

**GOVERNMENT COLLEGE**

**(AUTONOMOUS)**

**RAJAHMUNDRY**

DEPARTMENT OF PHYSICS  
**DEPARTMENT OF PHYSICS**

**ELECTRONICS**

BOARD OF STUDIES MEETING

ON

03-04-2014

**BOS MEMBERS**  
**RESOLUTIONS**  
**SYLLABUS, LIST OF PRACTICALS,**  
**MODAL PAPERS, LIST OF EXAMINERS**

**DEPARTMENT OF ELECTRONICS**  
**CONSOLIDATED REPORT OF BOARD OF STUDIES FOR THE YEAR 2014-15**

The Board of Studies of **ELECTRONICS** Department was convened on 03-04-2014 at 11-00 A.M. under the chairmanship of **Sri. B.V. Thirupanyam**. The following members were present.

S. No	Nominee	Name SarvaSree	Signature
1	University Nominee	Prof. D.S.V.V. Durga Prasad	
2	Industrial Nominee		
3	Local Nominee	D. Gangadharudu	
4	Staff Member	B. V. Tirupanyam	
5	Staff Member	G. V. G. Murthy Raju	
6	Staff Member	K. Srinivasa Rao	
7	Staff Member	Dr. K. Rama Chandra Rao	
8	Staff Member	Esub Basha Shaik	
9	Staff Member	B. Durga Lakshmi	
10	Student (B. Sc, III Year)	Y.Durga prasad	
11	Student (B. Sc, II Year)	Y.Suryanarayana	
12	Student (B. Sc, I Year)		

Date

Chairman  
Board of Studies  
Department of ELECTRONICS

**GOVERNMENT COLLEGE (AUTONOMOUS): RAJAHMUNDRY**

**(NAAC Accredited at "A")**

**BOARD OF STUDIES MEETING ON 03-04-2014  
DEPARTMENT OF ELECTRONICS**

**RESOLUTIONS:**

1. Resolved to approve the syllabus and books prescribed for all semesters.
2. Resolved to approve the additional inputs for intelligent students on non-creditable basis, for all the Semesters.
3. Resolved to approve the modal question papers for all semesters for a maximum of 75 marks and remaining 25 marks for internal assessment.
4. Resolved to approve the list of examiners and paper setters for the academic year 2013-14

University Nominee

Local Nominee

Subject Expert

Chairman  
Board Of Studies

**Government College:: Rajahmundry**  
B.Sc I year – Electronics  
**Paper-I Circuit Analysis and Electronic Devices**  
Semester – 1 (w.e.f. 2011 – 2012)

**Unit I (30 hrs)**

**I . AC Fundamentals:** The Sine Wave – Average and RMS values – The J operator – polar and rectangular forms of complex numbers – phasor diagram – complex independence and admittance.

**II. Passive networks:** Concept of voltage and current sources – KVL and KCL – Applications to simple circuits ( AC and DC ) consisting of resistors and sources (one or two) – Node voltage analysis and method of mesh currents.

**III. Network theorems (AC and DC):** Superposition theorems – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem - Reciprocity theorem – Milliman's theorem – Applications to simple networks.

**Unit – II (30 hrs)**

**IV. RC and RL circuits:** Tansient response of RL and RC circuits with step input time constants – Frequency response of RC and RL circuits – Types of filters – Low pass filter – high pass filter – frequency response – passive differentiating and integrating circuits.

**V. Resonance:** Series resonance and parallel resonance RLC circuits – Resonant frequency – Q factor - Bandwidth selectivity.

**Reference Books:**

1. Grob's basic Electronics – Mitchel E. Schulth 10<sup>th</sup> Edn. Tata McGraw Hill (TMH)
2. Network lines and fields – Ryder Prentice Hall of India (PHI)
3. Circuit analysis – P.Gnanasivam – Pearson Education.
4. Circuits and Networks – A.Sudhakar & Shyammohan S. Pillai – TMH.
5. Network Theory – Smarajit Ghosh – PHI.
6. Electronic Devices and Circuits – Millman and Halkias – TMH
7. Electronic Devices and Circuits – Allen Mottershead – PHI
8. Principles of Electronics - V.K.Mehtaand Rohit Mehta - S.Chand & Co
9. Electronic devices and circuit theory - R.L.Boylestad and L.Nashelsky – Pearson Education.
10. Pulse digital switching wavwforms - Millman & Taub – TMH
11. Applied Electronics – R.S.Sedha - S Chand & Co
12. A first course in Electronics - AA Khan & KK Day - PHI
13. Principles of Electronic circuits – Stanely G. Burns and Paul R. Bond – Galgotia
14. Electronic principles and applications - A.B.Bhattacharya - New Central Book Agency Pvt.,

