



Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**Question Paper Code : 50432**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Second/Third Semester

Electrical and Electronics Engineering

EC 6202 – ELECTRONIC DEVICES AND CIRCUITS

(Common to Biomedical Engineering/Electronics and Instrumentation Engineering/Instrumentation and Control Engineering/Medical Electronics/Robotics and Automation Engineering)  
(Regulations 2013)

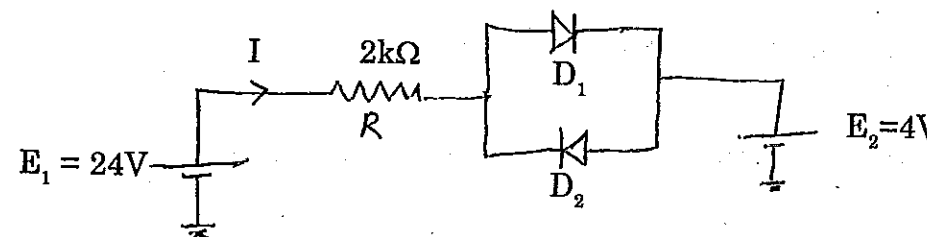
Time : Three Hours

Maximum : 100 Marks

PART – A

(10×2=20 Marks)

1. Find the current  $I$  in the following circuit.



Assume the diodes to be of silicon and forward resistance of diodes to be zero.

2. What is diffusion capacitance ?
3. State the advantages of FET over BJT.
4. Draw the structure of UJT.
5. In a common base connection, current amplification factor is 0.9. If the emitter current is 1 mA, find the value of base current.
6. Define transconductance of MOSFET.
7. A multistage amplifier employs five stages each of which has a power gain of 30. What is the total gain of the amplifier in db ?



8. What is thermal runaway ?
9. An amplifier has a current gain of 240 and input impedance of  $15\text{ k}\Omega$  without feedback. If negative current feedback (current attenuation = 0.015) is applied, what will be the input impedance of the amplifier ?
10. What are the essential blocks of a transistor oscillator ?

## PART - B

(5×13=65 Marks)

11. a) i) Explain the working of a bridge rectifier circuit. Discuss its advantages over centre-tap full wave rectifier circuit. (7)
- ii) Over what range of input voltage will the zener in a voltage regulator in circuit maintain 30 V across  $2000\ \Omega$  load, assuming that series resistance  $R = 200\ \Omega$  and zener current rating is 25 mA ? (6)
- (OR)
- b) i) Explain the working, advantages and applications of LED and laser diodes. (10)
- ii) What value of series resistor is required to limit the current through a LED to 20 mA with a forward voltage drop of 1.6 V when connected to a 10V supply ? (3)
12. a) i) Explain the working of a depletion mode MOSFET. Draw and explain its VI characteristics. (8)
- ii) Explain the emitter bias method used in transistor amplifier circuits. (5)
- (OR)
- b) i) Explain the working of a thyristor. (7)
- ii) In an transistor amplifier using voltage divider bias, the operating point is chosen such that  $I_C = 2\text{mA}$ ,  $V_{CE} = 3\text{V}$ . If  $R_C = 2.2\text{ k}\Omega$ ,  $V_{CC} = 9\text{V}$  and  $\beta = 50$ , find the values of bias resistors and  $R_E$ . Assume  $V_{BE} = 0.3\text{V}$  and current through the bias resistors is  $10I_B$ . (6)
13. a) i) Explain the working of a common emitter amplifier. (9)
- ii) The data sheet of an enhancement MOSFET gives  $I_{D(on)} = 500\text{ mA}$  at  $V_{GS} = 10\text{ V}$  and  $V_{GS(th)} = 1\text{V}$ . Find the drain current for  $V_{GS} = 5\text{V}$ . (4)
- (OR)
- b) i) Make a high frequency analysis of a common source amplifier. (6)
- ii) Compare the characteristics of CB, CE and CC amplifiers. (7)

14. a) i) Explain the working of a differential amplifier. (8)
- ii) Compare voltage and power amplifiers. (5)
- (OR)
- b) i) Explain the working of class C power amplifier. (7)
- ii) Discuss the advantages and disadvantages of any three classes of power amplifiers. (6)
15. a) i) Explain the working of Wien bridge oscillator. (5)
- ii) Discuss the advantages of negative current feedback on the performance of amplifiers. (4)
- iii) When negative voltage feedback is applied to an amplifier of gain 100, the overall gain falls to 50. Find the fraction of the output voltage feedback. If this fraction is maintained, find the value of the amplifier gain required if the overall stage gain is to be 75. (4)
- (OR)
- b) i) Explain the working of a phase shift oscillator. Discuss its advantages and disadvantages. (8)
- ii) A 1 mH inductor is available. Choose the capacitor values in a colpitts oscillator so that  $f = 1\text{ MHz}$  and feedback fraction is 0.25. (5)

## PART - C

(1×15=15 Marks)

16. a) There is an application which needs the output voltage to be regulated. Choose an appropriate diode/device, that would ensure this operation with appropriate circuit, describe how it regulates voltage. Consider a specific example, design the circuit with appropriate values of components involved. State the important constraints that need to be considered. (15)
- (OR)
- b) When a portion of the output signal is fed to input, as you are aware, feedback is generated. Distinguish between negative feedback and positive feedback and elaborate on their individual advantages. How different parameters of an amplifier (say) will be affected by these two types of feedback ? (15)