

**JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER**

Programme: B.Sc.

Semester: II

**ELECTRONICS PAPER II
TRANSISTOR APPLICATIONS AND POWER DEVICES**

Course Code: 18IIEEL2

No. of Hours: 60

COURSE OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to:

- Describe transistor biasing
- Differentiate various types of amplifiers
- Describe the characteristics of amplifiers, including classes of operation.
- Compare the characteristic of CE, CC and CB amplifiers
- Describe different types of coupling
- Study the characteristic of Darlington transistor
- Draw the schematics of class A and B push pull amplifier and explain its operation
- Define input characteristic, common mode gain and CMRR
- Study the performance of different transistor oscillators
- Study the performance of special devices like UJT, FET.
- Study the performance of SCR, DIAC, and TRIAC
- Study the performance of MOSFET

COURSE OUTCOMES

- Distinguish between the various transistor biasing and characteristics of CE, CB, CC Amplifier
- Explain the working of at least 3 types of oscillators
- Compare the performance of power devices
- Applications of a Bi polar Junction Transistor as an Amplifier and Oscillator

UNIT I

TRANSISTOR AMPLIFIER

14 HRS

Transistor Biasing circuits – Transistor Biasing, need for biasing, DC operating point and DC load line, Significance of the Q point. Numerical problems. Types of biasing circuits-Base bias with emitter feedback, circuit diagram, qualitative study, Voltage divider bias circuit-bias design equations using approximate analysis, numerical problems. Stability factor, significance, Thermal runaway.

Amplifiers: Block diagram of audio amplifier system, classification of amplifiers-working of a CE amplifier, AC load line, AC equivalent circuit (using re' model), and derivations for voltage gain, current gain, input and output impedance, numerical problems. Frequency response - Qualitative study of factors affecting the gain at low and high frequencies, bandwidth, half power frequencies, significance of gain in decibel. Qualitative study of emitter follower and applications of CE, CB and CC amplifiers, Darlington Amplifier- circuit diagram and characteristic features.

UNIT II

MULTISTAGE TRANSISTOR AMPLIFIERS

10 HRS

Need for cascading, Multistage amplifier - principle and overall gain of multistage amplifier, Types of coupling, RC coupling, Transformer Coupling, Direct coupling (mention only), Two stage RC coupled amplifier- working, frequency response (qualitative study), expression for voltage gain (re model), application. Direct coupled amplifier (qualitative study)- working and frequency response, application. Comparison of RC coupled amplifier and direct coupled amplifier.

UNIT III

POWER AMPLIFIERS

12 HRS

Power amplifiers: Classification of large signal amplifiers, Need for power transistor, Heat sink, Limitations of small signal amplifier. Class A Power Amplifier, transformer coupled, Class B- transformer coupled push pull amplifier, derivation of o/p power and efficiency, Numerical problems. Complementary symmetry push pull class B amplifier, Cross over distortion. Comparison of Class A, B, C, AB and D Amplifiers.

Audio power amplifier circuit using IC LM 386: Pin diagram and features, Simple audio power amplifier circuit

--8hr

Tuned Amplifiers: Class C power amplifier, Single tuned, Draw back - Double tuned amplifier, comparison of frequency responses, applications of class C amplifiers. --2Hrs

UNIT IV

SINUSOIDAL OSCILLATORS

12 HRS

Concept of feedback, Block diagram, types of feedback- positive and negative feedback, merits and demerits of positive and negative feedback, Feedback configuration- voltage series, voltage shunt, current series, current shunt (Block diagram of representation for each). Voltage series negative feedback- effect of negative feedback on voltage gain-derivation, effect of negative feedback on input impedance, output impedance, frequency and B.W (No derivation).

Basic principle of an oscillator, Damped and undamped oscillations, tank circuit, Classification of oscillators- LC, RC, Crystal oscillators. Colpitt's and Hartley oscillator using transistor- circuit diagram, working and derivation for frequency of Colpitt's oscillator, applications.

RC phase shift oscillator using transistor- circuit diagram, working and expression for frequency of oscillation (No derivations), applications.

Crystal oscillator- principle and equivalent circuit, series and parallel resonant frequencies, working of a Colpitt crystal oscillator, advantages of crystal oscillator over other types, Numerical problems.

UNIT V

SPECIAL SEMICONDUCTOR DEVICES

12 HRS

JFETS AND MOSFETS

Field Effect Transistor, Difference between FET and BJT, Construction and Working principle of n channel JFET, Characteristics of FET – parameters and relation between them. Numerical problems, CS-FET amplifier –mention voltage gain (qualitative study).

MOSFET – Construction, working and characteristics, Depletion mode and enhancement mode, Applications of MOSFET.

UJT – Construction, Equivalent circuit, Operation, characteristics. UJT working, formula for frequency of oscillation, waveform, application- relaxation oscillator, Numerical problems.

THYRISTORS -SCR, DIAC, TRIAC (Power devices):

SCR – Symbol, Construction, Working, Two transistor analogy of SCR, V-I characteristics, SCR as half wave controlled rectifier, formula (Mention only).

TRIAC – symbol, construction, Characteristics and application (Mention only)

DIAC — symbol, construction, Characteristics and application, Diac as bi-directional switch (Mention only).

TEXT BOOKS

1. V.K Mehta and Rohit Mehta, Principles of electronics, S.Chand publications, 2007.
2. R.S Sedha, Applied Electronics, S. Chand Publishers, 2005.
3. B.L Theraja, Basic Electronics, S.Chand & Co, 2007.

REFERENCE BOOKS

1. Dr.P.S. Bimbra, Power electronics, Khanna publication, Third edition, 2003.
2. Robert Boylested & Louis Nashelsky, Electronic Devices and Circuit Theory PHI 8 Th Edition-2003.
3. A.P.Malvino, Electronic Principles, TMH 7th Edition.
4. Floyd, Electronic devices, fifth edition, PHI publications, 1999.
5. David A Bell, Electronic Devices and Circuits, fourth Edition, PHI 1999. Electronics Practical II.

ELECTRONICS PRACTICAL II

LIST OF EXPERIMENTS

1. CE amplifier – determines frequency response, gain and band width.
2. CC amplifier - i/p and o/p impedance, gain
3. UJT characteristics
4. UJT relaxation oscillator
5. SCR characteristic
6. Colpitt's oscillator.
7. FET characteristics
8. FET-CS amplifier
9. Tuned Voltage Amplifier.
10. Two stage RC coupled amplifier

Note: Any 8 out of 10 experiments have to be conducted.

Project work: using IC LM386 as audio amplifier