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**DEPARTMENT OF ELECTRONICS**  
**ADDITIONAL INPUTS**

**CLASS** : I B.Sc

**SEMESTER** : I

**PAPER** : I

**TITLE OF THE PAPER** : PASSIVE COMPONENTS AND CIRCUIT ANALYSIS

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP
<ol style="list-style-type: none"><li>1. Units and definitions</li><li>2. Alternating Current and Voltage</li><li>3. Resistors</li><li>4. Inductors</li><li>5. Capacitors</li><li>6. Simple circuits</li><li>7. Kirchoff's Voltage and Current laws</li><li>8. Network Theorems (for both A.C. and D.C)</li></ol>	<ol style="list-style-type: none"><li>9. Three phase circuits. Phase sequence – Star and delta connection. Relation between line , phase voltages and current in balanced systems. Analysis of balanced and unbalanced three phase circuits. Star and Delta transformations.</li></ol>

**Government College(A) :: Rajahmundry**  
B.Sc I year – Electronics  
Paper – I Circuit Analysis and Electronic Devices

External Marks	: 75M
Internal Marks	: 25M
(Theory	: 15M
Viva-Voce	: 10M)

**External Examination Model Question Paper**

Duration: 3hrs

Max Marks :75

**Section – A**

Essay type questions 4 x 10 = 40 Marks

(One question from each unit with internal choice)

**Section – B**

Short type questions 5 x 3 = 15 Marks

(Four questions from each unit

Total questions: 08

Answer any FIVE questions.)

**Section – C**

Very short questions 10 x 2 = 20 Marks

( Answer all questions)

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**Government College(A) :: Rajahmundry**

**I Semester end examination**  
**B.Sc I year – Electronics**  
**Paper – I Circuit Analysis and Electronic Devices**  
**Semester-I**

Duration : 3hrs

Max Marks: 75

**Section – A**

Answer any **FOUR** questions

4 x 10 = 40 Marks

1. Explain the terms peak, RMS and average values of a sinusoidal voltage.

Derive the relations among them.

OR

Define complex number. Explain how complex numbers can be used to express sinusoidal quantities.

2. State Kirchoff's voltage and current rules. Discuss method of mesh currents and determinant node voltage analysis.

OR

State and prove superposition theorem. Explain how this can be successfully employed in a network.

3. State and prove Millman's theorem.

OR

Discuss transient response of RC circuit containing DC sources.

4. Explain the transient response of an R-L circuit.

OR

Explain bandwidth and selectivity of a parallel resonant circuit.

**Section – B**

Answer any **FIVE** questions.

5 x 3 = 15 Marks

5. Explain the term power factor. What is its significance?

6. Derive an expression for mean value of A.C

7. What do you understand by an active and passive network.

8. State and prove compensation theorem.

9. The angular frequency of waveform is  $500\pi$  radian/sec. Find it's a) Frequency b) Time period.

10. A sinusoidal waveform is given by

$$I = 10 \sin (6284t + 10^\circ) \text{ amp.}$$

Find it's a) Peak value b) rms value.

11. Find the branch circuit in the following circuit.

12. Obtain the resonant frequency and Q-factor for a series LCR circuit with  $L = 3.0\text{H}$  and  $C = 27\mu\text{f}$  and  $R = 7.4\ \Omega$ .

