PHY/VI/CC/21b

Student's Copy

2024

(CBCS)

(6th Semester)

PHYSICS

TWELFTH (B) PAPER

(Electronics-II)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(SECTION : A-OBJECTIVE)

(Marks: 10)

Tick (\checkmark) the correct answer in the brackets provided :

1×10=10

1. Kirchhoff's first law $\sum i = 0$ at the junction is based on the conservation of

- (a) energy ()
- (b) charge ()
- (c) momentum ()
- (d) speed ()

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2.	The	application of Norton's theorem in a linear circuit results in
	(a)	a current source and an impedance in parallel ()
	(b)	a voltage source and an impedance in series ()
	(c)	an ideal voltage source ()
	(d)	an ideal current source ()
3.	In v	which flip-flop, the present input will be the next output?
	(a)	S-R flip-flop ()
	(b)	J-K flip-flop ()
	(c)	D flip-flop ()
	(d)	T flip-flop ()
4.	Wh	ich of the following is not a type of monostable multivibrator?
	(a)	Schmitt trigger as a monostable multivibrator ()
	(Ь)	Emitter-coupled monostable multivibrator ()
	(c)	Using an op-amp ()
	(d)	555 timer as a monostable multivibrator ()
5.	Wh	ich one of the following is not the application of shift marine of
	(a)	Serial to parallel ()
	(Ь)	Analog to digital ()
	(c)	Parallel to serial ()
	(đ)	Data storage ()

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- 6. Which of the following is not a memory device of a computer?
 - (a) RAM ()
 - (b) Cache ()
 - (c) Floppy ()
 - (d) Screen ()
- 7. The most accurate device for measuring voltage is
 - (a) voltmeter ()
 - (b) multimeter ()
 - (c) CRO ()
 - (d) VTVM ()

8. Which of the following ICs is most commonly used?

- (a) Thin films ()
- (b) Monolithic ()
- (c) Hybrid ()
- (d) Two-diode IC ()
- 9. Demodulation is done in
 - (a) receiving antenna ()
 - (b) transmitter ()
 - (c) radio receiver ()
 - (d) transmitting antenna ()
- 10. In an AM wave, the majority of the power is in
 - (a) lower sideband ()
 - (b) middle band ()
 - (c) upper sideband ()
 - (d) carrier ()

(SECTION : B-SHORT ANSWERS)

(Marks: 15)

Answer the following questions :

UNIT—I

1. State and explain Kirchhoff's voltage law.

OR

2. State the advantages of Norton's theorem.

Unit—II

3. Draw the logical diagram and write the truth table for half-subtractor circuit.

OR

4. What is a clock in a flip-flop?

Unit—III

5. Explain the applications of 4-bit counter in digital system.

OR

6. Discuss the role of output devices and give examples of common output devices.

Unit—IV

7. Write the different steps of voltage measurement using CRO.

OR

8. What is the difference between analog and digital circuits?

Unit-V

9. What are the limitations of amplitude modulation?

OR

10. Draw a labelled circuit diagram of electronic communication system.

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Contc

3×5=15

(SECTION : C-DESCRIPTIVE)

(Marks : 50)

Answer the following questions :

UNIT-I

1. (a) Find the current flowing through 20 Ω resistor by finding a Thevenin's equivalent circuit :



(b) Define h-parameter equivalent circuit of a two-port network. Obtain the expression for input impedance and current gain of a two-port network in terms of hybrid parameters. 1+4+2=7

OR



(b) State Thevenin's theorem. Obtain the relation between Thevenin's and Norton's equivalent circuits. 1+5=6

UNIT-II

3. (a) With the help of a suitable diagram, explain the working of positive edge triggered D flip-flop. Write a truth table for the input and output conditions. 5+2=7

5

(b) Write the Boolean expression and truth table of full-adder circuit. з

3

10×5=50

OR

4. (a) Explain the term 'race around condition' in flip-flop. With the help of a block diagram, explain the working of a master-slave J-K flip-flop.

2+5=7

4

(b) Describe the working of 555 timer circuit as astable multivibrator. 3

Unit—III

- 5. (a) What is a shift register? Explain in brief, serial-in, serial-out and parallel-in, parallel-out shift registers. 1+5=6
 - (b) Describe the operation of 4-bit asynchronous counter.

OR

- 6. (a) Explain the concept of memory organization in a computer system. 5
 - (b) Describe the difference between ROM and RAM in terms of their organization and functionality. 5

Unit—IV

7. What is CRO? Explain the construction and working of a cathode-ray tube with a neat diagram. 2+3+5=10

OR

- (a) What is an integrated circuit (IC)? Discuss the advantages and disadvantages of IC over discrete assembly.
 2+3=5
 - (b) Define active and passive components of the circuit. What are the different types of integrated circuit based on the scale of integration?

2+3=5

UNIT-V

9. (a) Explain with a neat circuit diagram, how the amplitude modulation is obtained with a common-emitter amplifier. What is the function of tuned circuit at the collector of the modulation state? 6+2=8

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| Contd.

(b) A carrier of 200 V, 1.5 MHz is modulated by a 50 V, 1 MHz sine wave signal. Find the modulation factor.

OR

- 10. (a) What is amplitude modulation? Derive an expression for amplitude modulated carrier wave. 2+3=5
 - (b) Show that amplitude modulated wave can be represented by a carrier wave and two-sided band frequency.

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 - OR
- **2.** (a) Find the *h*-parameters of the circuit shown in the figure below : 4



(b) State Thevenin's theorem. Obtain the relation between Thevenin's and 1+5=6

- 3. (a) With the help of a suitable diagram, explain the working of positive edge triggered D flip-flop. Write a truth table for the input and output 5+2=7 conditions.
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