Printed Pages—4   **EEC309**

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

PAPER ID : 0321 **Roll No.** | | | | | | | | | |

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.

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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.

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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

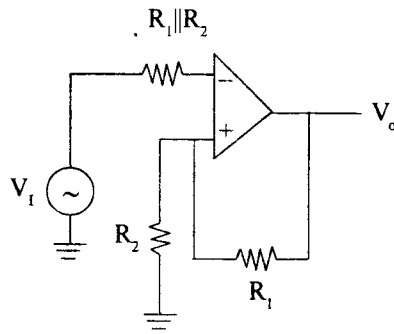Trigger as given in Fig. 1. Assuming $V_{sat} = +10$ V, $-V_{sat} = -10$ V and $V_H = 0.1$ V.

Fig. 1

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

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