### Section - C

Answer all questions

10x 2 = 20 Marks

13. Define Virtual Volt.

14. What is the Crest factor of a sine wave.

15. What is the internal resistance of ideal voltage source.

16. State the Kirchoff's law.

17. State reciprocity theorem

18. Find the load resistance for maximum power transfer from a source of 100Vdc, having internal resistance of 50 ohms

19. A Battery of 1.5V is connected in Series with a resistance of 20 ohms and 30 ohms. Find out Equivalent voltage and resistance across the points of 30 ohms resistance

20. What is the Ripple factor for shunt capacitor filter

21. Draw RC integrating circuit

22. Explain the term Quality factor.

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B.Sc I year – Electronics  
**Paper-I Circuit Analysis and Electronic Devices**  
Semester – II (w.e.f. 2011 – 2012)

**Unit III (30 hrs)**

**I . PN Junction:** Depletion region – Junction capacitance – Diode equation (no derivation) – Effect of temperature on reverse saturation current – construction, working V-I characteristics and simple applications of

- 1) Junction diode 2) Zener diode 3) Tunnel diode 4) Varactor diode.

**II Bipolar Junction Transistor (BJT):** PNP and NPN transistors- current components in BJT – BJT static characteristics (input and output) – Early effect – CB, CC, CE configurations (cutoff, active and saturation regions) CE configuration as two port network – h –parameters – equivalent circuit – experimental arrangement to study input and output characteristics of BJT in CE configuration. Determination of h-parameters from the characteristics – Biasing and load line analysis – Fixed bias and self-bias arrangement.

**Unit IV (30 hrs)**

**III. Field Effect Transistor (FET):** Construction and working of JFET and MOSFET – Output and transfer characteristics – Experimental arrangement for studying the characteristics and to determine FET parameters- Applications of FET as voltage variable resistor and MOSFET as a switch – Advantages of FET over transistor.

**IV. Uni Junction Transistor (UJT) :** Structure and working of UJT – Characteristics – Application of UJT as a relaxation oscillator.

**V. Silicon Controlled Rectifier (SCR):** Structure and working of SCR. Two-transistor representation – Characteristics of SCR – Experimental setup to study the SCR characteristics – Application of SCR for power control.

**VI. Photo Electric Devices:** Structure and operation of LDR – Photo voltaic cell – Photo diode – Phototransistor and LED.

(Note: Solving related problems in all units)

**Reference Books:**

15. Grob's basic Electronics – Mitchel E. Schulth 10<sup>th</sup> Edn. Tata McGraw Hill (TMH)
16. Network lines and fields – Ryder Prentice Hall of India (PHI)
17. Circuit analysis – P.Gnanasivam – Pearson Education.
18. Circuits and Networks – A.Sudhakar & Shyammohan S. Pillai – TMH.
19. Network Theory – Smarajit Ghosh – PHI.
20. Electronic Devices and Circuits – Millman and Halkias – TMH
21. Electronic Devices and Circuits – Allen Mottershead – PHI
22. Principles of Electronics - V.K.Mehtaand Rohit Mehta - S.Chand & Co
23. Electronic devices and circuit theory - R.L.Boylestad and L.Nashelsky – Pearson Education.

24. Pulse digital switching wavwforms - Millman & Taub – TMH
25. Applied Electronics – R.S.Sedha - S Chand & Co
26. A first course in Electronics - AA Khan & KK Day - PHI
27. Principles of Electronic circuits – Stanely G. Burns and Paul R. Bond – Galgotia
28. Electronic principles and applications - A.B.Bhattacharya - New Central Book Agency Pvt.,

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**DEPARTMENT OF ELECTRONICS**  
**ADDITIONAL INPUTS**

**CLASS** : I B.Sc

**SEMESTER** : II

**PAPER** : I

**TITLE OF THE PAPER** : CIRCUIT ANALYSIS

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP
<ol style="list-style-type: none"><li>1. AC Fundamentals</li><li>2. LR &amp; CR Circuits</li><li>3. Resonance</li><li>4. Network Theorms</li><li>5. Semiconductor devices</li></ol>	<p>Methods of Network Synthesis.</p>

Model question Paper  
B.Sc I year – Electronics  
Paper – I Circuit Analysis and Electronic Devices  
Semester-II

**Duration : 3hrs**

**Max. Marks: 75**

**Section – A**

Answer any **FOUR** questions

4 x 10 = 40 Marks

1. Describe the working of p-n junction diode under forward and reverse biasing.

OR

Write about the working and uses of a tunnel diode.

2. Discuss the action of a NPN transistor and draw a circuit diagram to obtain output characteristics for this transistor.

OR

Define h-parameters for a low frequency CE transistor.

