

2022  
B.A./B.Sc. (Hons.) Third Semester  
Physics  
Paper – II: Electronics

Time allowed: 3 Hours

Max. Marks: 44

*NOTE: Attempt five questions in all, including Question No. 7 (Unit-III) which is compulsory and select two questions each from Unit I - II*

x-x-x

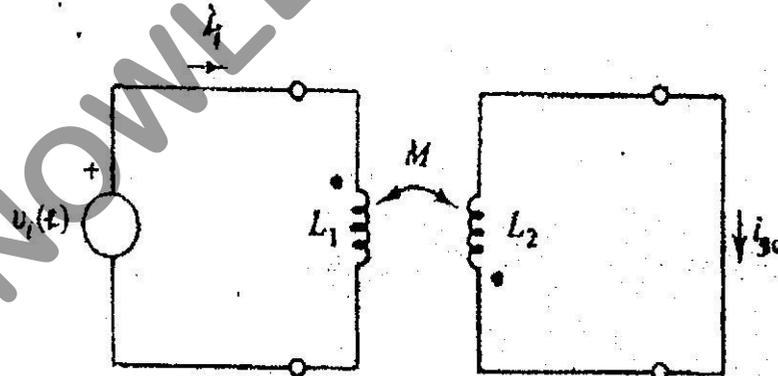
UNIT - I

- (a) State Norton's theorem. Prove it in the case of general network.

(b) The voltage source  $V_1$  has an internal resistance of 600 ohm, voltage source  $V_2$  has an internal resistance of 500 ohm and voltage source  $V_3$  has an internal resistance of 600 ohm. Design a simple circuit that produces a voltage of  $k(V_1 + V_2 + V_3)$  the constant  $k$  should have a large value as possible and the voltage source should have a common ground.

(5,4)
- (a) Two mutually coupled coils are connected in series opposing, derive and discuss the equation for the resulting equivalent inductance.

(b) In the figure shown below, obtain the input current  $i_i$  and the short circuit current  $i_{sc}$ . The input voltage is applied at time  $t = 0$ . Initial conditions are zero.



(5,4)

- (a) What is Piezo Electric effect? In detail explain the working of a transducer based upon Piezo electric effect and give its applications.

(b) What meant by Differential output transducers? Explain the working of a Differential output transducers by taking some suitable example.

(5,4)

P.T.O.

(2)

UNIT - II

4. (a) Convert the Hex number  $(17E.F6)_{16}$  into its octal equivalent.
- (b) Using Boolean algebra, convert the expression given below to a simplified Product of Sums form.  

$$A.B.C.\bar{D} + A.\bar{B}.\bar{C}.D + \bar{A}.\bar{B}.\bar{C}.\bar{D}.$$
- (c) Simplify the following Boolean function in Product of Sums form using K-Map  
 $f(A,B,C,D) = \Sigma(0,1,2,5,8,9,10)$  (3,3,3)
5. (a) What is EX-OR gate? Write its truth table and show how it is implemented using different gates
- (b) What are shift registers? With the help of a neat diagram explain the working of a four bit serial in parallel out type of a shift register. (2,7)
6. (a) What do you understand by a sequential and a combinational circuit describe by taking examples.
- (b) Describe JK Flip-Flop and master slave JK Flip-Flop Discuss its merits over clocked RS Flip-Flop. (3,6)

UNIT - III

7. (a). What is the difference between ideal voltage source and practical voltage source?
- (b) State and discuss briefly the superposition theorem.
- (c) By taking examples discuss floating point representation of binary numbers
- (d) State De Morgan's theorems.
- (e) State Maximum power transfer theorem.
- (f) Discuss the main use of serial in serial out type of shift register?
- (g) What is the roll of clock in the working of a flip flop
- (h) What is meant by LVDT?

(8x1)