Code No: 113AU

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, February/March - 2016
ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE, ECE, CSE, EIE, IT, MCT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A   (25 Marks)

1.a)   Write the applications of photo diode.   [2]
  b)   What is meant by depletion region?   [3]
  c)   Define ripple factor and PIV.   [2]
  d)   Explain the necessity of filter circuit after the rectifier circuit.   [3]
  e)   Why we call BJT as a current Controlled Device?   [2]
  f)   Which of the BJT configurations are suitable for impedance matching
       applications. Why?   [3]
  g)   Define operating point.   [2]
  h)   Explain thermal stability.   [3]
  i)   Compare FET and BJT.   [2]
  j)   Draw small signal model of JFET.   [3]

PART-B   (50 Marks)

2.a)   Define tunneling phenomenon. Explain how tunnel diode operates under different
       operating conditions. In what way it is different from conventional diodes? Give
       the necessary energy level diagrams.
  b)   Zener diode can be used as a voltage regulator. Justify it.   [6+4]
                                    OR
3.a)   With the help of V-I characteristics, explain SCR operation.
  b)   Derive the expression for Diffusion capacitance of a diode.   [5+5]

4.a)   A sinusoidal voltage whose Vm=12V is applied to half-wave rectifier. The diode
       may be considered to be ideal and R_L=1.5 KΩ is connected as load. Find out peak
       value of current, RMS value of Current, DC value of current and Ripple factor.
  b)   Derive the expression for Ripple factor for Full Wave Rectifier with L-Section
       filter.   [6+4]
                                    OR
5.   Draw the circuit diagram and explain the operation of full wave rectifier using
       center tap transformer and using bridge rectifier without center tap transformer.
       Obtain the expression for peak inverse voltages of both.   [10]

6.a) With neat diagram explain the construction, working characteristics of UJT. Give its equivalent circuit.
  b) Explain about Punch through and Base width modulation.   [5+5]

OR

7. Write a note on:
   a) Transistor construction.
   b) Voltage gain and current gain expression for CB configuration using transistor hybrid model.   [4+6]

8.a) In a Silicon transistor circuit with a fixed bias, V_{CC}=9V, R_C=3KΩ, R_B=8KΩ, β = 50, V_{BE}=0.7V. Find the operating point and Stability factor.
  b) What is the necessity of biasing circuits? Derive the expression for stability factor of self bias circuit.   [5+5]

OR

9.a) The hybrid parameters for a transistor used in CE configuration are h_{ie} = 5kΩ; h_{fe} = 180; h_{re} = 1.25×10^{-4}; h_{oe} = 16×10^{-6} ohms. The transistor has a load resistance of 20 KΩ in the collector and is supplied from a signal source of resistance 5 KΩ. Compute the value of input impedance, output impedance, current gain and voltage gain.
  b) Give the advantages of h-parameter analysis.   [7+3]

10.a) Write the construction, operation and characteristic behavior of JFET under various biasing conditions.
  b) Draw and explain small-signal model of a MOSFET.   [6+4]

OR

11.a) Describe the operation of common drain FET amplifier and derive the equation for voltage gain.
  b) Explain the operation of Depletion mode MOSFET in detail.   [5+5]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE, ECE, CSE, EIE, IT, MCT)

Time: 3 Hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) For what voltage will the reverse current in p-n junction Germanium diode reach 90% of its saturation value at room temperature?   [2]
  b) Write a short note on Varactor diode.   [3]
  c) Derive the ripple factor for full wave rectifier.   [2]
  d) Explain voltage regulation using zener diode.   [3]
  e) Explain how transistor acts as an amplifier.   [2]
  f) Give the Comparisons between CB, CE, CC configurations.   [3]
  g) Define thermal runaway.   [2]
  h) Compare all the three biasing circuits.   [3]
  i) For a p-channel Silicon FET, with effective width 'a'=2×10^{-4} cm and channel resistivity ρ =10 Ω. Find the pinch off voltage.   [2]
  j) Draw the circuit diagram of fixed bias arrangement of a JFET.   [3]

PART-B

(50 Marks)

2.a) Explain PN diode characteristics in forward bias and reverse bias regions.
  b) Find the width of the depletion layer in a germanium junction diode which has the following specifications: Area A = 0.001 cm^2, σ_n = 1 mhos / cm, μ_n = 3800 cm^2/sec, μ_p = 1800 cm^2/sec.   [5+5]

OR

3.a) Explain tunnel diode operation with the help of energy band diagrams.
  b) Explain the static characteristics of SCR.   [5+5]

4.a) A full wave rectifier circuit with C-type capacitor filter is to supply a D.C. Current of 20 mA at 16V. If frequency is 50 Hz ripple allowed is 5%. Calculate:
  i) Required secondary voltage of the transformer.
  ii) Ratio of I peak/ I_{max} through diodes and the value of C required.
  b) With a neat circuit diagram and necessary wave forms explain the operation of half wave rectifier.   [5+5]

OR

5.a) An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Assume the ideal diode. Find:
  i) dc output voltage   ii) PIV.
  b) Compare half wave, full wave and bridge rectifier circuits.   [5+5]

6.a) Explain CE configuration with the help of input and output characteristics.
  b) A transistor is operated at a forward current of 2µA and with the collector open circuited. Calculate the junction voltages V_C and V_E, the collector to emitter voltage V_{CE} assuming $I_{CO} = 2µA$, $I_{EO} = 1.6µA$ and $α_N = 0.98$. [5+5]