Give an equivalent h-parameter model for a BJT under CE configuration.

3. Discuss the output and transfer characteristics of JFET.

OR

What is the significance of threshold voltage in enhance mode and depletion mode MOSFET.

4. Discuss the Construction and characteristic of uni junction transistor.

OR

Give the basic structure of SCR. Explain SCR characteristics.

**Section – B**

Answer any **FIVE** questions.

5 x 3 = 15 Marks

5. Draw V-I characteristics of a junction diode and explain.
6. Explain the operation of a Varicap diode.
7. Explain active region, saturation region and cut-off region in transistor operation.
8. Define  $\alpha$  and  $\beta$  parameters of a transistor.
9. Write applications of JFET.
10. Draw circuits of voltage divider-bias and self-bias in JFET.
11. Define the terms 'interbase resistance' and 'intrinsic stand off ratio'.
12. Write about photovoltaic cell.

**Section – C**

Answer All questions.

10 x 2 = 20 Marks

13. Write the diode equation
14. The current through a p-n junction diode is 55 ma at a forward bias voltage of 3V.  
If the temperature is 27c, find the static and dynamic resistance of diode
15. Draw the V-I characteristics of Tunnel diode
16. Draw the BJT static Characters
17. What are the hybrid paramaters of transistor
18. Give the circuit symbol for p- channel MOSFET
19. Sketch in small signal FET model
20. Why is SCR always tuned on by gate current
21. What is the critical wavelength of pjhoto conductor
22. Write any two applications of UJT

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Government College(A):: Rajahmundry  
*B.Sc I year – Electronics*  
**Paper-I Circuit Analysis and Electronic Devices**  
**PRACTICALS PAPER – I (90 Hours – 30 Sessions)**

**Circuit Analysis and Electronic devices Lab**

1. Measurement of peak voltage, frequency and phase using CRO.
2. Thevenin's theorem – verification.
3. Norton's theorem – verification.
4. Maximum power transfer theorem – verification.
5. CR and LR circuits – Frequency response (Low pass and High pass).
6. CR and LR circuits – Differentiation and integration – tracing of waveforms.
7. LCR – Series resonance circuit – Frequency response – Determination of  $f_o$ , Q and bandwidth.
8. To draw volt-ampere characteristics of Junction diode and determine the cut-in voltage, forward and reverse resistances.
9. Zener diode V-I characteristics – Determination of Zener breakdown voltage.
10. Voltage regulator using Zener diode.
11. BJT input and output characteristics (CE configuration) and determination of h-parameters.
12. FET – Characteristics and determination of FET parameters.
13. UJT as relaxation oscillator.
14. LDR – characteristics.
15. SCR Volt-ampere characteristics.

**Note: Student has to perform any 12 experiments.**

**Government College (A), Rajahmundry**  
*B.ScII Year – Electronics*  
Paper – II Analog circuits and communication  
Year End Examination ( w.e.f. 2009-2010)

**Scheme of Practical Examinations**  
**Practical question paper**

External Marks : 75M  
Internal Marks : 25M  
  
Total Marks : 100M

**Scheme of Valuation for Practicals**

	<b>External Marks</b>	<b>Internal Marks</b>
1. Formulae and explanation of symbols	10	03
2. Tabular form with circuit diagrams (whenever necessary)	10	03
3. Circuit connections	05	02
4. Observations	15	03
5. Calculation & Graphs	10	02
6. Result	05	02
7. Procedure & Precautions	05	04
8. Viva-Voce	05	03
9. Record	10	03
<b>Total</b>	<b>75</b>	<b>25</b>

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Government College(A):: Rajahmundry  
***B.Sc II Year- Electronics SEMESTER III admitted batch 2011-12***

**PAPER–II Analog Circuits and Communications**

**UNIT- I**

***Power Supplies:*** Rectifiers– Halfwave, fullwave and bridge rectifiers- Efficiency- Ripple factor- Regulation – Harmonic components in rectified output

**UNIT-II**

Types of filters- Choke input (inductor) filter- Shunt capacitor filter- L section and  $\pi$  section filters – Block diagram of regulated power supply - Series and shunt regulated power supplies – Three terminal regulators (78XX and 79XX) – Principle and working of switch mode power supply (SMPS).

