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1216

Your Roll No.

B.Sc. (Hons.)/I

A

PHYSICS – Paper VI

(Linear Digital Circuits and Instruments)

Time : 3 Hours

Maximum Marks : 38

(Write your Roll No. on the top immediately
on receipt of this question paper.)

Attempt **All** questions.

1. Attempt any **TEN** of the following :-
 - (a) Draw a logic circuit for two input AND gate using only two input NOR gates.
 - (b) Given $(27)_{10} = (1000)_b$; calculate the value of the base 'b'.
 - (c) Draw a circuit diagram of an Astable multivibrator using a 555 IC.
 - (d) Prove $\overline{A+B} = \overline{A} \cdot \overline{B}$.
 - (e) Explain why the maximum frequency of a ripple counter's decreases as more flip-flops are added to the counter.

P.T.O.

- (f) How does a JK flip-flop differ from a RS flip-flop ?
- (g) Define resolution of a DAC, and show how can it be expressed in percentage.
- (h) Draw a pin out diagram of the IC-741. What can be the maximum value of the output voltage in any op-amp circuit ?
- (i) Explain the concept of 'ripple' in the output of a half-wave rectifier.
- (j) Define a multiplexer. What are its applications ?
- (k) What is racing in JK flip-flops ? How can it be avoided ? (1×10=10)
2. (a) Draw a circuit using an op-amp for a non-inverting amplifier and obtain an expression for its output voltage using the concept of feedback.

OR

- Describe how an op-amp can be used as a difference amplifier. (4)
- (b) Draw a circuit for a basic differentiator and obtain an expression for its output voltage. What are its limitations ? (3)

3. (a) Design a full-adder using K-maps and explain its working. (3)
- (b) Draw a circuit for a universal shift-register for 4 bits and explain how does it work for parallel in and serial out.

OR

Design a Logic Circuit with 3 bit input such that the output is HIGH whenever the decimal equivalent of the input lies between 2 and 6.

(4)

4. (a) Define duty-cycle of a square wave and describe a method for generating a square wave for a given duty-cycle.

OR

Describe a method for generating sinusoidal wave of a given frequency and obtain the necessary condition to be followed for self-sustained oscillations.

(4)

- (b) Draw a circuit for an asynchronous decade counter and explain its working. (3)
5. (a) Explain how a digital signal can be converted to its equivalent analog signal using appropriate circuit. (4)

P.T.O.

- (b) Draw a circuit for a bridge-rectifier and obtain expressions for its ripple factor.

OR

Draw a block diagram for a CRO and explain the functioning of its horizontal deflection system.

(3)