OR

7.a) Draw and explain h-parameter model of BJT.
  b) Qualitatively explain the static V-I characteristics of UJT. [5+5]

8.a) Explain the need for biasing in electronic circuits. What are the factors affecting the stability factor.
  b) A transistor with $β = 100$ is to be used in Common Emitter Configuration with collector to base bias. The collector circuit resistance is $R_C = 1kΩ$ and $V_{CC} = 10V$. Assume $V_{BE} = 0$.
  i) Choose R_B so that the quiescent collector to emitter voltage is 4V.
  ii) Find the stability factor. [5+5]

OR

9.a) Determine the quiescent currents and the collector to emitter voltage for a Ge transistor with $β = 50$ in the self biasing arrangements. The circuit component values are $V_{CC} = 20V$, $R_C = 2kΩ$, $R_e = 0.1 kΩ$, $R_1 = 100 kΩ$ and $R_2 = 5 kΩ$. Find the stability factor S.
  b) Explain the terms Bias Stabilization and Bias Compensation. [5+5]

10.a) Derive the expression for the width of depletion region 'W' in the case of p-channel JFET.
   b) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics. [5+5]

OR

11. Draw the circuit of source follower Amplifier and derive the expressions for A_I, A_V, R_i and R_o. [10]

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, April/May - 2018
ELECTRONIC DEVICES AND CIRCUITS
(Common to EEE, ECE, CSE, EIE, IT, MCT)

Time: 3 Hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A
                                                                                  (25 Marks)
1.a)   Define static resistance.   [2]
  b)   Write the effect of temperature on diode characteristics.   [3]
  c)   What is regulation?   [2]
  d)   List the differences between different filters.   [3]
  e)   Define current amplification factor.   [2]
  f)   What is emitter follower? Draw the circuit diagram of CC configuration.   [3]
  g)   What is the need of biasing?   [2]
  h)   Explain, how to avoid thermal runway?   [3]
  i)   Mention the applications of FET.   [2]
  j)   Why the input impedance of FET is higher than BJT?   [3]

PART-B
                                                                                  (50 Marks)
2.a)   Draw and explain V-I characteristics of PN diode.
  b)   With suitable expressions explain transition capacitance.   [5+5]
                                   OR
3.a)   Describe the principle of operation of tunnel diode.
  b)   Explain the working of semiconductor photo diode.   [5+5]

4.a)   Derive the equation for ripple factor of half wave rectifier with C-filter.
  b)   With suitable wave forms explain bridge rectifier.   [5+5]
                                   OR
5.a)   Describe the operation of full wave rectifier with π-section filter.
  b)   A 50 Hz transformer having 60 V r. m. s. on each side of the centre tap supplies a full
       wave rectifier circuit. The circuit load is 210 Ω with a shunt capacitor filter of 1000 μF.
       Find the ripple factor.   [5+5]

6.a)   Explain the working of PNP transistor.
  b)   Write the differences between CB, CE, and CC Amplifier Configurations.   [5+5]
                                   OR
7.a)   Derive the relation between α and β.
  b)   Discuss, how the h-parameters are determined from transistor Characteristics.   [4+6]

8.a) Derive the equation for stability factor for fixed bias.
  b) Draw and explain the circuit for bias compensation using diode.   [5+5]

OR

9.a) Write a short note on Stabilization against variations in V_{BE} and β.
  b) For the transistor amplifier circuit, when signal changes by 0.012 V, the base current changes by 9 µA and collector current by 1.3 mA. If the collector load $R_C = 6$ KΩ, $R_L = 12$ KΩ. Determine input resistance, current gain and voltage gain.   [5+5]

10.a) Write short notes on Small Signal Model of JFET.
  b) Draw and explain drain and transfer characteristics of depletion type MOSFET.   [5+5]

OR

11.a) With neat sketch, discuss about common source FET amplifier.
  b) Explain, how FET is working as Voltage Variable Resistor?   [6+4]

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Department Vision & Mission

Vision of the Department:

To evolve into a center of excellence in Electronics & Communications Engineering through creative and innovative practices in teaching-learning and Research in consonance with the contemporary and future needs of the country.

Mission of the Department:

To realize the department's vision, various academic and extra-curricular activities will be organized. The goal of these activities will be to:

i. To inspire and encourage development of key ideas and innovations that can contribute to socio-economic development of India as well as world.
ii. To identify and collaborate with experts, professionals, academicians, commercial and various governmental bodies and develop an environment conducive to research and development.
iii. To offer state-of-the-art programs that inspires and motivates students in perusing the role of researchers and developers through higher learning programs.

PROGRAMME EDUCATIONAL OBJECTIVES
(PEOs)

PEOs:

PEO-I: (Core competence – Discipline knowledge) To motivate and mold students in to world class professionals by cultivating a fundamental desire to learn and apply the acquired skill sets in complex constrains being faced by our social infrastructure.

PEO-II :(Preparation – Employment/Higher studies) To encourage students in striving for higher cognitive aspirations where they will actively participate in quality improvement of academic and industrial components of our society.

PEO-III: (Professionalism – Professional value-knowledge development) To enlighten students and help them in understanding their role as professionals who are well groomed, ethically poised, mentally strong, passionate human beings and upstanding citizens.