**UNIT-III**

***Amplifiers- classification of amplifiers-RC Coupled Amplifier:*** Analysis and frequency response of single stage RC coupled CE amplifier. Positive and negative feedback- Effect of feedback on gain, band width, noise, input and output impedances-Emitter follower and Darlington pair (simple treatment without derivation)

**UNIT-IV**

***Operational Amplifiers:*** Differential amplifier-double ended input and single ended output- Block diagram of Op-Amp- Ideal characteristics of Op-Amp- Op-Amp parameters- Input resistance- Output resistance- Common mode rejection ratio (CMMR)- Slew rate- Offset voltages – Input bias current-

**Reference Books:**

1. Operational Amplifiers and Linear Integrated Circuits- Ramakant A. Gayakwad
2. Principles of Electronics- V.K. Mehta and Rohit Mehta - S Chand &Co
3. Applied Electronics- R.S.Sedha- S Chand &Co
4. Basic electronics- Gupta Kumar Sharam
5. Analog Electronics- L.K. Maheswari and M.M.S. Anand- PHI
6. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
7. Unified Electronics Vol I,II,III & IV



**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**DEPARTMENT OF ELECTRONICS**  
**ADDITIONAL INPUTS**

**CLASS** : II B.Sc

**SEMESTER** : III

**PAPER** : II

**TITLE OF THE PAPER** : Analog circuits and communication

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP
1. Power supplies 2. Rectifiers-filters 3. Amplifier-RC coupled amplifier 4. Fundamentals on op-amp	1. DC/AC load line analysis 2. Different types of fabrication to form p-n junction <ol style="list-style-type: none"><li>i. Crown junction</li><li>ii. Alloy junction</li><li>iii. Diffusion junction</li><li>iv. Epitaxial junction</li><li>v. Point contact junction</li></ol> Derivation of depletion layer width and barrier potential Derivation of diode equation

**Government College(A) :: Rajahmundry**  
B.Sc II year – Electronics  
Paper – II Analog circuits and communications.

External Marks	: 75M
Internal Marks	: 25M
(Theory	: 15M
Viva-Voce	: 10M)

**External Examination Model Question Paper**

Duration: 3hrs

Max Marks :75

**Section – A**

Essay type questions 4 x 10 = 40 Marks

(One question from each unit with internal choice)

**Section – B**

Short type questions 5 x 3 = 15 Marks

(Four questions from each unit

Total questions: 08

Answer any FIVE questions.)

**Section – C**

Very short questions 10 x 2 = 20 Marks

( Answer all questions)

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**Government college (Autonomous) – Rajahmundry**  
**Accredited by NAAC Grade 'A'**  
B.Sc II year Electronics Semester III admitted batch 2011-2012  
Paper II - Analog circuits and communication

**Model Paper**

Time : 3hrs

Max Marks:75

**Section – A**

Answer ALL questions

4x10=40

1. Draw the circuit diagram of RC coupled amplifier. Discuss its frequency response.

Or

What is negative feed back? Discuss the effect of negative feed back on (i) Gain  
(ii) I/P impedance

2. Draw the circuit of Full wave rectifier and find  $I_{dc}$  and  $I_{ac}$  and efficiency.

Or

Obtain the harmonic components in its rectifier output

3. Explain shunt capacitor filter with a neat circuit.

Or

Explain the principle and working of switch mode power supply.

4. Draw the circuit diagram of emitter coupled differential amplifier and explain its working and characteristics.

Or

What are the characteristics of an ideal Op Amp. Explain about common mode Gain.

## Section B

Answer any **FIVE** of the following:

5X3=15

5. Explain the block diagram of op amp and explain each block
6. Draw the circuit of bridge rectifier.
7. Draw the block diagram of regulated power supply.
8. Explain the characteristics Emitter follower.
9. The DC output voltage is 40 V at full load and 41 V without any load current. Calculate the load regulation factor in percent.
10. The mid frequency of RC coupled amplifier is 200. If lower and upper cutoff frequencies are 20 Htz and 50 Htz. calculate the frequencies at which gain reduces to 100.
11. Amplitude has a bandwidth of 200 K Hz and voltage gain of 40 db. What will be its bandwidth if 5 % negative feedback is introduced?
12. If an op.amp has an output signal of 10V with slew rate of 2V/ms. Calculate the power band width in amplifier.

