



BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – B.Sc. (H) in Computer Science/ B.Sc. (H) in Hardware & Networking

Course Name – Basic Electronics II: Analog Electronics

Course Code – EC201 / BCSG201 / BHNG201

(Semester – 2)

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) Transistor biasing is generally provided by
 - a. biasing circuit
 - b. bias battery
 - c. diode
 - d. none of these
 - (ii) The point of intersection of d.c. load line with the relevant output characteristic represents
 - a. operating point
 - b. current gain
 - c. voltage gain
 - d. none the these
 - (iii) The voltage gain of an OPAMP used as inverting amplifier is
 - a. less than unity
 - b. greater than unity
 - c. equal to unity
 - d. none of these
 - (iv) The Op-amp can amplify
 - a. a.c signal only
 - b. d.c signal only
 - c. both a.c and d.c signals
 - d. neither d.c nor a.c signals
 - (v) The feedback element in a integrator is a
 - a. capacitor
 - b. inductor
 - c. diode
 - d. resistance

- (vi) Which of the following devices is expected to have the highest input impedance
- | | |
|-----------|------------------|
| a. MOSFET | b. BJT |
| c. JFET | d. None of these |
- (vii) A JFET is a
- | | |
|---|------------------------------|
| a. current controlled device | b. voltage controlled device |
| c. both Current and voltage controlled device | d. none of these |
- (viii) A voltage follower
- | | |
|--|---------------------|
| a. has a voltage gain of magnitude unity | b. is non-inverting |
| c. has zero feedback resistor | d. has all of these |
- (ix) When voltage feedback (negative) is applied to an amplifier, its input impedance
- | | |
|---------------------|---------------------|
| a. is decreased | b. is increased |
| c. remains the same | d. any one of these |
- (x) A JFET has three terminals, namely
- | | |
|-----------------------------|------------------------|
| a. cathode, anode, grid | b. source, gate, drain |
| c. emitter, base, collector | d. none of these |

Group – B

(Short Answer Type Questions)

3 x 5 = 15

Answer any *three* from the following

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| 2. What is slew rate? Explain virtual ground concept of an Op-Amp. | 2+3 |
| 3. Compare FET with BJT. Why is BJT called the current controlled device? | 4+1 |
| 4. Establish the relation $\mu = r_d g_m$ in case of FET, where the notations have their usual meanings. | 5 |
| 5. Write short notes on i) Emitter follower & ii) Darlington pair | 5 |
| 6. What are the different types of MOSFET? Explain with a neat sketch the structure and operation of the n-channel enhancement MOSFET. | 1+4 |

Group – C

(Long Answer Type Questions)

3 x 15 = 45

Answer any *three* from the following

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|--|---|
| 7. (a) State the characteristics of an ideal OPAMP. | 5 |
| (b) Draw the circuit diagram of adder using OPAMP and explain its operation. | 5 |
| (c) Sketch the circuit diagram of OPAMP to get $V_0 = -4V_1 + 3V_2 - 2V_3$.
Where V_1, V_2 and V_3 are the concerned input voltages. | 5 |

8. (a) Explain with the help of a block diagram, the working principle of a feedback amplifier. Hence deduce Barkhausen criterion of oscillation for both positive and negative feedback. 7+2
- (b) Illustrate the merits of negative feedback in amplifier. 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. 4
9. (a) Develop the theory of action of an OPAMP as an integrator. 5
- (b) Elucidate the action of OPAMP as Low pass filter. 3
- (c) Calculate the output voltage for the summing amplifier circuit using OPAMP. Given $V_1=1.2V, V_2=3V, V_3=2V$ and $R_1=10K\Omega, R_2=20K\Omega, R_3=50K\Omega$ and $R_f=30K\Omega$, where notations carry the usual meanings. 5
10. (a) Draw the circuit diagram for base bias considering an n-p-n transistor in CE configuration. Derive expressions for its stability factors. Mention demerits of this circuit. What are the functions of the coupling capacitors? 2+6+2
- (b) In the base bias circuit of a transistor, $V_{CC}=15 V, R_B=300 K\Omega$ and $R_L=2 K\Omega$. If $\beta=100, I_{CO}=20 nA$ and $V_{BE}=0.7 V$, find the Q point analytically. 5
11. (a) Define the hybrid parameters for a basic transistor circuit in any configuration. Draw the h equivalent circuit for small signal linearly operating transistor. 2+1
- (b) Using h parameters, calculate current gain, input resistance, voltage gain and output resistance in case of low frequency small signal transistor amplifier. 3+3+3+3
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