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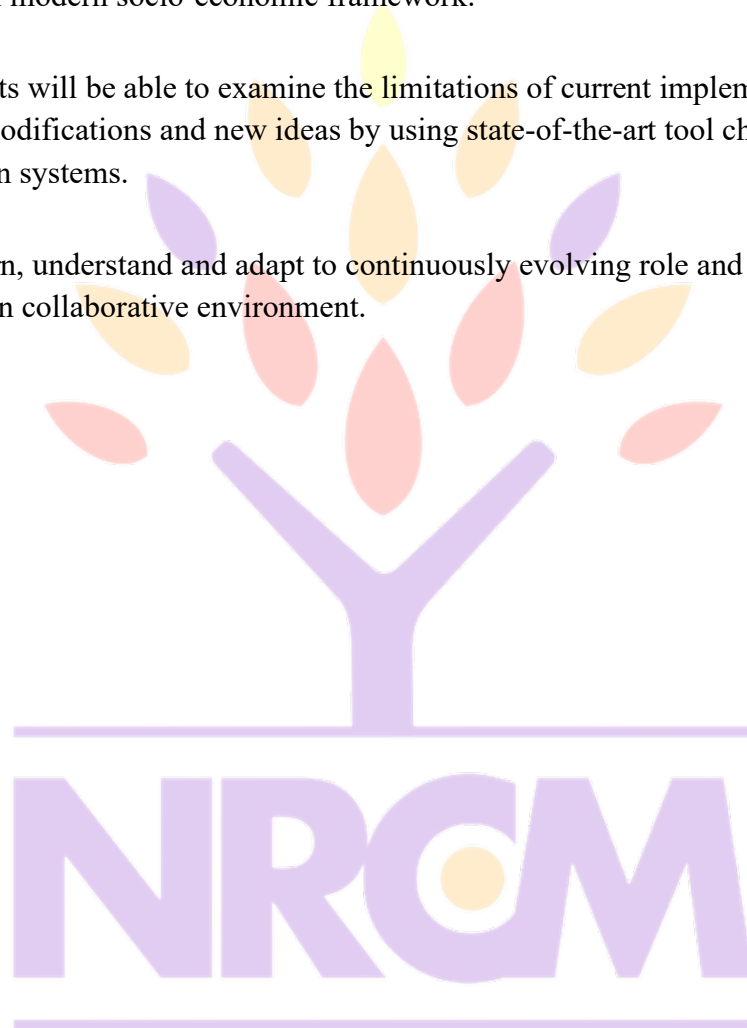Permanently affiliated to JNTUH

PROGRAM OUTCOMES
(POs)

1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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PROGRAM SPECIFIC OUTCOMES
(PSOs)

PSO1: Enabling the students to apply the knowledge of algorithm analysis, modeling, circuit design and verification methodologies to use and manage electro-mechanical systems that are integral part of modern socio-economic framework.

PSO2: Students will be able to examine the limitations of current implementation strategies and propose modifications and new ideas by using state-of-the-art tool chain in electronic communication systems.

PSO3: To learn, understand and adapt to continuously evolving role and ethical needs of professionals in collaborative environment.

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REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.

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ACADEMIC CALENDAR :: 2023-24
B.TECH I YEAR I & II SEMESTER

I SEM

S.No.	Description	Duration From	Duration To	Duration (Weeks)
1	Commencement of I Semester class work	26.08.2023		
2	Induction Program	26.08.2023	05.09.2023	2
3	1st Spell of Instructions (Including Dussehra Recess)	07.09.2023	08.11.2023	9
4	First Mid Term Examinations	09.11.2023	15.11.2023	1
5	2nd Spell of Instructions	16.11.2023	17.01.2024	9
6	Second Mid Term Examinations	18.01.2024	24.01.2024	1
7	End Semester Examinations	25.01.2024	07.02.2024	2
8	Lab Examinations	08.02.2024	14.02.2024	1

II SEM

S.No.	Description	Duration From	Duration To	Duration (Weeks)
1	Commencement of II Semester class work	19.02.2024		
2	1st Spell of Instructions	19.02.2024	13.04.2024	8
3	First Mid Term Examinations	15.04.2024	20.04.2024	1
4	2nd Spell of Instructions (Including Summer Vacation)	22.04.2024	29.06.2024	10
5	Second Mid Term Examinations	01.07.2024	06.07.2024	1
6	End Semester Examinations	08.07.2024	20.07.2024	2
7	Lab Examinations	22.07.2024	27.07.2024	1

Copy to:
1. Deans
2. IQAC
3. All HODs
4. Administrative Officer
5. Account officer
6. Web Portal I/C
7. ERP I/C
8. Library
9. Student Notice Boards

PRINCIPAL
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Your roots to success....

SYLLABUS

ELECTRONIC DEVICES AND CIRCUITS

B.Tech. I Year I Sem.   **L T P C**

2 0 0 2

Course Objectives:

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of devices.
3. To know the switching characteristics of devices.

Course Outcomes: Upon completion of the Course, the students will be able to:

1. Acquire the knowledge of various electronic devices and their use on real life.
2. Know the applications of various devices.
3. Acquire the knowledge about the role of special purpose devices and their applications.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	-	-	1	1	-	-	-	-	1
CO2	3	2	3	-	-	2	1	-	-	-	-	1
CO3	3	3	3	-	-	2	1	-	-	-	-	1

UNIT - I
 Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

UNIT - II
 Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III
 Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times,

UNIT - IV
 Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor.

