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First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Electronics

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, choosing at least TWO from each part.

PART – A

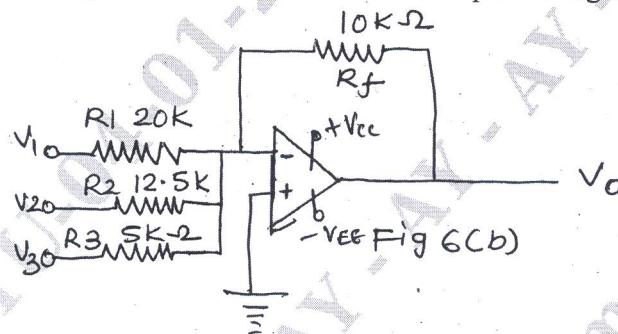
- 1 a. Choose the correct answers for the following : (04 Marks)
- The PIV of a centre tapped transformer full wave rectifier is equal to _____ for an input signal $V_m \sin \omega t$
 A) $2 V_m$ B) V_m C) zero D) one
 - If a zener diode of 6.8 volts has power dissipation of 500 mw then the current flowing through it is equal to _____
 A) $73.5 \mu A$ B) 73.5 mA C) 73.5 nA D) 73.5 pA
 - The _____ diode is used as a regulator
 A) junction B) point contact C) zener D) depletion
 - The reverse saturation current of a diode is 100 nA and voltage 25 volts then the reverse static resistance is equal to _____ ohms.
 A) 250 B) 250 K C) 250 M D) 250μ
- b. Explain the operation of a full wave bridge rectifier with circuit diagram and waveforms. (06 Marks)
- c. A two diode full wave rectifier gets the ac supply from 200V – 0 – 200V transformer. Calculate the average load current, average load voltage and ripple factor. Assume $R_L = 2 \text{ k}\Omega$ and frequency $f = 50 \text{ Hz}$. (05 Marks)
- d. Discuss temperature effects in a diode with reference to power dissipation. (05 Marks)
- 2 a. Choose the correct answers for the following : (04 Marks)
- To operate the transistor in active region, the emitter is _____ biased and collector is _____ biased.
 A) forward, forward B) forward, reversed
 C) reversed, forward D) reversed, reversed
 - In a transistor the collector current is equal to 3 mA and emitter current is equal to 3.03 mA. The β_{dc} of the transistor is equal to _____
 A) 1000 B) 50 C) 200 D) 100
 - The _____ region is slightly doped in the transistor.
 A) base B) emitter C) collector D) all of these
 - The current amplification will be high in _____ mode.
 A) CB B) CE C) CC D) all of these
- b. Draw the input and output characteristics of common base mode using PNP transistor and also explain it. (10 Marks)
- c. A transistor connected in CE mode has $\beta = 200$ and $I_B = 50 \mu A$. Calculate the value of I_E , I_C and α . (06 Marks)
- 3 a. Choose the correct answers for the following : (04 Marks)
- The stability factor of a transistor connected in base bias is equal to _____ when $h_{FE} = 100$.
 A) 100 B) 101 C) 150 D) 200

- ii) An amplifier will produce amplification when it is operated in _____ region.
 A) cutoff B) saturation C) active D) both b and c
- iii) The I_{CBO} is 15 nA at 25°C and its value changes to _____ at 35°C.
 A) 15 nA B) 20 nA C) 25 nA D) 30 nA
- iv) The output voltage of an amplifier is equal to 10 volts when the input voltage is equal to 2 volts, then the gain of the amplifier is equal to _____.
 A) Five B) Ten C) Two D) One
- b. Draw the circuit diagram of voltage divider bias and obtain the expression for calculating I_C and V_{CE} using accurate analysis. (08 Marks)
- c. Design a collector to base bias circuit to have $I_C = 3$ mA and $V_{CE} = 10$ volts. The supply voltage $V_{CC} = 25$ volts and transistor $h_{FE} = 80$. Calculate the suitable value of resistance required and assume $V_{BE} = 0.7$ volts. (08 Marks)
- 4 a. Choose the correct answers for the following : (04 Marks)
- i) The SCR is having _____ layer and _____ junction device.
 A) 4, 3 B) 4, 4 C) 3, 4 D) 3, 3
- ii) The minimum triggering voltage required to trigger an UJT when $V_{BB} = 20$ volts and intrinsic ratio 0.6 is equal to _____.
 A) 12.7 volts B) 12 volts C) 13.7 volts D) 15 volts
- iii) The FET is _____ operated device.
 A) current B) voltage C) power D) current & power
- iv) The gate to source of an FET will be _____ biased when it is in the on condition.
 A) forward B) reverse C) not D) all of the above.
- b. Explain the transistor analogy of an SCR. (10 Marks)
- c. With neat circuit diagram and necessary waveforms explain the operation of a UJT relaxation oscillator. (06 Marks)

