ESC133

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RAMAIAH Institute of Technology

(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
Accredited by NBA & NAAC with 'A+' Grade

MAKE UP EXAMINATIONS – JULY 2023

Program	:	**B.E. – Common to all Programs**	**Semester**	:	**I**
Course Name	:	**Introduction to Electronics Engineering**	**Max. Marks**	:	**100**
Course Code	:	**ESC133**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.
- Missing data may be suitably assumed

UNIT - I

1.	a)	Differentiate between conductors, semiconductors, and insulators by taking into consideration various factors.	CO1	(08)
	b)	Define doping in semiconductors. Explain the formation of P-type and N-Type extrinsic semiconductors using crystalline structures.	CO1	(05)
	c)	A transistor operates with I_C=30 mA, I_B= 600 uA. Determine the value of I_E and h_{FE}	CO1	(02)
	d)	Differentiate between Zener breakdown and Avalanche breakdown.	CO1	(05)
2.	a)	Explain the forward and reverse bias characteristics of the PN Junction Diode.	CO1	(07)
	b)	With a neat diagram explain Light Emitting Diode (LED) and its operation.	CO1	(03)
	c)	Explain the input and output characteristics of an NPN transistor in a common emitter mode (CE) configuration.	CO1	(10)

UNIT - II

3.	a)	With a neat circuit diagram, explain the operation of half-wave rectifier with C-filter.	CO2	(07)
	b)	With a neat diagram explain the operation of voltage multiplier.	CO2	(07)
	c)	The following data were obtained during a test carried out on a DC power supply: In scenario-1, Output voltage with no-load= 12 V and Output voltage with 2 A load current = 11.5 V.In scenario-2, Output voltage with 220 V mains input= 12 V and Output voltage with 200 V mains input= 11.9 V. Determine (i) the equivalent output resistance of the power supply and (ii) the regulation of the power supply.	CO2	(06)
4.	a)	Explain the operation of centre-tapped full-wave rectifier circuit.	CO2	(07)
	b)	With the relevant circuit diagram and based on proper reasoning, derive the expressions for minimum and maximum values of series resistance considered in Zener diode voltage regulator.	CO2	(07)
	c)	A mains transformer having a turns ratio of 44:1 is connected to a 220 V r.m.s. mains supply. If the secondary output is applied to a half-wave rectifier, determine the peak voltage that will appear across a load.	CO2	(06)

UNIT - III

5.	a)	With block diagram explain amplifier with positive feedback.	CO3	(08)
	b)	Explain with relevant circuit the phase shift provided by CE amplifier.	CO3	(08)
	c)	The following measurements were made during a test on an amplifier: V_{in} = 250 mV, I_{in} = 2.5 mA, V_{out} = 10 V, I_{out} = 400 mA Determine: (i) voltage gain; (ii) current gain; (iii) power gain.	CO3	(04)
6.	a)	With frequency response curve of an amplfier explain the folowing terms: i) Cutoff frequencies ii) Bandwidth iii) Gain.	CO3	(06)
	b)	Explain the working of the transistor as a switch.	CO3	(04)
	c)	Design a voltage divider bias circuit with V_{cc}=18V,I_c=3.7mA,h_{FE}=100.	CO3	(10)

UNIT- IV

7.	a)	Manipulate the expression of Ex-OR operation to arrive at the expression indicating the realization of the same using minimum number of NAND gates.	CO4	(07)
	b)	Write the truth table of full-adder, and derive the simplified sum and carry-out expressions of the same. Realize the full-adder using basic gates.	CO4	(07)
	c)	Realize AND, OR and NOT operations using NOR gates.	CO4	(06)
8.	a)	Realize a three-bit counter using J-K flip-flops, sketch the relevant waveforms based on the function table of J-K flip-flop.	CO4	(07)
	b)	Write the truth table of half-adder, and derive the simplified sum and carry-out expressions of the same. Realize the half-adder using: (i) basic gates and (ii) NAND gates.	CO4	(07)
	c)	Prove that (i) $\overline{A+B} = \overline{A}.\overline{B}$ (ii) $\overline{A.B} = \overline{A}+\overline{B}$.	CO4	(06)

UNIT - V

9.	a)	With a neat block diagram, explain the working of a microprocessor system.	CO5	(10)
	b)	Elaborate with neat diagram the steps carried out for the Read and Write operation in Microprocessor along with the instruction cycle.	CO5	(10)
10.	a)	With a neat block diagram, explain the microcontroller system with typical inputs and outputs.	CO5	(10)
	b)	With a neat block diagram, explain the internal architecture of a typical 8-bit microprocessor CPU.	CO5	(10)

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