

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  
End Semester Examination, Dec 2019

Course: Basic Electronics Engineering

Program: B.Tech. CSE-AIML, Big Data, SCF, Dev Ops, OSS, OGI, IoT smart city, Cyber Law

Course Code: PHYS1003

Semester: I

Time 03 hrs.

Max. Marks: 100

Instructions:

1. Draw suitable diagrams wherever required.
2. Your answer should be concise and to the point.

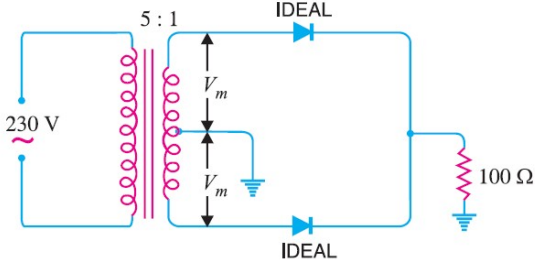
SECTION A (20 Marks)

Attempt all the Questions

| S. No. |   | Marks | CO  |
|--------|---|-------|-----|
| Q 1    | Plot the VI characteristics of silicon and germanium diodes on the same scales. Clearly label the various parameters.         | 4     | CO1 |
| Q 2    | Explain the physical structure of PNP transistor. Also label various majority charge carriers for the terminals.              | 4     | CO2 |
| Q 3    | Differentiate between Junction Field Effect Transistor (JFET) and Metal Oxide Semiconductor Field Effect Transistor (MOSFET). | 4     | CO2 |
| Q 4    | Briefly enumerate the characteristics of an ideal op-amp.   | 4     | CO3 |
| Q 5    | Why is it necessary to modulate a signal for long distance transmission?  | 4     | CO4 |

SECTION B (20 Marks)

Attempt all the Questions

|     |  |    |     |
|-----|--|----|-----|
| Q 6 | Design a Zener voltage regulator which has variable load $R_L$ and load current should vary between 10 mA to 85 mA. It is given that $V_z = 10V$ , $I_{Zmin}=15$ mA, $I_{Zmax}=100$ mA and the series resistance $R_s=40 \Omega$ . Calculate the range of dc variation permissible and Zener power dissipation | 10 | CO1 |
| Q 7 | For the rectifier circuit given below, calculate (i) $V_{DC}$ , (ii) rectification efficiency (iii) PIV<br>   | 10 | CO1 |
| Q 8 | Enumerate working of a p-channel MOSFET in Enhancement mode.   | 10 | CO2 |
| Q 9 | Define modulation. Explain key differences between amplitude and frequency   | 10 | CO4 |

|  |  |           |            |
|--|--|-----------|------------|
|  | modulation.  |           |            |
| <b>SECTION-C (40 Marks)</b>              |  |           |            |
| <b>Attempt any Two of the followings</b> |  |           |            |
| Q 10                                     | <p>a) Draw the circuit diagram of an operational amplifier to be used as a differentiator. Also find the expression for the output voltage.</p> <p>b) Design a closed-loop inverting amplifier using op-amp. Also derive the expression for the output voltage.</p>  | <b>10</b> | <b>CO3</b> |
| Q 11                                     | <p>a) Design an op-amp based circuit using to implement the following signal manipulation:</p> $V_o = 6V_1 + 2V_2 + 4V_3$ <p>where <math>V_1, V_2</math> and <math>V_3</math> are the inputs, use <math>R_f = 10k\Omega</math></p> <p>b) Determine the output voltages at <math>V_2</math> and <math>V_3</math> for the circuit given below:</p> | <b>10</b> | <b>CO3</b> |
|  |  | <b>10</b> | <b>CO3</b> |
| Q.12                                     | <p>a) Explain the working of half wave rectifier. Determine the value efficiency and PIV of half wave rectifier.</p> <p>b) Plot the input and output V-I Characteristics of NPN transistor in CE configuration. Derive the mathematical expression of <math>\alpha</math> and <math>\beta</math> parameters of the BJT.</p>                      | <b>10</b> | <b>CO2</b> |
|  |  | <b>10</b> | <b>CO2</b> |