Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27186

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Electrical and Electronics Engineering

EC 6202 — ELECTRONIC DEVICES AND CIRCUITS

(Common to Electronics and Instrumentation Engineering, Instrumentation and Control Engineering, Robotics and Automation Engineering, Biomedical Engineering, and Medical Electronics)

(Also Common to Second Semester for Biomedical Engineering and Medical Electronics)

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the symbol of the following devices.
   (a) PN diode
   (b) Zener diode
   (c) LED
   (d) UJT.
2. Calculate the diffusion Capacitance for a silicon diode with a 15 mA forward current, if the charge carrier transit time is 70nsec.
3. Calculate I_C and I_E for a transistor that has $\alpha_{dc} = 0.99$ and $I_B = 150\,\mu A$. Determine the value of β_{dc} for the transistor.
4. Show how an SCR can be triggered on by the application of a pulse to the gate terminal.
5. Draw the small signal equivalent circuit of a CS JFET.
6. What is the need of coupling capacitors in amplifier design?
7. Define CMRR. What is its ideal value?
8. What is the need for neutralization?

9. Mention the advantages of negative feedback circuits.

10. What is the advantage of a Colpitts oscillator compared to a phase shift oscillator?

PART B — (5 × 16 = 80 marks)

11. (a) (i) With necessary diagrams, explain the forward and reverse characteristics of PN junction diode. (8)

(ii) Draw the circuit diagram of a half wave rectifier for producing a positive output voltage. Explain the circuit operation and sketch the waveforms. (8)

Or

(b) With neat diagram, explain the operation of Zener diode and its forward and reverse characteristics. Also distinguish between Avalanche and Zener Break downs. (16)

12. (a) (i) Explain the selection of Q point for a transistor bias circuit and discuss the limitations on the output voltage swing. (8)

(ii) Draw the cross section diagram for an N type enhancement mode MOSFET. Briefly explain its operation. (8)

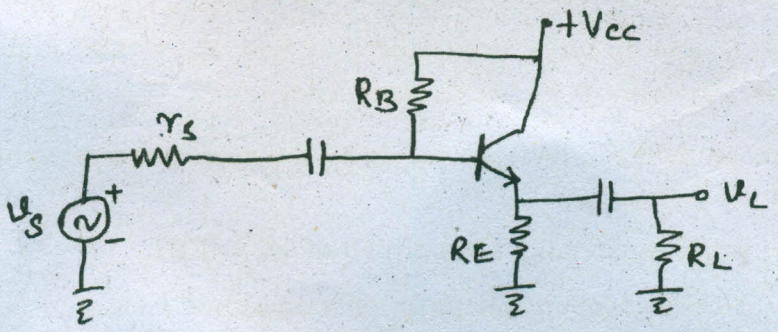
Or

(b) (i) Draw the basic construction and equivalent circuit of a Uni Junction Transistor. Briefly explain the device operation. (8)

(ii) Sketch the four layer construction of an SCR and the two transistor equivalent circuit Explain the device operation. (8)

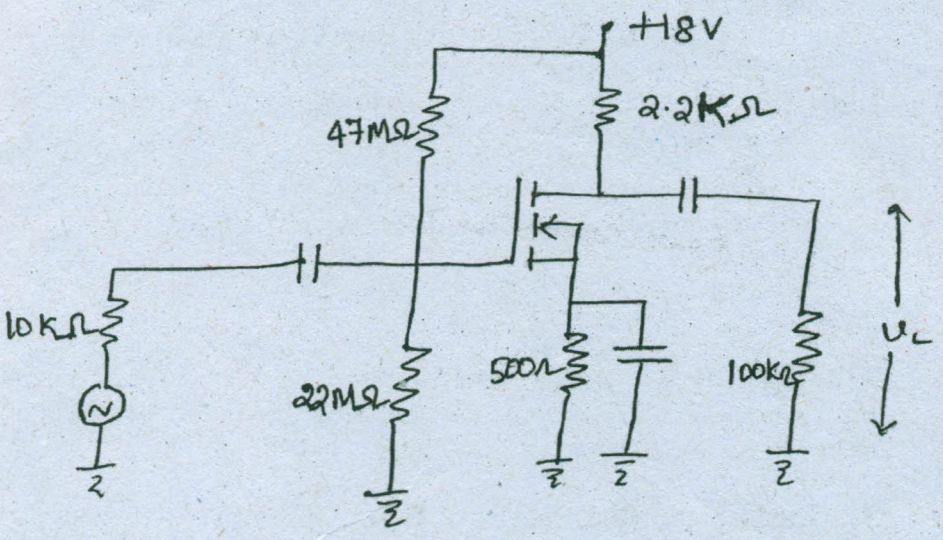
13. (a) (i) Discuss the factors involved in the selection of I_C, R_C and R_E for a single stage common emitter BJT amplifier circuit, using voltage divider bias. (8)

(ii) A CC amplifier shown in below figure has V_{CC} = 15 V, R_B = 75$k\Omega$ and R_E = 910Ω The β of the silicon transistor is 100 and the load resistor is 600Ω Find r_{in} and A_v. (8)



Or

(b) (i) The MOSFET shown in below figure has the following parameters. $V_T = 2$ V, $\beta = 0.5 \times 10^{-3}$, $r_D = 75k\Omega$ It is biased at $I_D = 1.93$mA Determine the input impedance and voltage gain. (8)



(ii) With neat circuit diagram, perform ac analysis for common source using equivalent circuit NMOSFET amplifier. (8)

14. (a) With neat sketch, explain the BJT differential amplifier with active load and derive for Ad, Ac and CMRR. How CMRR can be improved. (16)

Or

(b) (i) Explain with circuit diagram class B power amplifier and derive for its efficiency. (8)

(ii) With neat circuit, explain and derive the gain and Band width of a single tuned amplifier. (8)

15. (a) Sketch the circuit diagram of a two-stage capacitor coupled BJT amplifier that uses series voltage negative feedback. Briefly explain how the feed back operates.

Or

(b) Describe and explain the operation of the following oscillators.

(i) Wien bridge oscillator (5)

(ii) Design a Wien bridge oscillator circuit to oscillate at a frequency of 20 kHz. (5)

(iii) Crystel oscillator. (6)

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