



BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – B.Sc. (Honours) in Hardware & Networking/ Bachelor of Computer Applications

Course Name - Analog Electronics

Course Code – BECE010601

(Semester – 1)

Time allotted: 3 Hours

Full Marks: 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question)

10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) The cut in voltage (or knee voltage) of a silicon diode is

- | | |
|----------|---------|
| a. 0.2V | b. 0.7V |
| c. 0.8 V | d. 1.0V |

(ii) An OPAMP has

- | | |
|-------------------------------------------------------|-----------------------------------------------------|
| a. equal input and output resistance | b. large input resistance and low output resistance |
| c. low input resistance and a large output resistance | d. none of these. |

(iii) The open loop voltage gain of an OPAMP is

- | | |
|--------------------|----------|
| a. small | b. large |
| c. can be anything | d. unity |

- (iv) In zener and avalanche breakdown diodes the current flow is due to
- a. majority carriers
 - b. minority carriers
 - c. majority and minority carriers
 - d. none of these
- (v) Which of the following devices is expected to have the highest input impedance
- a. MOSFET
 - b. BJT
 - c. JFEET
 - d. OPAMP
- (vi) The OPAMP can amplify
- a. a.c signal only
 - b. d.c signal only
 - c. both a.c and d.c signals
 - d. none of these
- (vii) FET is a
- a. voltage controlled device
 - b. current controlled device
 - c. both a & b
 - d. none of these
- (viii) The common mode gain of OP AMP is
- a. very high
 - b. very low
 - c. always unity
 - d. unpredictable
- (ix) The ripple factor of a bridge rectifier is
- a. 0.482
 - b. 0.812
 - c. 1.11
 - d. 1.21
- (x) The feedback element in the integrator is a
- a. capacitor
 - b. inductor
 - c. diode
 - d. resistance

Group – B

(Short Answer Type Questions)

3 x 5 = 15

Answer any *three* from the following

2. Draw the circuit diagram of voltage regulator using Zener diode.

5

3. What is slew rate? Explain virtual ground concept of Op-Amp. 2+3
4. Draw the circuit diagram of full wave rectifier using junction diodes. Explain clearly its action. Also explain how the pulsating potential across the load can be smoothed out by the use of L-C filter. 1+2+2
5. Describe the use of an OPAMP as non- inverting amplifier. 5
6. State the principle of action of Light emitting diode (LED). 5

Group – C

(Long Answer Type Questions)

3 x 15 = 45

Answer any *three* from the following

7. (a) Draw the circuit diagrams of both forward-biased and reverse-biased junction diode. Write down the current voltage relationship for a p-n junction diode. Draw the corresponding curve. Define static resistance and dynamic resistance of p-n junction diode. What is the origin of reverse saturation current in p-n junction diode? 2+2+2+2+2
- (b) The current flowing through a p-n junction silicon diode is 60 mA for a forward bias of 0.9 V at 300 K. Determine the static and dynamic resistance. (Given Boltzmann constant (k)= 1.38×10^{-23} J/K). 1+4
8. (a) Describe the use of an OPAMP as summing amplifier. 5
- (b) Sketch the circuit diagram of OPAMP to get $V_0 = -V_1 + 3 V_2 - 5V_3$. 5
- (c) Calculate the output voltage for the summing amplifier circuit using OPAMP. Given $V_1=0.2V, V_2=2V, V_3=1V$ and $R_1=1K\Omega, R_2=2K\Omega, R_3=5K\Omega$ and $R_f=3K\Omega$, where notations carry the usual meanings. 5
9. (a) Explain transfer of resistor in transistor. 3
- (b) Draw the circuit diagrams of different configurations of transistor. 6
- (c) Define α and β of transistor. Derive a relation between them. 2+4

10. (a) Draw the circuit of bridge rectifier and describe its operation. 2+4
- (b) Define ripple factor. Describe how filters are used to eliminate ripples from rectifier output. 2+4
- (c) Write down the advantages of Bridge Rectifier. 3
11. (a) Distinguish between unipolar and bipolar devices with examples. 3+1
- (b) Draw the circuit symbol of MOSFET. Sketch the structure of an n channel depletion type MOSFET. Draw the typical drain characteristics of it in both enhancement and depletion modes. 1+2+2
- (c) An amplifier has voltage gain equal to -100. The feedback ratio is -0.04. Find i) Voltage gain with feedback, ii) the output voltage of feedback amplifier for an input voltage of 40 mV, iii) the feedback factor and iv) the feedback voltage. 6
