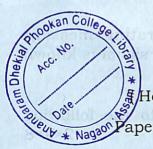
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## 3 (Sem-5/CBCS) PHY HE 4



2024 assort of Time

## PHYSICS

Honours Elective)

aper: PHY-HE-5046

(Physics of Devices and Instruments)

Full Marks: 60

Time: Three hours

## The figures in the margin indicate full marks for the questions.

. Fill	in the blanks: 2007 marship 1×7=7
(i)	Junction Field Effect Transistor (JFET)
P.Draw	is a controlled device.
(ii)	Rectifier of a DC power supply converts
	ainput from mains to a DC
eda, mo	Answer any three questituquo
(iii)	filter is a passive electronic
	device has higher cut of frequency.
(iv)	SiO <sub>2</sub> layer in an Integrated Circuit (IC)
and no-	acts as a
(1)	The full form of GPIB is
១៨៦, ពេល ខា ២៩៩៦	a input from mains to a Do output.  filter is a passive electronic device has higher cut of frequency.  SiO <sub>2</sub> layer in an Integrated Circuit (IC)

- (vi) The maximum value of a modulation index of an Amplitude-Modulated waveform is \_\_\_\_\_.
  - (vii) The process of separating message signal from the carrier signal is known as \_\_\_
- Give very short answers to the following questions:  $2 \times 4 = 8$ 
  - (i) Give a comparison between a JFET and MOSFET device.
  - What is a multivibrator circuit? How many stable states exist in an astable multivibrator?
  - What is the role of a rectifier in a DCregulated power supply? What are different types of rectifiers used in a regulated power supply?
- (iv) What is frequency modulation? Draw a frequency-modulated waveform.

  3. Answer any three questions from the following:

  5×3=15

  (i) What is a depletion-type MOSFET?
  - (i) What is a depletion-type MOSFET? Discuss the operation of a Depletiontype MOSFET with its input-output characteristic curve. 2+3=5

- What are load regulation and line regulation in a DC-regulated power supply?
- What is lithography technique? Distinguish between optical lithography and electron-beam lithography.

2+3=5

- (iv) Discuss briefly about working principle of a phase-locked loop (PLL)
- Discuss the operation of a 1st order band-pass filter circuit.
- (vi) What is the modulation index of an AM wave? Draw an AM wave with modulation index 0.5 and 1.0.

res north big throng off segree 3+2=5

- 4. Answer any three questions from the following: 10×3=30
  - Explain RS232 communication standards. Discuss briefly about universal serial BUS and its 5+5=10applications.
  - Draw the basic block diagram of a wireless communication system and discuss briefly about different blocks of the system. What is the need of modulation in wireless a communication system? Discuss 3+4+3=10 briefly.



- (iii) Discuss briefly about different steps involved in the fabrication of an integrated circuit (IC). What is the importance of metallization technique used in IC fabrication and packaging? 6+4=10
- Write short notes on any two of the (iv) following: 5×2=10
  - (a) Voltage Controlled Oscillator (VCO)
- (b) Parallel Communication
- (c) Digital Modulation techniques What is the modulation index of an
- (v) Derive the expression of a drain current in an enhancement-type MOSFET.
- (vi) Discuss the circuit operation for generation of an amplitude-modulated wave for a wireless communication system. What is the importance of side band frequercy in AM wave? Discuss briefly about single and double side band AM-modulated wa forms.

5+2+3=10

