NEC409(A)

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15
ANALOG AND DIGITAL ELECTRONICS

Time : **3 Hours**]   [Total Marks : **100**

1   Attempt any **four** parts :   5×4=20

(a)   Discuss how the variable capacitance is achieved in varactor diode. Enlist the application of varactor diode.

(b)   Explain the principle and working of light emitting diode (LED) with V-I characteristics.

(c)   Draw the V-I characteristics of tunnel diode and indicate the useful region in the curve.

(d)   Draw the output characteristics of transistor and also explain how it is used as a switch.

(e)   An LED is connected across a voltage source of +10V through a series resistance of 820 Ω Calculate the LED current. Assume the voltage drop across an LED of 15 Volt.

(f)   Define the following terms :
   (i)   Rise time
   (ii)   Fall time
   (iii)   Delay time
   (iv)   Storage time.

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2 Attempt any **four** parts :　　　　　　　　　　　　　　5×4=20

(a) Derive the input and output resistance of a Transconductance and Voltage amplifier.

(b) Calculate the voltage gain, input and output resistance of voltage series feedback amplifier having $A_v = 300$, $R_i = 1.5 k\Omega$, $R_0 = 50 k\Omega$ and $\beta = 1/15$.

(c) Describe the properties of series-shunt and shunt-shunt feedback amplifier.

(d) Draw the high frequency equivalent circuit or the typical RC coupled common emitter amplifier.

(e) An RC coupled amplifier has voltage gain of 1000, $f_1 = 50$ Hz, $f_2 = 200$ kHz and a distortion of 5% without feedback. Find the amplifier voltage gain, f_1, f_2 and distortion when negative feedback is applied with feedback ratio 0.01.

(f) List five characteristics of an amplifier which are modified by negative feedback.

3 Attempt any two parts :　　　　　　　　　　　　　　10×2=20

(a) (i) Discuss how does the circuit of a hantley oscillator differ from that of a Colpitt oscillator.

　　(ii) Explain the properties of a quartz crystal which are responsible for its use in oscillator.

(b) What is the Barkhausen criterion for the Feedback oscillator? Draw a neat diagram of phase shift oscillator using BJT. Derive an expression for its frequency of oscillation.

(c) A coupling oscillator is designed with $C_1 = 100$ pF and $C_2 = 7500$ pf. The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 kHz and 2050 kHz.

4   Attempt any two parts :   10×2=20
     (a)   (i)   Implement the following Boolean function using
                 8:1 multiplexer
                 F(A,B,C,D)=$\sum$ (2,4,5,7,10,14)
           (ii) Explain the working of SR flip-flop using NAND
                 gates.
     (b)   (i)   Differentiate between an encoder and decoder.
           (ii) Tabulate the excitation table of J-K flip flop.
     (c)   Draw and explain the working of 4-bit up and down
           synchronous counter. Also describe the working of shift
           register.

5   Attempt any two parts :   10×2=20
     (a)   Explain the organisation of RAM with the help of neat
           diagram. Also describe the switching regulators.
     (b)   Explain A/D convertor using voltage to frequency
           convertor. Describe any one method of A/D convertor.
     (c)   What are the voltage regulators? Discuss the working
           of shunt and series op-amp based voltage regulators.

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