

Faculty of Engineering & Technology  
Third Semester B.E. (Electronic/ET/EC) (C.B.S.)  
Examination  
ELECTRONICS DEVICES AND CIRCUITS

Time—Three Hours]

[Maximum Marks—80

**INSTRUCTIONS TO CANDIDATES**

- (1) All questions carry marks as indicated.
- (2) Answer **SIX** questions
- (3) Due credit will be given to neatness and adequate dimensions.
- (4) Assume suitable data wherever necessary.
- (5) Illustrate your answers wherever necessary with the help of neat sketches.
- (6) Answer the questions as per choice given.

1. (a) Write a short note on capacitive effect of P-N junction diode. 6
- (b) Given Si diode with forward voltage of  $V=0.4V$ . Calculate the factor by which the current will be multiplied when the temperature is increased from  $25^{\circ}C$  to  $150^{\circ}C$ . 7

**OR**

2. (a) Draw the circuit diagram of full wave bridge rectifier

and explain its operation. Also derive the expression for ripple factor and efficiency for full wave rectifier.

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(b) A full wave rectifier with capacitor filter is to supply a current of 20 mA at 16 V of  $f = 50$  Hz and the allowed ripple of 1%. Calculate :

(i) Secondary voltage of transformer

(ii) The value of capacitor.

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3. (a) What are the different methods used for biasing of transistor ? Explain any one method of biasing a single stage BJT.

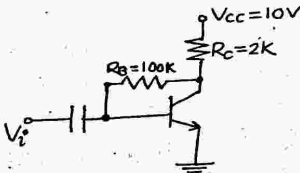
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(b) For the circuit shown below :

(i) Find  $I_B$ ,  $I_C$  and  $V_{CE}$  if Si-transistor with  $\beta = 50$  is used

(ii) Specify  $R_B$  so that  $V_{CE} = 7V$ .

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OR

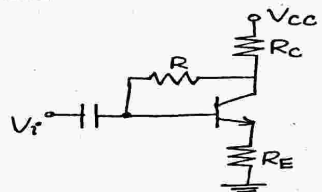
4. (a) Draw and explain the Ebers-Moll's model of a NPN transistor.

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(b) Discuss Early effect or Base Width modulation in transistor.

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(c) In the circuit shown  $V_{cc} = 24V$ ,  $R_c = 10 k\Omega$ ,  $R_E = 270 \Omega$  for Si transistor with  $\beta = 45$  and  $V_{CE} = 5V$ , find R.



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5. (a) Show block schematically the different feedback connections in an amplifier. Explain the effect of each type of feedback on input and output impedance.

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(b) The overall gain of the two stage amplifier is 200 with negative feedback of 20% applied only to the second stage. Assuming that the first stage has negligible distortion and that the second stage has a gain of 300 and 10% distortion without feedback. Find (i) the distortion of second stage with feedback. (ii) The gain of the first stage.

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OR

6. (a) Explain the effect of negative feedback on :

(i) Voltage gain

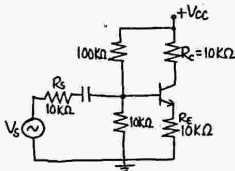
(ii) Bandwidth and

(iii) Noise

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- (b) The transistor amplifier shown in figure below has a parameter given below :

$h_{ie} = 1.1 \text{ k}\Omega$ ,  $h_{re} = 2.5 \times 10^{-4}$ ,  $h_{fe} = 50$ ,  $h_{oe} = 2.5 \mu\text{A/V}$ .  
Calculate  $A_v$ ,  $A_{v_s}$ ,  $A_{v_{S'}}$ ,  $Z_i$  and  $Z_o$ .



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7. (a) Draw and explain the working of Wien Bridge oscillator. Also derive the expression for frequency of oscillation. 7
- (b) State the conditions under which a feedback amplifier works as an oscillator. 3
- (c) Determine the series and parallel resonant frequencies and quality factor for a Quartz crystal. Given that  $L = 150 \mu\text{H}$ ,  $R = 7\Omega$ ,  $C = 0.025 \text{ pF}$  and  $C_m = 0.4 \text{ pF}$ . 4

OR

8. (a) Draw the circuit diagram for Colpitt's oscillator and explain its working. 7

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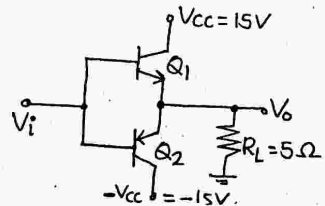
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- (b) Draw the circuit diagram of transistorized Astable multivibrator and explain its working with waveform. 7

9. (a) Show that the efficiency of transformer coupled power amplifier in class A is 50%. 6
- (b) Draw the schematic diagram of class-B push-pull amplifier and show that output consists of odd harmonics only. 7

OR

10. (a) What is Cross-over distortion in amplifier? How can it be eliminated? 6
- (b) The ideal class-B push-pull amplifier shown with  $V_{cc} = 15\text{V}$ ,  $R_L = 5\Omega$  and the input signal. Determine :  
(i) Maximum output signal power  
(ii) Maximum d.c. input power  
(iii) The conversion efficiency.  
(iv) What is the maximum dissipation of each transistor and what is the efficiency under these conditions?



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11. (a) Draw and explain common source drain-characteristics of an n-channel JFET. 5

(b) Draw mutual characteristics of JFET and show that :

$$g_m = \frac{2}{|V_p|} \sqrt{I_{DSS} \cdot I_{DS}} \quad 5$$

(c) Compare BJT and JFET. 3

OR

12. (a) Explain the working of P-channel Depletion type MOSEFT with neat diagram and draw the characteristics also. 6

(b) A bias circuit FET is shown in figure below. Determine the quiescent values of  $V_{DS}$ ,  $V_{GS}$  and  $I_D$ . Given that  $V_p = -5V$ ,  $I_{DSS} = 5mA$  7