PART - B

- 5 a. Choose the correct answers for the following : (04 Marks)
- i) In an amplifier at high frequency the gain will decrease due to the _____ capacitance
 A) junction cap B) bypass C) coupling D) all of these.
- ii) In the oscillator _____ feedback is used
 A) positive B) negative
 C) both positive and negative D) none of the above.
- iii) The bandwidth of an amplifier will _____ due to negative feedback.
 A) not change B) decrease C) increase D) double.
- iv) To get the sustained oscillation the loop gain must be equal to _____.
 A) zero B) unity C) ten D) hundred
- b. Explain the operation of a one stage RC coupled amplifier and also draws its frequency response. (06 Marks)
- c. Draw the circuit diagram of Colpitt's oscillator and explain its working. (05 Marks)
- d. A crystal has the following parameters $L = 3$ H, $C_S = 0.05$ pF, $R = 2$ k Ω and $C_m = 10$ pF. Calculate the series and parallel resonant frequency of the crystal. (05 Marks)

- 6 a. Choose the correct answers for the following : (04 Marks)
- The CMRR of an ideal op.amp is equal to _____.
A) zero B) one C) infinity D) None of these
 - The output voltage of an inverting amplifier will be equal to _____ when $R_f = 10\text{ K}$, $R_i = 1\text{ K}$, and $V_i = 10\text{ mV}$.
A) 1 volt B) 10 mV C) 20 mV D) 100 mV.
 - The voltage gain of a voltage follower will be equal to _____.
A) unity B) zero C) ten D) twenty
 - An op.amp can be used as _____.
A) integrator B) differentiator C) filter D) all of these
- b. Derive an expression to find the output voltage of an op-amp as shown in Fig.Q6(b) and also using the expression obtained find the output voltage. (06 Marks)



$$V_1 = +05\text{ volts}$$

$$V_2 = -07\text{ volts}$$

$$V_3 = +03\text{ volts}$$

Fig.Q6(b)

- c. Derive an expression to calculate the gain of a non inverting op-amp amplifier. Also calculate the value of resistance required to produce gain of 50 when the input resistance of the non-inverting amplifier is equal to $2\text{ k}\Omega$. (05 Marks)
- d. Draw the circuit diagram of a differentiator using operational amplifier and also derive an expression to find the output voltage. (05 Marks)
- 7 a. Choose correct answers for the following : (04 Marks)
- The carrier power $P_C = 8\text{ kW}$ in an AM transmitter and the modulation index 1% then the radiated power will be equal to _____ kW.
A) 12 B) 1 C) 10 D) 100
 - The modulation index of FM is given by _____.
A) f_m/δ B) δ C) f_m D) δ/f_m
 - $(1AB)_H = (\quad)_2$
A) 000110101011 B) 111100001111 C) 000011111111 D) 111100001010
 - $(10001)_B - (25) = (\quad)_2$
A) 00000 B) 11000 C) 10101 D) 00111
- b. Explain the working of super heterodyne receiver along with block diagram. (08 Marks)
- c. Draw the block diagram of a CRO and explain the function of each block. (08 Marks)

