

U.G. 3rd Semester Examination - 2020

PHYSICS

[HONOURS]

Course Code : PHY-H-CC-P-7

(Digital Systems and Applications)

[PRACTICAL]

Full Marks : 20

Time : 2 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any **two** of the following experiment related questions: 10×2=20

1. a) How will you measure the voltage and frequency of a given sine wave and a triangular wave using a CRO?
- b) How will you measure the β -value of a given transistor (CL100/SL100) using a multimeter?
- c) Discuss briefly how the forward and reverse resistance of a diode can be measured by a multimeter. 5+3+2
2. a) Draw the circuit diagram of a NOT gate using transistor and write down its truth table.

- b) Give the experimental procedure to verify the truth table of a NOT gate. Also discuss the precautions. 3+5+2
3. a) Draw the circuit diagrams of AND, OR and NOT gate using NAND gate (IC-7400). Write down their truth tables.
- b) Give the experimental procedure to verify the truth tables of the above gates. 3+2+5
4. a) Discuss how you will experimentally verify the following logic identity:

$$AB+AC+B\bar{C}=AC+B\bar{C}$$
- b) Give the logic circuit of the above identity. 7+3
5. a) Draw the circuit diagram of a Half Adder using basic gates. Write down its truth table.
- b) Discuss the experimental procedure to verify the truth table. 2+2+6
6. a) Draw the circuit diagram of a Full Adder using basic gates. Write down its truth table.
- b) Discuss the experimental procedure to verify the above truth table. 2+2+6
7. a) What is a Half -Subtractor? Draw the circuit diagram of a Half-Subtractor and write down its truth table.

[Turn over]

- b) Give the experimental procedure to verify its truth table. 1+2+1+6
8. a) What is a Full-Subtractor? Draw the circuit diagram of a Full-Subtractor and write down its truth table.
- b) Explain the truth table of the Full-Subtractor. 1+2+2+5
9. a) Draw the circuit diagram of a 4-bit binary Adder using Full -Adder IC(IC-7483). Write down its truth table.
- b) Explain the operation of the 4-bit binary Adder on the basis of its truth table. 2+2+6
10. a) Draw the circuit diagram of a 4-bit binary Subtractor using Full -Adder IC(IC-7483). Write down its truth table.
- b) Explain the operation of the 4-bit binary Subtractor on the basis of its truth table. 2+2+6
11. a) Draw the circuit diagram of a SR flip-flop using NAND gates and verify its truth table.
- b) Draw the circuit diagram of a D flip-flop using NAND gates and verify its truth table. 5+5
12. a) What is a clocked SR flip-flop? Give its logic symbol and truth table.
- b) Explain the truth table of clocked SR flip-flop using NAND gates. 1+1+2+6
13. a) Draw the circuit diagram of a Master-Slave JK flip-flop using NAND gates. Write down its truth table.
- b) Explain the operation of a Master-Slave JK flip-flop having preset and clear facilities. 2+2+6
14. a) Define a Register. Draw the circuit diagram of a 4-bit Shift Register (serial-in and parallel-out).
- b) Explain the operation of the Shift Register. 1+2+7
15. a) What is a multivibrator? Give their classifications.
- b) Draw the circuit diagram of a monostable multivibrator using IC-555 and explain its operation. 1+2+7
16. a) What is an astable multivibrator? Draw the circuit diagram of an astable multivibrator using IC-555 timer.

b) Explain the operation of the astable
multivibrator. $1+2+7$

17. Write down the following programmes using 8085-
microprocessor:

a) Multiplication by repeated addition.

b) Division by repeated subtraction. $5+5$

18. Write down the following programmes using 8085-
microprocessor:

a) Addition and subtraction using direct
addressing mode.

b) Addition and subtraction using indirect
addressing mode. $5+5$
