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|  | WINTER-2023  |                       |  |
|  | Exam Seat No.:   |                       |  |
|  | Academic Year: 2023-2024   | Semester: I           |  |
|  | Name of Programme: B.Tech  | Pattern: 2023         |  |
|  | Name of Course: Fundamentals of Electronics Engineering  | Course Code: 2300107A |  |
|  | Max. Marks: 60   | Duration: 2:30 Hrs    |  |
|  | <p><b>Instructions:</b> Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.</p> <ol style="list-style-type: none"><li>1. This question paper contains 2 pages.</li><li>2. Answer to each new question is to be started on a new page.</li><li>3. Assume suitable data wherever required, but justify it.</li><li>4. Draw the neat labelled diagrams, wherever necessary.</li><li>5. The last columns indicates the Course Outcome of the Question/sub-question.</li></ol> |                       |  |

**Question No. 1 Attempt following Question**

- 1 With the help of neat circuit diagram and waveforms, explain the working of full wave bridge rectifier. (6) CO3

**Question No. 2 Attempt following Question**

- 2 How the BJT can be used as a switch? Explain. (6) CO3

**Question No. 3 Attempt following Question**

- 3.a) (1) Draw pin diagram of Op-Amp IC 741. (4) CO1  
(2) Define and give typical values of the following op-amp parameters: i) CMRR ii) PSRR

**OR**

- 3.b) (1) Explain the concept of virtual ground and virtual short (4) CO1  
(2) Define and give typical values of the following op-amp parameters: i) Slew Rate ii) Input bias current

- 3.c) Draw and explain inverting summing amplifier using Op-Amp. (6) CO3

**OR**

- 3.d) Draw and explain non inverting comparator using Op-Amp. (6) CO3

- 3.e) For the inverting amplifier using Op-Amp, if  $R_f = 47\text{ k}\Omega$ ,  $R_1 = 4.7\text{ k}\Omega$ ,  $V_{CC} = \pm 10\text{ V}$ ,  $V_i = 2\text{ V}$  (6) CO3

- i) Calculate output voltage
- ii) Is the result in part (i) practically possible? Justify.

**OR**

- 3.f) An op-amp is used in a non –inverting mode with  $R_1 = 2.2 \text{ k}\Omega$ ,  $R_f = 18 \text{ k}\Omega$ ,  $V_{cc} = \pm 12 \text{ V}$ . Calculate Output voltage for (6) CO3
- i)  $V_{in} = 150 \text{ mV}$
  - ii)  $V_{in} = 2 \text{ V}$  and comment on the result.

**Question No. 4 Attempt following Question**

- 4.a) (1) Name the derived gates. Draw their symbols and truth tables. (4) CO2
- (2) i) Convert  $(19)_{10}$  to binary.
- ii) Convert  $(1101110101100.00101101)_2$  to hexadecimal.

**OR**

- 4.b) (1) Why NAND and NOR gates are called as universal gates? Draw their symbols and truth tables. (4) CO2
- (2) i) Convert  $(26)_{10}$  to binary.
- ii) Convert  $(10100111.11011)_2$  to octal.

- 4.c) State law of commutation, law of association and law of distribution. (6) CO2

**OR**

- 4.d) State and prove De' Morgan's sum & product theorem with the help of truth table. (6) CO2
- 4.e) Design and implement full adder circuit. (6) CO4

**OR**

- 4.f) What is flipflop? Draw & explain the working SR flip-flop. (6) CO4

**Question No. 5 Attempt following Question**

- 5.a) Write short note on Amplitude modulation. (4) CO2

**OR**

- 5.b) Write short note on Frequency modulation. (4) CO2

- 5.c) Explain the types of twisted pair cables. (6) CO2

**OR**

- 5.d) Draw and explain electromagnetic spectrum along with its applications. (6) CO2

- 5.e) Explain the elements of communication system with the help of block diagram. (6) CO2

**OR**

- 5.f) Explain GSM architecture. (6) CO2