



Fig. 1

- (e) Sketch the circuit for simple dipolar transistor inverter, and also the phase relationship between the input and output pulse wave form.
- (f) ECL is said to be nonsaturating. Explain why this is true and the reason for wanting a non saturating logic family.
2. Attempt any **four** from the following : **5×4=20**
- (a) Explain the parameters used to characterize logic family.
 - (b) The totem-pole output stage of the TTL circuit solved what problem, that plagued DTL logic circuits.
 - (c) Explain the purpose of the Darlington transistor pair found in top transistor position of the TTL totem pole for high speed and Schottky subfamilies.
 - (d) What are the advantages of using the wired-AND connection ?

- (e) Draw the schematic diagram for a simple N-channel, enhancement-mode MOS inverter. Explain its logical operation.
- (f) Write a brief note on interfacing TTL with CMOS.

3. Attempt any **two** from the following : 10×2

- (a) Design a four stage shift register composed of JK flip flops. Give state diagram for circuit.
- (b) Design a synchronous modulo – 8 binary counter. Use a binary state assignment. Realze the counter using D flip-flops.
- (c) Using a multiplexer of suitable size implement a 2 bit adder.

4. Attempt any **two** from the following : 10×2=20

- (a) Draw the circuit for CMOS SRAM cell. Explain read and write operation.
- (b) Describe the function of the row-select decodes, column-select decodes and output buffers in the ROM architecture.
- (c) Draw the circuit diagram of Monostable multivibrator circuit and explain its working with the help of suitable waveforms.

Write short notes on any **two** of the following : 10×2=20

- (a) PAL
- (b) FPGA
- (c) Bi CMOS.