**SRM UNIVERSITY**
**FACULTY OF ENGINEERING AND TECHNOLOGY**

**SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**
**DEPARTMENT OF ECE**
**SESSION PLAN**

**Course Code** : EC0204
**Course Title** : Electronic circuits
**Year& Semester** : II Yr / IV semester
**Course Time** : Even semester (Dec 2011 – April 2012)
**Location** : Tech Park

**Faculty Details:**

| Name of the staff | Sec. | Office | Office Hours | Mail ID |
|---|---|---|---|---|
| Mr. S. Nivash | A | TP1206A | Day 2 – 1st & 5th<br>Day 5 – 1st & 2nd | nivash.s@ktr.srmuniv.ac.in |
| Mr. Ramchandran | B | TP1206A | Day 1 – 3rd<br>Day 3 – 3rd & 4th<br>Day 4 – 1st | ramachandran.ma@ktr.srmuniv.ac.in |
| Mr. B. Srinath | C | TP1206A | Day 1 – 3rd & 4th<br>Day 2 – 4th<br>Day 5 – 1st | srinath.b@ktr.srminiv.ac.in |
| Mrs. B. Selvapriya | D | TP1006A | Day 2 – 2nd<br>Day 3 – 3rd<br>Day 4 – 6th<br>Day 5 – 1st | selvapriya.b@ktr.srmuniv.ac.in |
| Mrs. E. Chitra | E | TP1203A | Day 1 – 2nd<br>Day 2 – 6th & 7th<br>Day 3 – 4th | chitra.e@ktr.srmuniv.ac.in |
| Mr.E.Sivakumar | F | TP1106A | Day 2 – 7th<br>Day 3 – 2nd & 3rd<br>Day 5 – 5th | sivakumar.e@ktr.srmuniv.ac.in |

**Required Text Books:**
1. Robert l. Boylsted,Louis Nashelsky,"Electronic Devices and Circuit Theory",Pearson , 1997.
2. Donald L.Schilling,Charles Belove" Electronic circuits",3rd edition.1989.
3. David A Bell, Electronic Devices and Circuits", Prentice hall of India,1998.

**Web Resources:**

www.allaboutcircuits.com
www.docstoc.com
www.learnabout-electronics.org
www.electronics-tutorials.ws/amplifier/amp_2.html

**Prerequisite:** EC0203, Electron Devices

**Instructional Objectives**:

- Operating point calculations and working of basic amplifiers
- Working of different types of feedback amplifiers & oscillators
- Frequency response and design of tuned amplifiers
- Basic working & design of wave shaping circuits

**Assessment details:**

Surprise test - 5 marks
Cycle test I - 10 marks
Cycle test II - 10 marks
Model Exam - 20 marks
Attendance - 5 marks

**Test Schedule:**

| S.No. | DATE | TEST | PORTIONS | DURATION |
|---|---|---|---|---|
| 1. | 30.01.2012 (tentative) | Cycle Test-1 | Session 1 to 12 | 1 hour and 40min |
| 2. | 26.03.2012 (tentative) | Cycle Test-2 | Session 13 to 25 | 1 hour and 40min |
| 3. | 09.04.2012 (tentative) | Model Test | All Sessions | 3 hours |

**Outcomes**

Students who have successfully completed this course

| Course outcome | Program outcome |
|---|---|
| • Operating point calculations and working of basic amplifiers<br>• Working of different types of feedback amplifiers & oscillators<br>• Frequency response and design of tuned amplifiers<br>• Basic working & design of wave shaping circuits | a) Graduates will demonstrate knowledge of mathematics, science and engineering.<br>b)Graduates will demonstrate the ability to identify, formulate and solve engineering problems.<br>c) Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.<br>d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.<br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |

**Detailed Session Plan**

**BIASING METHODS AND SMALL SIGNAL MODELS (BJT, JFET, MOSFET)**
DC & AC Load Lines-Operating Point-Q- Point variation-various Biasing Methods- Small signal equivalent - Calculation of voltage gain, current gain, power gain, input impedance and output impedance.

| Session No. | Topics to be covered | Reference | | Instruction Objective | Program Outcome |
|---|---|---|---|---|---|
| 1. | Introduction about Electronic circuit | Electronic Device and circuit theory- Robert L.Boylestad | | Operating point calculations and working of basic amplifiers | |
| 2. | DC & AC load lines, Q point | | Book1, Chapter 4 | | c) Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.<br>d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications. |
| 3. | Biasing methods: BJT<br>Biasing methods: JFET | | Book1, Chapter 4,7 | | |
| 4. | Biasing methods: MOSFET | | Book1, Chapter 7 | | |
| 5. | Small signal equivalent Model | | Book1, Chapter 5,8 | | a) Graduates will demonstrate knowledge of mathematics, science and engineering.<br>b)Graduates will demonstrate the ability to identify, formulate and solve engineering problems.<br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 6. | Small signal equivalent Model-Calculation of voltage gain, current gain, power gain | | Book1, Chapter 5,8 | | |
| 7. | Calculation of Input Impedance, output impedance | | Book1, Chapter 5,8 | | |
| 8. | Problems in Biasing Techniques | | Book1, Chapter 5,8 | | |
| 9. | DC & AC load lines, Q point | | Book1, Chapter 4 | | d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications. |

**TRANSISTOR AMPLIFIER AND ANALYSIS**
Small Signal analysis of BJT, JFET and MOSFET amplifiers - Cascade amplifier- Cascode amplifier- Darlington Bootstrap amplifier- Differential amplifier.

