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B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2023

Second Semester

EC22201 – ELECTRON DEVICES

(Electronics and Communication Engineering)

(Regulation 2022)

TIME: 3 HOURS

MAX. MARKS: 100

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Gain knowledge of PN diodes.	2
CO 2	Analyze the characteristics of BJT and use it in designing simple circuits.	4
CO 3	Analyze the characteristics of FET and use it in designing simple circuits.	4
CO 4	Analyze the working principle of Special diodes and use it in designing simple circuits.	4
CO 5	Analyze the working principle of power and display devices and use it in designing simple circuits.	4

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

Q. No.	STATEMENT	CO	RBT LEVEL
1.	Show the expression for diode current equation with necessary explanation.	1	2
2.	Explain barrier potential with its expression.	1	3
3.	Differentiate between drift and diffusion current densities with expressions.	1	4
4.	Describe the reverse recovery time of diodes.	1	2
5.	Distinguish between the different configurations of transistor.	2	4
6.	Define the large signal current gain in CB and CE configuration and relate each other with necessary expressions.	2	3
7.	List out the hybrid parameters of transistor in CE configuration.	2	3
8.	Sketch the Ebers–Moll model for a transistor.	2	3
9.	Distinguish between BJT and FET.	3	4
10.	Discuss the significance of pinch off voltage in JFET.	3	2
11.	Sketch the circuit symbol for n-channel and P-channel D MOSFET and E MOSFET.	3	3
12.	Describe the effect of Channel length modulation.	3	2
13.	Explain the concept of breakdown in Zener diode.	4	3
14.	Outline the working principle of LDR.	4	2
15.	List the differences between JFET and MESFET.	4	3
16.	Draw the symbol of IGBT and state its advantages.	4	2

17.	Describe intrinsic standoff ratio of UJT with its equivalent circuit.	5	3
18.	Differentiate between DIAC and TRIAC.	5	4
19.	Discuss about the conversion efficiency of Solar cell.	5	2
20.	Explain the concept of optocoupler.	5	2

PART- B (5 x 10 = 50 Marks)

Q. No.	STATEMENT	Marks	CO	RBT LEVEL
21. (a)	Derive the expression for PN junction diode forward and reverse currents with suitable diagram and necessary explanation.	(10)	1	3
(OR)				
(b) (i)	Explain about the drift and diffusion current and obtain the expression for current densities for P type and N type semiconductor.	(7)	1	3
(b) (ii)	Sketch the forward and reverse bias characteristics of a PN junction diode.	(3)	1	3
22. (a)	Analyze the working mechanism of CB configuration of BJT with its input and output characteristics.	(10)	2	4
(OR)				
(b) (i)	Illustrate the h parameter model of transistor in CE configuration with suitable circuit diagram.	(6)	2	4
(b) (ii)	A transistor operating in CB configuration has $I_C = 2.98 \text{ mA}$, $I_E = 3 \text{ mA}$ and $I_{CBO} = 0.01 \text{ mA}$. What current will flow in the collector circuit of this transistor when connected in CE configuration with a base current of $30 \mu\text{A}$?	(4)	2	4
23. (a) (i)	Explain the drain and transfer characteristics of N-channel JFET.	(7)	3	3
(a) (ii)	Give an important reason for preferring N-Channel FET's over P-Channel FET's	(3)	3	3
(OR)				
(b)	Explain the construction and principle of operation of Depletion mode MOSFET with the help of suitable diagram.	(10)	3	3
24. (a) (i)	Illustrate how zener diode is used in Voltage regulation.	(6)	4	3

(ii) Explain the working principle of varactor diode and list its applications. (4) 4 3

(OR)

(b) (i) Sketch the forward bias and reverse bias of metal semiconductor junction with necessary explanation. (6) 4 3

(ii) Explain the structure and characteristics of LASER diode. (4) 4 3

25. (a) Draw the basic structure of UJT and explain the working and characteristics of UJT with the help of equivalent circuit. (10) 5 2

(OR)

(b) (i) Describe the operation of LED and CCD and list out its applications. (5) 5 2

(ii) Explain the working of phototransistor and optocoupler. (5) 5 2

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

Marks CO RBT
LEVEL

26. For the transistor circuit in CE configuration shown in fig. Evaluate the following, a) Base current, b) Collector current, c) Emitter current, d) V_{CE} , e) V_{CB}

(10) 2 5


