

USN

18ELN14

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the working of PN junction diode under forward and reverse biased conditions. (06 Marks)
- b. Explain how zener diode helps in voltage regulation with neat circuit diagram. (06 Marks)
- c. Explain with neat circuit diagram and waveforms the working of center-tap full wave rectifier. Show that efficiency of full-wave rectifier is 81%. (08 Marks)

OR

- 2 a. Explain the operation of half-wave rectifier with capacitor filter with neat circuit diagram and waveforms. (06 Marks)
- b. Show that the ripple factor of a half-wave rectifier is 1.21 and efficiency is 40.5%. (06 Marks)
- c. Explain VI characteristics of photodiode and its operation. (04 Marks)
- d. For the circuit shown in Fig.Q2(d) find (i) current and voltages in the circuit for $R_L = 450 \Omega$. (04 Marks)

Fig.Q2(d)

Module-2

- 3 a. Explain the drain and transfer characteristics of a JFET with neat circuit diagram. (08 Marks)
- b. Explain the basic structure and operation of JFET with neat diagrams. (08 Marks)
- c. For a JFET $I_{DSS} = 9 \text{ mA}$ and $V_{GS(off)} = -8 \text{ V}_{(max)}$ determine drain current for $V_{GS} = -4 \text{ V}$. (04 Marks)

OR

- 4 a. Explain the operation of an enhancement MOSFET with neat circuit diagram. (06 Marks)
- b. Explain CMOS as an inverter with neat circuit diagram. Give its equivalent circuit and its advantages. (08 Marks)
- Explain VI characteristics of SCR. (06 Marks)

Module-3

- 5 a. Explain the block diagram of an operational amplifier. (06 Marks)
- b. Explain the operation of an op-amp as a non-inverting amplifier with neat diagram and waveforms. (06 Marks)
- c. Define the following terms with respect to op-amp.
 (i) CMRR (ii) Slewrate (iii) pp offset voltage and current) pp bias current (08 Marks)

OR

- 6 a. Explain op-amp as a subtractor with neat circuit diagram. (08 Marks)
- b. Explain the different iv modes of an op-amp. (06 Marks)

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- c. For an op-amp circuit shown in Fig.Q6(c), find the output V_{O1} and V_{O2} .

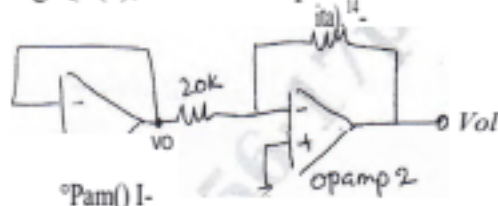


Fig.Q6(c)

Also write the function of each op-amp used.

(06 Marks)

Module-4

- 7 a. With neat circuit diagram explain how transistor is used as an voltage amplifier. Derive an equation for A_v . (08 Marks)
- b. Explain the voltage series feedback circuit and derive an equation for voltage gain A_v with feedback. (04 Marks)
- c. Explain RC phase-shift oscillator with circuit diagram and necessary equations. (08 Marks)

OR

- 8 a. With neat circuit diagram explain how transistor can be used to switch an LED ON/OFF and give the necessary equation. (08 Marks)
- b. The transistor in common emitter configuration is shown in Fig.Q8(b) with $I_{CQ} = 10 \text{ mA}$ and $\beta_{DC} = 200$ determine
 - (i) V_{CE} at $V_{in} = 0$
 - (ii) $I_{B(min)}$ to saturate the collector current
 - (iii) $R_{th(max)}$ when $V_{in} = 5V$. $V_{CE(1)}$ can be neglected. (04 Marks)



Fig.Q8(b)

- c. Explain the operation of IC-555 as an Astable oscillator with neat circuit diagram and necessary equation. (08 Marks)

Module-5

- 9 a. Design Full adder circuit and implement it using basic gates. (10 Marks)
- b. Explain the basic elements of communication system with block diagram. (06 Marks)
- c. Find
 - (i) $(1010111011110101)_2 = (?)_6$
 - (ii) $(FA876)_{16} = (?)_{10}$ (04 Marks)

OR

- 10 a. State and prove De Morgan's theorems. (04 Marks)
- b. Explain the working of a 3-bit ripple counter with neat circuit diagram and timing diagrams. (08 Marks)
- c. Explain the working of RS flip flop with truth table and diagram. (06 Marks)
- d. Subtract the following using 2's complement:
 - (i) $11100 - 10011$ (02 Marks)