## Section C

Answer **ALL** questions

10X2=20

13. An op amp has a CMRR value of 60 db and difference mode gain of 1200. Find common mode gain.
14. Define Input offset current.
15. What is the slew rate for ideal op amp.
16. What is 'Peak Inverse Voltage' in half wave rectifier?
17. Write a brief note on regulated power supply.
18. How many diodes are required in Full Wave rectifier?
19. AC power of 100W is applied as input to a half wave rectifier. Find the rectifier efficiency of the dc power obtained is 40W.
20. What is the use of bypass capacitor in RC coupled amplifier.
21. Draw the circuit of transistor shunt voltage regulator.
22. Define positive feedback.

**Government College:: Rajahmundry**  
B.Sc II year – Electronics  
**Paper-II Analog circuits and communication**  
Semester – IV (w.e.f. 2011 – 2012)

### **UNIT-I**

Basic Op-Amp circuits- Inverting Op-Amp- Virtual ground- Non-inverting Op-Amp- Frequency response of Op-Amp. Interpretation of Op-Amp data sheets.

### **UNIT-II**

*Applications of Op-Amps:* Summing amplifier- subtractor- Voltage follower- Integrator- Differentiator - Comparator- Logarithmic amplifier- Sine wave [Wein Bridge] and square wave [Astable] generators- Triangular wave generator- Monostable multivibrator- Solving simple second order differential equation. Basic Op-Amp series regulator and shunt regulator.

### **UNIT-III**

*Communications:* Need for modulation-Types of modulation- Amplitude, Frequency and Phase modulation.

Amplitude modulation-side bands- modulation index- square law diode modulator- Demodulation- diode detector.

Frequency modulation working of simple frequency modulator- Ratio detection of FM waves- Advantages of frequency modulation.

AM and FM radio receivers [block diagram approach].

### **Reference Books:**

1. Operational Amplifiers and Linear Integrated Circuits- K. Lalkishore - Pearson Education
2. Operational Amplifiers and Linear Integrated Circuits- Ramakant A. Gayakwad
3. Electronic Communication Systems - George Kennedy & Bernard Davis - TMH.
4. Electronic Communication -D. Roddy & J. Coolen- PHI
5. Electronic Devices and Circuits-Millman and Halkias- Tata Mc Graw Hill (TMH)
6. Microelectronics- J. Millman and A. Grabel - TMH
7. Principles of Electronic Communication Systems –Louis E. Frenzel -TMH

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**DEPARTMENT OF ELECTRONICS**  
**ADDITIONAL INPUTS**

**CLASS** : II B.Sc  
**SEMESTER** : IV  
**PAPER** : II  
**TITLE OF THE PAPER** : Analog circuits and communication

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SETUP
Basic op amp circuits	Application of op amp
Oscillators	Concept,essential of oscillators,Phase shift oscillator,Hartely-colpites oscillator and crystal oscillator
Amplitude FM modulation	Pulse digital modulation Quantization pulse code modulation delta modulation adaptive modulation comparision-Optical fibre communication-the general system advantages-Ray theory transimission

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

***B.Sc II Year - Electronics***

**PRACTICALS PAPER-II (90 hours - 30 Sessions)**

**Paper-II Analog Circuits and Communications Lab**

1. D.C Power supply
2. Single stage RC – coupled amplifier – frequency response.
3. Inverting amplifier.
4. Non- inverting amplifier.
5. Comparator.
6. Integrator.
7. Differentiator.
8. OP-Amp as Wien bridge oscillator.
9. Astable multivibrator – Determination of frequency (using IC741 Op-Amp).
10. Monostable multivibrator–Determination of pulse width (using IC 741Op Amp).
11. Voltage regulator using IC- 7805and IC-7905.
12. AM modulator and Demodulator.
13. FM modulator.