UNIT – V
 Special Purpose Devices: Zener Diode **-** Characteristics, Zener diode as Voltage Regulator, Principleof Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TEXT BOOKS:

1.   Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education

2.   Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition,2009, Pearson**.**

REFERENCE BOOKS:

1.   Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2.   Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles andApplications, Cambridge, 2018

MAPPING OF COURSE OUTCOMES (CO) WITH PO'S & PSO'S MATRIX:

Course Outcomes (CO's)	Program Outcomes (PO's)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	-	1	1	-	-	-	-	-	1
CO2	3	2	3	-	2	1	-	-	-	-	-	1
CO3	3	2	3	-	2	1	-	-	-	-	-	1
CO4	2	2	3	-	2	1	-	-	-	-	-	1
CO5	2	2	3	-	2	1	-	-	-	-	-	1

Course Outcomes (CO's)	Program Specific Outcomes (PSO's)		
	PSO1	PSO2	PSO3
CO1	3	2	
CO2	2	2	
CO3	3	2	
CO4	2	2	
CO5	2	2	

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NOMINAL SHEET

I ECE-A

S.NO	ROLL NO	NAME OF THE STUDENT
1	23X01A0401	AADHIMULLA SAI RITHUN
2	23X01A0402	ABBAGONI SATHVIKA
3	23X01A0403	AKULA SAI KOUSHIK
4	23X01A0404	ALETI SIRISHA
5	23X01A0405	ANAGANDULA SHIVAKUMAR
6	23X01A0406	ANNAPUREDDY MANIKANTA REDDY
7	23X01A0407	ANTHIREDDY GARI SRIPAL REDDY
8	23X01A0408	ANTHIREDDY GARI SRUTHI
9	23X01A0409	ANURAGAM KARTHIKEYA
10	23X01A0410	B PURUSHOTHAM
11	23X01A0411	BABU SANDEEP
12	23X01A0412	BALUSA THANISH KUMAR
13	23X01A0413	BANDA MANIKANTA
14	23X01A0414	BATTHULA SRIDHAR
15	23X01A0415	BETHI SATHWIKA
16	23X01A0416	BHEEMA HARI CHARAN
17	23X01A0417	BHIMIREDDY RADHA
18	23X01A0418	BHUSA VAISHNAVI
19	23X01A0419	BODAKUNTA SOWMIKA
20	23X01A0420	BODANAMU SREEDHAR
21	23X01A0421	bontha anuk
22	23X01A0422	BOORLA AMULYA
23	23X01A0423	BOORUGUPALLY NEELIMA
24	23X01A0424	BUDDE ROHINI
25	23X01A0425	BUKA VINAY
26	23X01A0426	BUNNE PREETHAM DATTA
27	23X01A0427	CHAUDHARI SOHAM
28	23X01A0428	CHEDADEEPU PAVAN
29	23X01A0429	CHELLAM VIKAS
30	23X01A0430	CHILUKA SRIHARI
31	23X01A0431	CHINDE DILEEP KUMAR
32	23X01A0432	CHINTHALA UDHAYA SRI
33	23X01A0433	DOMADI ARAVIND
34	23X01A0434	DULAM AKSHARA
35	23X01A0435	DUNDIGELA LIKHITHA
36	23X01A0436	EMBARI LOHITH
37	23X01A0437	ETTABOINA HARI KRISHNA
38	23X01A0438	GADARI KALYANI
39	23X01A0439	GADDAM HARSHITH REDDY

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S.NO	ROLL NO	NAME OF THE STUDENT
40	23X01A0440	GADDAM SRIVARSHA
41	23X01A0441	GADDAM SURASHMIKA
42	23X01A0442	GAITHINI BHANUPRASAD
43	23X01A0443	GOLAKOTI VIKAS
44	23X01A0444	GOLLA AKHIL
45	23X01A0445	GOLLA SHIVAKUMAR
46	23X01A0446	GOLLAPALLI GOPI KRISHNA
47	23X01A0447	GUDURI SAI PRASAD
48	23X01A0448	GUDURU LAKSHMI PATHI
49	23X01A0449	K J LASYA
50	23X01A0450	KADARI BHARATH
51	23X01A0451	KADARI SAGAR
52	23X01A0452	KADUDULA NANDA KISHORE
53	23X01A0453	KANJARLA VAISHNAVI
54	23X01A0454	KATHI SATHYA SAI SRAVANTH
55	23X01A0455	KATPALLY DINESH REDDY
56	23X01A0456	KEESARI MAHESH KUMAR
57	23X01A0457	KODIGELA MADHURI
58	23X01A0458	KOLA GOWTHAM
59	23X01A0459	KOLI SRIJA
60	23X01A0460	KONAPOLU RAJESH
61	23X01A0461	KONDA NITHYASRI
62	23X01A0462	KOTA CHANDU
63	23X01A0463	KOTHAPALLY MAHENDHAR
64	23X01A0464	KOTHAPALLY NIKHIL