| Session No. | Topics to be covered | Reference | | Instruction Objective | Program Outcome |
|---|---|---|---|---|---|
| 10. | Small signal analysis of BJT | | Book1, Chapter 5 | | a) Graduates will demonstrate knowledge of mathematics, science and engineering.<br>b)Graduates will demonstrate the ability to identify, formulate and |
| 11. | Small signal analysis of JFET | | Book1, Chapter 8 | | |

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|---|---|---|---|---|---|
| 12. | Small signal analysis of MOSFET | Electronic Device and circuit theory- Robert L.Boylestad | Book1, Chapter 8 | Operating point calculations and working of basic amplifiers | solve engineering problems.<br>d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.<br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 13. | Cascade amplifier | | Book1, Chapter 5 | | c) Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.<br>d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.<br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 14. | Cascode amplifier | | Book1, Chapter 5 | | |
| 15. | Darlington Bootstrap amplifier | | Book1, Chapter 5 | | |
| 16. | Differential amplifier | | Book1, Chapter 10 | | |

**FEEDBACK AMPLIFIERS AND OSCILLATORS**

Concept of feedback- Types of feedback- Analysis of voltage & current feedback amplifiers Barkhausen criterion for oscillation - mechanism for start of oscillation & stabilization of amplitude - Analysis of RC & LC oscillators.

| Session No. | Topics to be covered | Ref | | Instruction Objective | Program Outcome |
|---|---|---|---|---|---|
| 17. | Concept of Feedback and types of feedback | Electronic Device and circuit theory- Robert L.Boylestad | Book1, Chapter 14 | Working of different types of feedback amplifiers & oscillators | c) Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.<br>d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.<br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 18. | Voltage feedback amplifier | | Book1, Chapter 14 | | |
| 19. | Current feedback amplifier | | Book1, Chapter 14 | | |
| 20. | Analysis of voltage feedback amplifier | | Book1, Chapter 14 | | |
| 21. | Analysis of current feedback amplifier | | Book1, Chapter 14 | | |
| 22. | Oscillator: Barkhausen criterion and mechanism for oscillation | | Book1, Chapter 14 | | c) Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.<br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 23. | Analysis of RC phase shift oscillator | | Book1, Chapter 14 | | |
| 24. | Analysis of Wien Bridge oscillator | | Book1, Chapter 14 | | |

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|---|---|---|---|---|---|
| 25. | Analysis of LC oscillator | | Book1, Chapter 14 | | |

**LARGE SIGNAL AND TUNED AMPLIFIERS**

Class-A CE amplifier - Q point placement - Power calculation - Maximum dissipation Hyperbola - Transformer coupled Amplifier - Class-B push pull amplifier - Class-AB operation-- Direct coupled push pull amplifier - Amplifier using complementary symmetry- Heat sink.

Single Tuned Amplifiers - Double tuned & synchronously tuned amplifiers.

| Session No. | Topics to be covered | Ref | | Instruction Objective | Program Outcome |
|---|---|---|---|---|---|
| 26. | Class A CE amplifier: Q point, Power calculation, maximum dissipation Hyperbola | Electronic circuits- Donald L.Schilling | Book 2, Chapter 5 | Frequency response and design of tuned amplifiers | a) Graduates will demonstrate knowledge of mathematics, science and engineering.<br><br>b)Graduates will demonstrate the ability to identify, formulate and solve engineering problems.<br><br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 27. | Transformer coupled amplifier | | Book 2, Chapter 5 | | a) Graduates will demonstrate knowledge of mathematics, science and engineering.<br><br>b)Graduates will demonstrate the ability to identify, formulate and solve engineering problems.<br><br>c) Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.<br><br>d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.<br><br>k) Graduate will show the ability to participate and try to succeed in competitive examinations |
| 28. | Class B push pull amplifier | | Book 2, Chapter 5 | | |
| 29. | Class AB | | Book 3, Chapter 18 | | |
| 30. | Direct coupled push pull amplifier | Electron Devices and Circuits- David A Bell | Book 3, Chapter 18 | | |
| 31. | Amplifier using complementary symmetry, Heat sink | | Book 2, Chapter 5 | | |
| 32. | Single Tuned amplifier | | Book 2, Chapter 9 | | |
| 33. | Double tuned & synchronously tuned amplifier | | Book 2, Chapter 9 | | |

**FREQUENCY RESPONSE AND WAVE SHAPING CIIRCUITS**

Low frequency and High frequency response of BJT and FET amplifier. **Nonlinear wave shaping circuits**: Astable - Bistable - Monostable Multivibrators. Schmitt Trigger - Time Base Generators.

| Session No. | Topics to be covered | Ref | | Instruction Objective | Program Outcome |
|---|---|---|---|---|---|
| 34. | Low frequency response –BJT | Electronic Device and circuit theory-Robert L.Boylestad | Book 1, Chapter 9 | | d) Graduates will demonstrate the ability to design a system, component or process as per needs and specifications.<br><br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 35. | Low frequency response –JFET | | Book 1, Chapter 9 | | |
| 36. | High frequency response –BJT | | Book 1, Chapter 9 | | |
| 37. | High frequency response -JFET | | Book 1, Chapter 9 | | |
| 38. | **Nonlinear Wave shaping circuits:** Astable Multivibrator | Applied Electronics-R.S.Sedha | Chapter 32 | Basic working & design of wave shaping circuits | b)Graduates will demonstrate the ability to identify, formulate and solve engineering problems.<br><br>c) Graduate will demonstrate the ability to design and conduct experiments, analyze and interpret data.<br><br>k) Graduate will show the ability to participate and try to succeed in competitive examinations. |
| 39. | Monostable Multivibrator | | Chapter 32 | | |
| 40. | Bistable Multivibrator | | Chapter 32 | | |
| 41. | Schmitt trigger | | Chapter 32 | | |
| 42. | Time base generators | | Chapter 34 | | |