

**T 8141**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Second Semester

Mechatronics Engineering

EC 1161 — ELECTRONIC DEVICES AND CIRCUITS

(Regulation 2004)

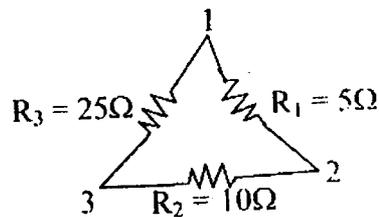
Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State and explain the Kirchoff's current law and Kirchoff's voltage law.
2. For a delta network with the given configuration as resistances  $R_1$  between nodes 1 and 2 as  $5 \Omega$ ;  $R_2$  as  $10 \Omega$  between nodes 2, 3 and resistance  $R_3$  as  $25 \Omega$  between nodes 3, 1. Obtain its equivalent star network.



3. What are intrinsic P-type semiconductors?
4. Write briefly on Zener diodes.
5. Draw a half wave diode rectifier circuit and explain briefly.
6. Explain briefly on peak inverse voltage (PIV) rating of diodes.
7. Compare at least 4 features between field effect transistor (FET) and Bipolar junction transistor. (BJT)
8. What is the advantage of negative feedback configuration in amplifier circuits?
9. List the ideal characteristics of op-amps.
10. Give two applications of multivibrator circuits.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is a symmetrical network and reciprocal network?  
(ii) A two port network with  $V_1$  and  $V_2$  are given by  $V_1 = 60I_1 + 20I_2$ ,  
 $V_2 = 20I_1 + 40I_2$ . Find the y-parameters of the network. (8 + 8)

Or

- (b) (i)  $Z_{11} = 20\ \Omega$ ;  $Z_{22} = 30\ \Omega$ ;  $Z_{12} = Z_{21} = 10\ \Omega$ . Find y and ABCD parameters of the networks.  
(ii) Obtain the condition of transmission parameters for two networks connected in cascade. (8 + 8)
12. (a) (i) Explain how transistor amplifiers are classified.  
(ii) For a common Emitter biased transistor obtain the current amplification factor  $\beta$  giving neat figures of the circuit and the output characteristics. (8 + 8)

Or

- (b) (i) Write briefly on energy levels for insulators and semiconductors.  
(ii) Obtain the V-I characteristics of a PN junction diode with explaining the temperature effects. (8 + 8)
13. (a) (i) With neat figures explain the full wave bridge rectifier circuit design using diodes, deriving the expression of ripple factor improvement with use of a capacitor filter.  
(ii) Calculate the ripple of a capacitor filter for a peak rectified voltage of  $V_{dc} = 30\text{ V}$ ,  $C = 50\ \mu\text{F}$ , load current of 50 mA. (12 + 4)

Or

- (b) Write briefly with neat circuits on any two diode circuits :
- (i) Clipper circuits.  
(ii) Voltage doubler circuits.  
(iii) Sinusoidal ac regulation.

14. (a) (i) Discuss briefly on the 4 feedback configuration with amplifiers. Determine the voltage gain, input, output impedance with feed back for voltage series feedback having  $A = -100$ ;  $R_i = 10 \text{ k}\Omega$ ,  $R_o = 20 \text{ k}\Omega$ ,  $\beta = -0.1$ .
- (ii) Draw the circuit of a voltage shunt feedback amplifier using an FET.

Or

- (b) With neat circuit diagram explain the design of a Colpitt oscillator. Explain the Barkhausen criterion for oscillation. How does the Hartley oscillator differ from a Colpitt oscillator? (8 + 4 + 4)
15. (a) Show that the inverting configuration of an Op-amp amplifier is preferred to a non-inverting configuration characteristics. (16)

Or

- (b) Write briefly on :
- (i) Op-amp Wein Bridge oscillator.
- (ii) Schmitt trigger using Op-amps. (8 + 8)