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NOMINAL SHEET

I ECE-B

S.NO	ROLL NO	NAME OF THE STUDENT
1	23X01A0465	KOTTALA KARTHIK
2	23X01A0466	KUNAPARAJU LAKSHMI SAI SOWJANYA
3	23X01A0467	KUNDENA SAI PRASAD
4	23X01A0468	KYATHAM RUSHIKESH
5	23X01A0469	LINGALA SAI CHARAN
6	23X01A0470	M KEERTHANA
7	23X01A0471	MALICHALIMA SHASHANK
8	23X01A0472	MALLARAM SAI TEJA
9	23X01A0473	MALLARAM SRIRAM REDDY
10	23X01A0474	MALLEPOOLA HEMANTH GOUD
11	23X01A0475	MANNAPURAM SPANDANA
12	23X01A0476	METHRY DHANUSH
13	23X01A0477	MIRUPALA MANOJ
14	23X01A0478	MITTAPALLI SHASHANK
15	23X01A0479	MYSANOLLA SRAVANTHI
16	23X01A0480	NAIDI PAVAN
17	23X01A0481	NAKKIRTHI GOUTHAM
18	23X01A0482	NALLANAGULA HARSHINI
19	23X01A0483	NAYAKA JAGADHISH
20	23X01A0484	NUKALA SREEVALLI SARVANI
21	23X01A0485	PALAMAKULA AKHILA
22	23X01A0486	PEDDAKONDROLLA POOJITHA REDDY
23	23X01A0487	PEDDOLLA RISHANK REDDY
24	23X01A0488	PERAM VENKATESWARLU
25	23X01A0489	PERUKA MAHESH
26	23X01A0490	PERUKA THANUSHA
27	23X01A0491	PILLI VARUN
28	23X01A0492	POLAKI PAVANI
29	23X01A0493	PORLA VAMSHI KUMAR
30	23X01A0494	RAO GREESHMA
31	23X01A0495	RAVIKANTI AKSHITHA
32	23X01A0496	RAVULAPALLI RAMA KRISHNA REDDY
33	23X01A0497	SAMBARI VENKAT SAI
34	23X01A0498	SAMOD RUTHUJA
35	23X01A0499	SANGI SUMUKH
36	23X01A04A0	SESHAM PRATHIBHA
37	23X01A04A1	SHAIK MD SHABBIER
38	23X01A04A2	SIRIPURAM SRIJA
39	23X01A04A3	SRIRAMA SRITHI

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S.NO	ROLL NO	NAME OF THE STUDENT
40	23X01A04A4	SURGU VISHAL GOUD
41	23X01A04A5	TAMMALI MUKESH
42	23X01A04A6	TAMMEVAR SACHIN
43	23X01A04A7	TAMMISETTI HARSHITH
44	23X01A04A8	THAVITI MANIDEEP
45	23X01A04A9	THOTTE NITHIN
46	23X01A04B0	TIPPY REDDY PRANAVI
47	23X01A04B1	TOKALA VENKATA SIVA NAGA RAJU
48	23X01A04B2	TUNGENA NAVYA
49	23X01A04B3	UDI HARISH
50	23X01A04B4	UPPUGALLA THARUN KUMAR
51	23X01A04B5	URA RATHAN KUMAR
52	23X01A04B6	VANGA VAIBHAV REDDY
53	23X01A04B7	VANGALA MEGHA SHYAM REDDY
54	23X01A04B8	VELPUR NAVATEJ
55	23X01A04B9	VEMULA REVANTH
56	23X01A04C0	VEMULA SAI KARTHIK
57	23X01A04C1	VETUKURI SAIVARMA
58	23X01A04C2	VUPPUNUTULA HARSHAVARDHAN GOUD
59	23X01A04C3	VUTAKURI VASUNDHARA
60	23X01A04C4	VUTNOOR MANIDHAR
61	23X01A04C5	YARAVEDA VENKATREDDY
62	23X01A04C6	YEDDI NITHYA SRI
63	23X01A04C7	YELETI SHREYAN REDDY
64	23X01A04C8	YERAVEDA JANARDHAN REDDY

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NOMINAL SHEET

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S.NO	ROLL NO	NAME OF THE STUDENT
1	23X01A6201	AAKULA VARUN MALLIK GOUD
2	23X01A6202	AAREPALLY GEETHA
3	23X01A6203	ADAPA DURGA SATYA SAI PAVAN
4	23X01A6204	AKKIREDDY SHIREESHA
5	23X01A6205	ALLANKI SIDDHARTHA GOUD
6	23X01A6206	AMBATI POOJITHA
7	23X01A6207	AMKOLE BHARATH KUMAR
8	23X01A6208	ANDHE MANIL REDDY
9	23X01A6209	ANKAPURAM VINDHYA REDDY
10	23X01A6210	ANUMANDLA ANVESH
11	23X01A6211	AREMPULA MAHESH
12	23X01A6212	ARKALA MOUNIKA
13	23X01A6213	ARRELI BHARATH
14	23X01A6214	BADDAM SWETHA REDDY
15	23X01A6215	BADEPALLY SRUJANA
16	23X01A6216	BADISHA SANDHYA
17	23X01A6217	BANOTHU PREM KUMAR
18	23X01A6218	BATTU MANIDEEP
19	23X01A6219	BATTUPALLI CHARAN
20	23X01A6220	BAWAJI YASWANTH KUMAR
21	23X01A6221	BAYAGANI MANIDEEP
22	23X01A6222	BHANUVARUN GONTYALA
23	23X01A6223	BHUTHAPALLY BALAJI
24	23X01A6224	BIRUDURAJU ASHWITHRAJU
25	23X01A6225	BOGGULA RAJU
26	23X01A6226	BOLLU REVANTH
27	23X01A6227	BOOSA PRAVEEN
28	23X01A6228	BOPPA NISHANTH
29	23X01A6229	BUDDE DINESH
30	23X01A6230	BUNNI SHIVA PRASAD
31	23X01A6231	BURRA ASHWITH
32	23X01A6232	BURRA SHIVADIKSHITHA
33	23X01A6233	BUSI NAGESH
34	23X01A6234	CH SHIVA PRASAD
35	23X01A6235	CHADA YESHWANTH

