

Time : Three Hours



Max. Marks : 50

Notes :

1. All questions are compulsory.
2. Draw well labelled diagram wherever necessary.

Either

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|----|----|------|--|---|
| 1. | A) | i) | State De Morgan's theorems and prove them. | 4 |
| | | ii) | Subtract the following using 1's complement method. | 2 |
| | | a) | 10011-10001 | |
| | | b) | 0110-1000 | |
| | | iii) | Define AND gate and OR gate. Write it's truth table. | 2 |
| | | iv) | Reduce the following Boolean equation using laws and theorems of Boolean Algebra | 2 |
| | | | $Y = (A + B)(A + \bar{B})(\bar{A} + B).$ | |

OR

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|----|------|--|----|
| B) | a) | Explain in short about : | 2½ |
| | i) | Decimal number system. | |
| | ii) | Binary number system. | |
| | iii) | Hexadecimal number system. | |
| | b) | Convert as shown | 2½ |
| | a) | $482_{16} = ?_{10}$ | |
| | b) | $CAB_{16} = ?_2$ | |
| | c) | Explain 1's and 2's complement method with examples. | 2½ |
| | d) | Write down the truth table for a Half Adder and explain how you will implement it. | 2½ |

Either

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|-----------|-----------|-------------|--|----------|
| 2. | A) | i) | What are forward bias and reversed bias ? | 2 |
| | | ii) | Explain construction and working of PN-junction diode. | 4 |
| | | iii) | Describe construction and working of full-wave rectifiers. | 4 |

OR

- B) a) What are P and N type semiconductors ? 2½
- b) What is Zener diode ? Explain the working of Zener diode as a voltage regulation. 2½
- c) What is rectification efficiency ? How it is increase in rectifier circuit ? 2½
- d) Explain the mechanism of LED. 2½

Either

3. A) i) With neat circuit diagram explain output characteristics of NPN transistor in CE mode and CB mode. 7
- ii) The current gain of an NPN transistor is 0.98 and it gives reverse saturation current of $12\mu\text{A}$ in CB mode. Find base current and collector current of 2 mA. 3

OR

- B) a) Explain construction and working of PNP transistor. 2½
- b) Distinguish between class A, class B and class C amplifier on the basis of waveform. 2½
- c) What is current gain ? Derive the relation between α and β current gain. 2½
- d) Draw the construction of RC coupled amplifier and explain its working. 2½

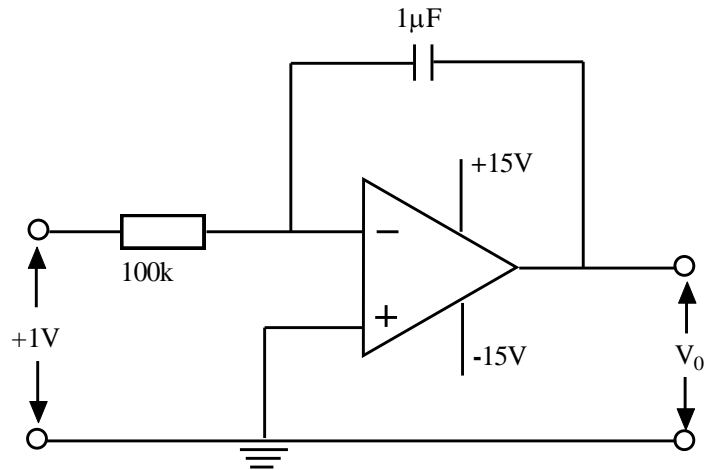
Either

4. A) i) What is operational amplifier ? 1
- ii) State the characteristics of an ideal Op-Amp. 2
- iii) Explain the working of differential amplifier. 3
- iv) Explain the application of Op-Amp as an adder. 2
- v) Explain the concept of virtual ground in Op-Amp. 2

OR

- B) a) Explain how an Op-Amp can be used as non-inverting amplifier. 2½
- b) Define : a) Input bias current b) Input offset current c) Input offset voltage 2½

- c) Calculate the output of the integrator shown in fig. after 1sec, after 1.5 sec and 2 sec. Initial charge on the capacitor being zero. 2½



- d) Discuss the working of a differentiator circuit using Op-Amp. 2½

5. Attempt **any ten** questions from the followings.

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|--|---|
| a) Which gates are universal gate ? Why? | 1 |
| b) What is 8421 code? | 1 |
| c) Draw the symbol of NAND gate and its truth table. | 1 |
| d) What is Ripple factor ? | 1 |
| e) Draw the circuit of full wave rectifier. | 1 |
| f) Define L-section filter. | 1 |
| g) What is operating point ? | 1 |
| h) Draw the input characteristics of CE mode. | 1 |
| i) What is Q-Point ? | 1 |
| j) Draw symbol of Op-Amp. | 1 |
| k) Define CMRR. | 1 |
| l) What is slew rate? | 1 |
