QP CODE: 25800345

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Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, JANUARY 2025

First Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

CORE - IPH1CR03 - SEMICONDUCTOR PHYSICS

2021 Admission Onwards

55681AF0

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Give the expression of energy stored in a capacitor.
2. What is called a transformer? Which are the two types of transformers based on voltage levels?
3. List the applications of the diode.
4. Discuss the terms efficiency and ripple factor of a rectifier.
5. What do you mean by percentage load regulation? Write its expression.
6. What is meant by active , saturation and cut off regions of transistor operation?
7. What are the three operating regions of a bipolar transistor?
8. Draw the circuit diagram of a CE amplifier.
9. Sketch the drain characteristic of a JFET.
10. Draw a neat sketch of MOSFET in depletion mode.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. What is the value of a 4 band resistor which has green, blue, orange and gold bands?
12. Explain the working of a zener diode. Give its applications.
13. Discuss the different types of clipping circuits along with corresponding input and output waveforms.
14. Define the current gain α. For a transistor I_B = 20μA and I_E = 2mA. Compute the values of I_C and α.
15. What is negative feedback? Derive the equation for the gain of the amplifier with negative feedback.

16. A phase shift oscillator is designed to have a frequency 1000Hz. If it uses equal resistors R=4.7KΩ, calculate the capacitance of the capacitors required for sustained sinusoidal oscillations.

17. Explain in detail with diagrams how voltage applied at gate of FET controls the flow of carriers through the channel.

18. As V_{GS} is changed from -1 V to -1.5 V keeping V_{DS} constant, I_D of the FET drops from 7 mA to 5 mA. What is the transconductance of FET? If the drain resistance is 200 kΩ, find also the amplification factor of the FET.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Discuss 1) inductors in series and parallel without mutual inductance and 2) inductors in series with mutual inductance

20. Define the P-N junction. Explain the working of a P-N junction diode.

21. What do you mean by decibel system? Explain how voltage gain, power gain and current gain are expressed in dB. State its merits.

22. With neat schematic diagrams explain the working of a Depletion type MOSFET, Draw and explain the drain characteristics.

(2×5=10 weightage)