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S.NO	ROLL NO	NAME OF THE STUDENT
36	23X01A6236	CHALLA GEETHIKA
37	23X01A6237	CHEKKILLA SHIVANI
38	23X01A6238	CHELIMALA HARISH REDDY
39	23X01A6239	CHINTHAKINDI MANASA
40	23X01A6240	CHINTHAKULA REVATHI
41	23X01A6241	CHOWDOJU MANASWI
42	23X01A6242	DADIGALA PRAVEEN
43	23X01A6243	DAMMANNAGARI SHIVASREE
44	23X01A6244	DEBBATI MANOHAR
45	23X01A6245	DODDANNAGARI VAMSHI REDDY
46	23X01A6246	DOGGALA ANUSH
47	23X01A6247	DONGA JAYA SATYA KARTHIK
48	23X01A6248	DONTHI HARSHITHA
49	23X01A6249	DORNALA VIGNESH
50	23X01A6250	DUNDIGAL VISHALI
51	23X01A6251	DUPETI SAI KUMAR
52	23X01A6252	DURGAM USHASRI
53	23X01A6253	DYAVANAPELLY PRADEEP
54	23X01A6254	ELIGETI SHIVA KUMAR
55	23X01A6255	ELKUSI RAJKUMAR
56	23X01A6256	ELLENDULA DHIRAJ
57	23X01A6257	ERAM DEEPIKA
58	23X01A6258	GADDAM RUTHIKA REDDY
59	23X01A6259	GADDAM SRIHITHA
60	23X01A6260	GANNOJU SUSHMITHA
61	23X01A6261	GODI SPURTHI
62	23X01A6262	GOPATHI ROHAN
63	23X01A6263	GUNDALA JAGADEESHWAR
64	23X01A6264	HARSHAVARDHAN VELISHOJU
65	23X01A6265	ILAPURAM RAJASHEKAR

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TIME TABLE

	9:30-10:30	10:30-11:30	11:30-12:20	12:20-1:10	1.10-2.10	2.10-3.10	3.10-4.00
EDC							
	1	**2**	**3**		**4**	**5**	**6**
Mon		ECE B					
Tue		CSC A					
Wed		ECE B	ECE A	Lunch break		CSC A	
Thu						ECE A	
Fri							
Sat	ECE A		CSC A		ECE B		

LESSON PLAN

UNIT-I

Learning Objectives:

- To understand the definitions static and dynamic resistances
- To illustrate the Load line analysis
- To define Diffusion and transition capacitance and its derivation

- Explain how a diode acts a switch and its applications.

S.No.	Description of Topic	No. of Hrs. required	Method of Teaching
1.	Diode - Static and Dynamic resistances,	2	Black board
2.	Equivalent circuit, Load line Analysis	2	Black board + PPT
3.	Diffusion and Transition Capacitances	2	Black board + PPT
4.	Diode Applications: Switch-Switching times.	**2**	Black board + PPT
5	Problems related to discussed topic	**2**	Black board
	Total Hours	10	

UNIT – II

Learning Objectives:

➢ To construct Rectifier and discuss their properties

➢ To construct Rectifiers with filters and discuss about them.

➢ To define Clipping and clamping and discuss their analysis

S.No.	Description of Topic	No. of Hrs. required	Method of Teaching
1.	Rectifier - Half Wave Rectifier, Full Wave Rectifier,	1	Black board + PPT
2.	Bridge Rectifier,	2	Black board + PPT
3.	Rectifiers with Capacitive and Inductive Filters,	1	Black board + PPT
4.	Clippers-Clipping at two independent levels,	2	Black board + PPT
5.	Clamper-Clamping Circuit Theorem,	1	Black board + PPT
6.	Clamping Operation, Types of Clampers.	1	Black board + PPT
7.	Problems on rectifiers	2	Black board
	Total hours	10	

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UNIT-III

Learning Objectives:

- To Define BJT and its operation
- To discuss Transistor configurations and h- parameters
- To Construct transistor as a switch and discuss its switching times

S.No.	Description of Topic	No. of Hrs. required	Method of Teaching
1.	Principle of operation bjt	2	Black board + ppt
2.	Common emitter configuration	1	Black board
3.	Common base configuration	1	Black board + ppt
S.No.	Description of Topic	No. of Hrs. required	Method of Teaching
4.	Common collector configuration	1	Black board + PPT
5.	Difference between configurations	1	Black board + PPT
6.	Transistor as a switch and switching timings	1	Black board + PPT
7.	Problems related to BJT	2	Black board + PPT
	Total Hours	09	

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UNIT-IV

Learning Objectives:

- ➤ To define JFET and its characteristics
- ➤ To construct and operation of FET
- ➤ Comparison of BJT and FET
- ➤ MOSFET AND ITS CONSTRUCTION

S.No.	Description of Topic	No. of Hrs. required	Method of Teaching
1.	Construction of JFET and its operation	2	Black board
2.	Pinch off voltage, V-I characteristics	2	Black board
3.	Comparison of BJT and FET	1	Black board
4.	FET as voltage variable resistor	1	Black board
5.	MOSFET introduction	1	Black board
6.	MOSFET as a capacitor	1	Black board
7.	Problems related to FET	1	Black board
	Total Hours	09	

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UNIT-V

Learning Objectives:

➢ To learn about special purpose devices and its characteristics
➢ Principle and its operation of zener diode, scr, varactor diode, photo diode.

