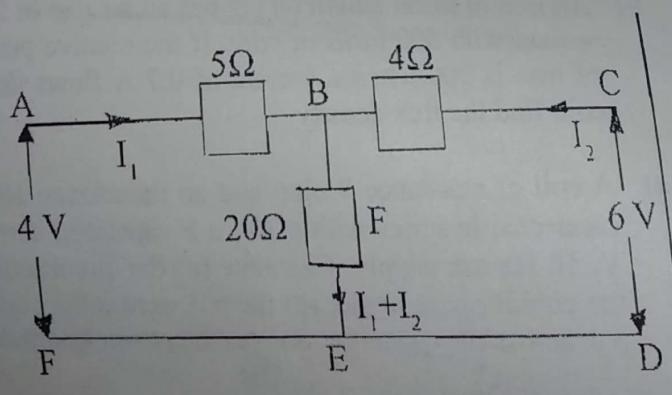
Time: 2.00 hrs.

Max. Marks: 30

Instructions to Candidate

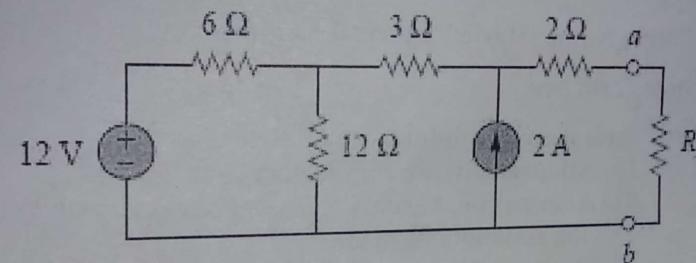
- 1) All questions are compulsory.
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- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

1. a) Using Kirchhoff's laws, calculate the current flowing through each resistor as shown in figure. 4



Contd..

- b) A resistor of 10 ohms is connected in series with two resistances each of 15 ohms arranged in parallel. What resistance must be shunted across this combination so that current taken shall be 1.5 amps, if 20V applied? 4
- c) Find the value of R_L for maximum power transfer in the circuit of Fig. Find the Maximum power.



2. a) Derive the expression for energy stored in a magnetic field. 4

OR
 Compare electric and magnetic circuits with respect to their similarities and dissimilarities. 4

- b) An iron of mean length 60 cm has an air gap of 2mm. It is wound with 300 turns of wire. If the relative permeability of iron is 300 when a current of 0.7 A flows through the coil, find the flux density. 5

3. a) A coil of resistance 8 ohm and an inductance 150 mH, is connected in series with a $100 \mu F$ capacitor, across a 240 V, 50 Hz a.c. supply. Calculate (a) the circuit current, (b) the circuit phase angle, (c) the p.d. across the coil, (d) the p.d. across the capacitor, and (e) the power dissipated. 5

OR

Derive the relationship between line voltage and phase voltage, and line current and phase current for a balanced star connected load.

- b) A capacitor of $100 \mu\text{F}$ is connected across a 200V , 50Hz single phase supply. Calculate (i) the reactance of the capacitor (ii) rms value of current and (iii) the maximum current.

Handwritten notes for question b):

- Top right: $V = V_1 + V_2 + V_3$, $\Omega = Q_1 + Q_2 + Q_3$, $CV = CV_1 + CV_2 + CV_3$.
- Middle left: $C = \frac{Q}{V}$.
- Middle center: $V = \frac{Q}{C}$, $C = \frac{V}{Q}$, $Q = CV$.
- Bottom left: $V = \frac{Q}{C}$.

you to please give us
to complete our project.

Government College of Engineering, Amravati
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I Sem. B. Tech. (All Branches)

Winter – 2018

Course Code: ETU101

Course Name: Basic Electronics Engineering

Time: 1 Hrs. 30 Min.

Max. Marks: 30

Instructions to Candidate

- 1) All questions are compulsory.
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- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

1. Solve any two (2)

- a) Explain the zener voltage regulator with appropriate circuit diagram for the given conditions **6**
 - i) Regulation with variable input
 - ii) Regulation with variable load resistance
- b) Draw and explain the voltage ampere characteristics of a P-n junction diode. **6**
- c) Analyze the given circuit to specify the output and explain the working with suitable waveforms **6**

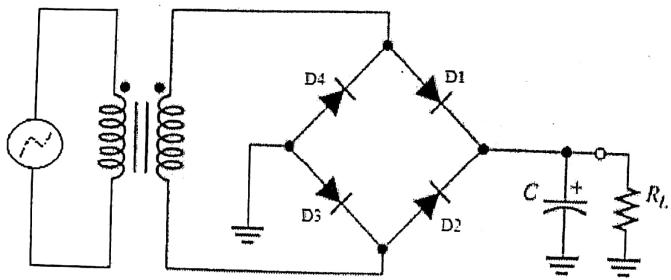


Fig.Qu.1(c)

2. a) What do you mean by the current amplification factor? 4
 Derive the relationship between α , β , and γ
- b) Define g_m and μ with respect to FET and enlist its advantages and disadvantages. 4
- c) Explain the working of n-channel enhancement type MOSFET. 4
3. a) Explain the working of SCR in forward blocking and forward conduction modes. 3
- b) Draw and explain the basic block diagram of communication system. 3