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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

BIOMEDICAL ENGINEERING
Semester 03
EC5305 &Electronic Devices and Circuits
(Regulation 2019)

Time:3hrs   Max.Marks: 100

CO1	Explain the structure of basic electronic devices
CO2	Design amplifier circuits and apply negative feedback principle to amplifier stages.
CO3	Realize power amplifier circuits for a given specification.
CO4	Apply positive feedback principle and design oscillators.
CO5	Understand the specifications of regulators and power supply circuits.

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Difference between Avalanche and Zener breakdown	2	CO1	L2
2	What is an LED and how does it work?	2	CO1	L2
3	What is the need for biasing a transistor in an amplifier circuit?	2	CO2	L2
4	How does negative feedback improve the performance of a system?	2	CO2	L2
5	Define small signal model of a BJT	2	CO3	L2
6	What is the conduction angle in a Class C amplifier?	2	CO3	L1
7	In Colpitts oscillator C1 = C2 = C and L = 47µH, the frequency of oscillation is 1KHz. Determine the value of capacitor	2	CO4	L3
8	Why is positive feedback used in oscillator circuits?	2	CO4	L2
9	What is the function of a voltage regulator in a power supply circuit?	2	CO5	L2
10	Define line regulation.	2	CO5	L1

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	i) Compare and contrast Half-Wave Rectifier (HWR) and Full-Wave Rectifier (FWR)	8	CO1	L4
	ii) A half-wave rectifier is connected to a 230 V, 50 Hz AC supply. The load resistance is 1 kΩ. Calculate Peak value of input voltage and Average DC output voltage	5	CO1	L3
OR				
11 (b)	i) The reverse saturation current of transistor in Common Base is 0.1µA and for Common Emitter configuration is 16µA. Calculate the current gain for Common Base, Common Emitter and Common Collector.	5	CO1	L3
	ii) Explain the VI Characteristics of PN junction diode under different bias.	8	CO1	L4

Q.No.	Questions	Marks	CO	BL
12 (a)	Determine the following for and Input impedance using h-parameter model for CE amplifier i) Voltage gain (A_v) ii) Current gain (A_I) iii) Input Impedance (Z_i)	13	CO2	L4
OR				
12 (b)	Derive the expressions for Common mode and Differential mode gain of a differential amplifier using AC analysis.	13	CO2	L4
13 (a)	Explain the concept of neutralization in amplifiers. Discuss various neutralization methods used to eliminate unwanted feedback in high-frequency amplifiers. Also, state the advantages and limitations of neutralization.	13	CO3	L5
OR				
13 (b)	Explain the classification of power amplifiers with proper circuit diagrams and waveforms. Discuss the working, efficiency and applications of Class A, Class B and Class AB power amplifiers. Also compare their performance in terms of efficiency and distortion.	13	CO3	L5
14 (a)	Explain the operation of RC phase shift oscillator using BJT to achieve the frequency of oscillation.	13	CO4	L4
OR				
14 (b)	Describe the working principles of the Hartley and Colpitts oscillators. Explain their circuit diagrams, frequency of oscillation formulas, and the role of each component in generating sustained oscillations.	13	CO4	L4
15 (a)	Explain the working principle, types, advantages and applications of SMPS. Draw and explain the block diagram of SMPS.	13	CO5	L4
OR				
15 (b)	Discuss the operational characteristics of a Zener diode and how it acts as a Voltage Regulator.	13	CO5	L4

PART- C(1x 15=15Marks)
(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	Explain the construction and working principle of a Unijunction Transistor (UJT) and a Silicon Controlled Rectifier (SCR).	15	CO1	L2