S.No.	Description of Topic	No. of Hrs. required	Method of Teaching
1.	Zener diode- characteristics and zener as voltage regulator	1	Black board + PPT
2.	Principle & operation -scr	2	Black board + PPT
3.	Tunnel diode, UJT	2	Black board + PPT
4.	Varactor diode, photo diode	2	Black board + PPT
5.	Solar cell, led, schottky diode	2	Black board + PPT
	Total hours	9	

Total Hours required

UNIT	No. of Hours Required
UNIT-I	10
UNIT:2	10
UNIT:3	09
UNIT:4	09
UNIT:5	9
Total	47

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QUESTION BANK
UNIT-I

S.No		Questions	BT	CO	PO
		Part – A (Short Answer Questions)			
1		Define Static and Dynamic resistance of PN diode	2	1	2
2		What is meant by depletion region	2	1	1
3		For what voltage will the reverse current in pn ge diode reach 90%of its saturation value at room temperature	2	1	1
4		Write the effect of temperature on diode characteristics	4	1	2
5		Define static resistance	3	1	2
8		Draw the Diode Equivalent Circuit. Mention the applications of PN-junction diode.	3	1	1
9		Explain how P-N junction diode acts as a Rectifier.	4	1	1
		Part – B (Long Answer Questions)			
10	a)	write short notes on load line analysis of PN Diode	4	1	2
	b)	Explain the avalanche and Zener break down in PN diode	3	1	3
11	a)	Derive the expression for Transition capacitance of PN Diode	3	1	2
	b)	Derive the expression for diffusion capacitance of a diode	3	1	1
12	a)	Explain PN diode characteristics in forward and reverse bias regions	4	1	3
	b)	Find the width of the depletion layer in a germanium junction diode which has the following specifications: Area A = 0.001 cm^2, σ_n = 1 mhos / cm, μ_n = 3800 cm^2/sec, μ_p = 1800 cm^2/sec. [5+5]	3	1	2
13	a)	Discuss switching characteristics of PN junction diode	3	1	3

UNIT–II

S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)					
1		what is a rectifier and its types	2	2	1
2		Distinguish between series and shunt clippers	2	2	1
3		What is the necessity of filter. List the types of filters	2	2	1
4		Define regulation and efficiency of a rectifier.	2	2	1
5		Define ripple factor and PIV	2	2	1
6		Explain the necessity of filter circuit after the rectifier circuit	2	2	1
7		Derive the ripple factor for a full wave rectifier	1	2	1
8		List the difference between different filters	1	2	1
9		Define clampers	2	2	1
Part – B (Long Answer Questions)					
10	a)	A sinusoidal voltage whose Vm=12V is applied to half-wave rectifier. The diode may be considered to be ideal and R_L=1.5 KΩ is connected as load. Find out peak value of current, RMS value of Current, DC value of current and Ripple factor.	3	2	1
	b)	Derive the expression for Ripple factor for Full Wave Rectifier with L-Section filter. [6+4]	3	2	2
		OR			
11	a)	Draw the circuit diagram and explain the operation of full wave rectifier using center tap transformer and using bridge rectifier without center tap transformer. Obtain the expression for peak inverse voltages of both. [10]	4	2	3
	b)	A full wave rectifier circuit with C-type capacitor filter is to supply a D.C. Current of 20 mA at 16V. If frequency is 50 Hz ripple allowed is 5%. Calculate: i) Required secondary voltage of the transformer. ii) Ratio of I peak/ I_{max} through diodes and the value of C required.	2	2	2
14	a)	With a neat circuit diagram and necessary wave forms explain the operation of half wave rectifier. [5+5]	4	2	3
	b)	An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Assume the ideal diode. Find: i) dc output voltage ii) PIV.	3	2	3
15	a)	Compare half wave, full wave and bridge rectifier circuits.	2	2	2
	b)	Derive the expression for halfwave rectifier with c- filter	2	2	2
16		With suitable wave forms explain bridge rectifier	2	2	2
17		A 50 Hz transformer having 60 V r. m. s. on each side of the centre tap supplies a full wave rectifier circuit. The circuit load is 210 Ω with a shunt capacitor filter of 1000 µF. Find the ripple factor. [5+5]	2	2	2

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UNIT–III

S.No		Questions	BT	CO	PO
**Part – A (Short Answer Questions)**					
1		What is meant by thermal runaway? Explain.	2	3	1
2		What do you mean by early effect	1	3	1
3		Explain about collector feedback bias.	2	3	1
4		Compare CE, CB and CC configurations	2	3	1
5		What is the need of biasing?	2	3	1
6		Explain Bias Compensation using Diodes.	2	3	1
7		Explain the working of a transistor as a switch	4	3	2
8		Define alpha and beta DC amplification factors of BJT.	2	3	2
**Part – B (Long Answer Questions)**					
9		With neat diagram explain various current components in an PNP bipolar junction transistor.	3	3	1
10		Draw and explain input and output characteristics of CB configuration	2	3	1
11	a)	Draw and explain input and output characteristics of CE configuration	4	3	2
	b)	Explain the different operating regions of transistor.	2	3	3
12	a)	Draw and explain input and output characteristics of CC configuration	3	3	3
	b)	Derive general equation for collector current Ic	2	3	2

