



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

**PAPER ID : 131410**

Roll No.

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## 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  $\Omega$ . 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.

- 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  $A_v = 300$ ,  $R_i = 1.5k\Omega$ ,  $R_o = 50k\Omega$  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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