

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0321

Roll No.

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B.Tech.

(SEM. III) THEORY EXAMINATION 2012-13

ANALOG & DIGITAL ELECTRONICS

Time : 3 Hours

Total Marks : 100

Note : Answer *all* questions. All questions carry equal marks.

1. Attempt any **four** parts of the following : (5×4=20)
 - (a) How does a tunnel diode differ from a conventional P-N junction diode ? Explain its principle of operation in forward and reverse bias conditions. Sketch its V-I characteristics and mark negative resistance on it.
 - (b) What is varactor diode ? Why is it sometimes called the voltage variable capacitance ? On what fact its operation is based ?
 - (c) What is Schottky diode ? How does it differ in construction from a normal P-N junction ? Give its characteristics and applications.
 - (d) What is LED ? Give its principle of working, construction, merit, demerits and application.
 - (e) What is photo diode ? Explain the working principle of photo diode and draw its characteristic.
 - (f) With the help of suitable circuit diagram, show that a transistor can be used as a switch.

2. Attempt any **four** parts of the following : **(5×4=20)**
- (a) Draw the frequency response of an R-C coupled amplifier and show that gain-bandwidth product is constant.
 - (b) Explain the working of a common emitter amplifier with the help of its circuit diagram.
 - (c) Differentiate between positive and negative feedback. How does negative feedback modify the gain of an amplifier?
 - (d) Draw the block diagrams of negative feedback arrangements. Derive an expression for gain with negative feedback.
 - (e) What are the main advantages of negative feedback? An amplifier with voltage gain of 60 dB uses $\frac{1}{20}$ of its output in negative feedback. Calculate the gain with feedback in dB.
 - (f) Draw the circuit diagram of series-shunt feedback amplifier and explain the working operation.
3. Attempt any **two** parts of the following : **(10×2=20)**
- (a) Draw the circuit diagram of an Hartley Oscillator. Explain how Barkhausen conditions are satisfied? Design the oscillator to produce 10 MHz sinusoidal output using BJT.
 - (b) What are the main considerations which are to be kept in view while selecting an oscillator for a particular application?
 - (c) What is the oscillation criteria? Draw the circuit diagram of Colpitts oscillator using BJT and explain its operation. Derive the expressions for the frequency of oscillation and conditions for sustained oscillations.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) (i) Realize the function using 8 : 1 MUX for the given function $f(A, B, C, D) = \Sigma m(0, 2, 4, 5, 8, 9, 10, 12, 14)$ with variable B is connected from input line and A, C, D connected from selection line.

(ii) What is Decoder ? Draw the circuit diagram of 3 : 8 decoder and explain the operation.

(b) Design a binary counter using J-K flip flops having the following repeated sequences :

2, 1, 4, 7, 5, 3.

(c) What is shift register ? Draw diagram of a 4-bit binary ripple up counter using flip flops that trigger on negative edge transition.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Draw the circuit of a voltage regulator using linear ICs. Explain the working operation. What are the advantages of adjustable voltage regulator over the fixed voltage regulator ?

(b) Determine the value of R1 and R2 if the maximum allowable current through them is 100 MA for Schmitt

Trigger as given in Fig. 1. Assuming $V_{\text{sat}} = +10 \text{ V}$,

$-V_{\text{sat}} = -10 \text{ V}$ and $V_H = 0.1 \text{ V}$.

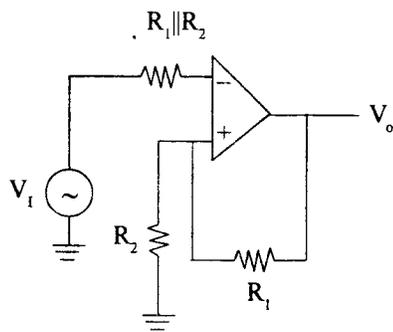


Fig. 1

- (c) Discuss the different types of RAM, ROM and sequential memory.