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UNIT–IV

S.No		Questions	BT	CO	PO
		Part – A (Short Answer Questions)			
1		Compare BJT and FET.	2	4	1
2		Explain classification of FET	1	4	1
3		Define Transconductance of FET	2	4	1
4		Define MOSFET how it is different from JFET	2	4	1
5		What is meant of enhancement MOSFET	2	4	1
6		What is meant of Depletion MOSFET	2	4	1
7		What is the input impedance of common source amplifier	2	4	1
8		For a p-channel Silicon FET, with effective width 'a'=2×10^{-4} cm and channel resistivity ρ =10 Ω. Find the pinch off voltage.	1	4	2
9		Explain how to avoid thermal runway	2	4	1
10		How FET acts as voltage variable resistor	1	4	1
		Part – B (Long Answer Questions)			
11	a)	With the help of a neat diagram explain the operation of an n-channel enhancement type MOSFET	4	4	2
	b)	Detail the construction of an p-channel MOSFET of depletion type. Draw and explain its characteristics	4	4	2
12	a)	Differentiate Enhancement MOSFET and Depletion MOSFET	4	4	2
	b)	Explain drain and transfer characteristics of JFET	3	4	3
13		Why the input impedance in FET is very high in comparison with BJT?	2	4	1
14	a)	Illustrate the working mechanism of JFET with necessary diagram	4	4	3
	b)	What is the relation among FET parameters	3	4	3

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UNIT–V

S.No		Questions	BT	CO	PO
Part – A (Short Answer Questions)
1		Draw zener diode characteristics	2	5	1
2		Write the applications of photo diode	2	5	1
3		Write a short notes on varactor diode	2	5	1
4		Explain voltage regulation using Zener diode	2	5	1
5		What is regulation	2	5	1
6		What are the applications of UJT	2	5	2
7		Draw V-I characteristics of UJT and explain graph	2	5	2
8		Write short notes on SCR	2	5	2
9		Write short note on LED	2	5	2
10		Write short notes on Schottky diode	2	5	1
Part – B (Long Answer Questions)
11	a)	Write short notes on varactor diode	3	5	2
	b)	Describe the construction and working of UJT with its equivalent circuit and V-I characteristics	4	5	2
12	a)	Distinguish between Avalanche and Zener breakdown	2	5	2
	b)	Explain about silicon-controlled rectifier	3	5	2
13	a)	With neat diagram explain the operation of zener diode and its forward and reverse characteristics	3	5	1
	b)	Mention some advantages and disadvantages of tunnel diode	2	5	1
14	a)	Explain the tunneling phenomenon in detail	4	5	2
	b)	Describe the principle of operation of tunnel diode	4	5	2
15	a)	Explain the working of semiconductor photo diode	4	5	2
	b)	Explain static characteristics of SCR	4	5	2
16	a)	Define varactor diode? Explain the operation of varactor diode with its equivalent circuit and mention its applications	4	5	2
	b)	With the help of V-I characteristics, explain SCR operation	4	5	2

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R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 2017
ELECTRONIC DEVICES AND CIRCUITS
(Common to CSE, ECE, EEE, EIE, ETM, IT, MCT)

Time: 3 Hours   **Max. Marks: 75**

Note: This question paper contains two parts A and B.
.   Part A is compulsory which carries 25 marks. Answer all questions in Part A.
        Part B consists of 5 Units. Answer any one full question from each unit.
        Each question carries 10 marks and may have a, b, c as sub questions.

PART-A
(25 Marks)

1.a) Draw Zener Diode Characteristics.   [2]
  b) Draw the Diode Equivalent Circuit. Mention the applications of PN-junction
      diode.   [3]
  c) Explain how P-N junction diode acts as a Rectifier.   [2]
  d) Explain the necessity of filter circuit after the rectifier circuit.   [3]
  e) Explain how transistor work as an amplifier.   [2]
  f) Compare CE,CC and CB configurations.   [3]
  g) What is the need of biasing?   [2]
  h) Explain Bias Compensation using Diodes.   [3]
  i) Compare BJT and FET.   [2]
  j) How FET acts as Voltage Variable Resistor?   [3]

PART-B
(50 Marks)

2.a) Explain the Avalanche and Zener Breakdowns in PN junction diode.
  b) What is tunneling phenomena? Explain the principle of operation of tunnel diode
      with its characteristics.   [5+5]
OR
3.a) Derive the expression for transition capacitance of a diode.
  b) Define varactor diode? Explain the operation of varactor diode with its equivalent
      circuit and mention its applications.   [5+5]

4.   A sinusoidal voltage whose V_m=26V is applied to half-wave rectifier. The diode
      may be considered to be ideal and R_L=1.2 KΩ is connected as load. Find out peak
      value of current, RMS value of Current, DC value of current and Ripple factor.
                                                                                               [10]
OR
5.a) Derive the expression for Ripple factor for Full Wave Rectifier with L-section
      filter.
  b) Compare FWR and Bridge rectifier.   [5+5]

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6. The reverse leakage current of the transistor when in CB configuration is 0.3μA while it is 16μA when the same transistor is connected in CE configuration. Determine α, β and γ. [10]

OR

7.a) Explain input and output characteristics of transistor in CB configuration with neat diagram.
  b) Discuss the base width modulation. [5+5]

8.a) Derive the operating point using AC and DC load lines.
  b) Draw the circuit diagram of a voltage divider bias and derive expression for Stability factor. [4+6]

OR

9. Draw the circuit diagram of CC amplifier using hybrid parameters and derive the expression for A_I, A_V, R_i and R_O. [10]

10. Explain the different biasing techniques of JFET. [10]

OR

11. Describe the construction and working principle of Enhancement mode and depletion mode MOSFET and draw its characteristics. [10]