***Any 9 experiments.***



**Government College (A), Rajahmundry**  
*B.ScII Year – Electronics*  
Paper – II Analog circuits and communication  
Year End Examination ( w.e.f. 2009-2010)

**Scheme of Practical Examinations**  
**Practical question paper**

External Marks	: 75M
Internal Marks	: 25M
Total Marks	: 100M

**Scheme of Valuation for Practicals**

	<b>External Marks</b>	<b>Internal Marks</b>
1. Formulae and explanation of symbols	10	03
2. Tabular form with circuit diagrams (whenever necessary)	10	03
3. Circuit connections	05	02
4. Observations	15	03
5. Calculation & Graphs	10	02
6. Result	05	02
7. Procedure & Precautions	05	04
8. Viva-Voce	05	03
9. Record	10	03
<b>Total</b>	<b>75</b>	<b>25</b>

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## Government College:: Rajahmundry

*B.Sc III Year - Electronics*  
Semester – V (w.e.f. 2011 – 2012)

### **PAPER – III Digital Electronics and Microprocessor 8085**

#### **UNIT-I**

Introduction to number systems, Logic gates OR, AND, NOT, X-OR, NAND, NOR gates - Truth tables – Positive and negative logic – Logic families and their characteristics – RTL, DTL, ECL, TTL and CMOS.– Universal building blocks NAND and NOR gates. Laws of Boolean algebra De Morgan's Theorems – Boolean identities – Simplification of Boolean expressions– Karnaugh Maps – Sum of products (SOP) and Product of sums (POS).

#### **UNIT-II**

***Combinational and Sequential circuits:*** Multiplexer and De-Multiplexer – Decoder, Half adder, Full adder and Parallel adder circuits. Flip flops – RS, D, JK and JK Master-Slave (working and truth tables) - Semiconductor memories – Organization and working- Synchronous and asynchronous binary counters, Up/Down counters- Decade counter (7490) - working, truth tables and timing diagrams.

#### Reference Books:

1. Digital Principles and Applications- Malvino & Leach- TMH
2. Digital Fundamentals – F.Loyd & Jain- Pearson Education
3. Modern Digital Electronics- R.P Jain-TMH
4. Fundamentals of Digital Circuits- Anand Kumar- PHI
5. Digital Systems – Rajkamal- Pearson Education
6. Digital Electronic Principles and Integrated Circuits- Maini- Willey India
7. Digital Electronics- Gothman-
8. Digital Electronics –J.W. Bignel & Robert Donova- Thomson Publishers (Indian 5<sup>th</sup> Ed)

**Government College(A) :: Rajahmundry**  
B.Sc III year – Electronics  
Paper – III Digital Electronics and Microprocessors.  
Semester End Examinations

External Marks	: 75M
Internal Marks	: 25M
(Theory	: 15M
Viva-Voce	: 10M)

**External Examination Model Question Paper**

Duration: 3hrs

Max Marks :75

**Section – A**

Essay type questions 4 x 10 = 40 Marks

(One question from each unit with internal choice)

**Section – B**

Short type questions 5 x 3 = 15 Marks

(Four questions from each unit

Total questions: 08

Answer any FIVE questions.)

**Section – C**

Very short questions 10 x 2 = 20 Marks

( Answer all questions)

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**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**V SEMESTER EXAMINATIONS – MODEL PAPER**  
**III B.SC. ELECTRONICS – PAPER III**  
**(W.E.F 2011 – 2012)**  
**DIGITAL ELECTRONICS & MICROPROCESSOR 8085**

3 hrs

Max.Marks:75

**Section – A**

**Answer all questions**

4X10=40

- 1. Reduce the expression**

$$AB + A'C + AB'C(AB+C)$$

Or

Compare the relative merits of CMOS, TTL and ECL logic families.

- 2. Simplify the following Boolean function in product of sums(POS)**

$$F(A,B,C,D) = \Pi(0,1,2,5,8,9,10)$$

Or

**Prepare K-map and obtain minimized expression for the following function**

**and don't care conditions in terms of min terms (SOP)**

$$F(A,B,C,D) = \Sigma_{\text{O-Ring}} m(1,3,7,11,15) + d(0,25)$$

- 3. Describe JK-Flip flop and Master-Slave JK Flip flop.**

Or

**Describe a clocked R-S flip flop.**

- 4. Describe the operation of half adder and full adder.**

Or

**Explain the working of a BCD decade counter.**

**Section – B**

Answer any FIVE questions

5X3=15

1. Show that positive logic AND operation is equivalent to a negative logic OR operation.
2. De Morganise the function  $AB'$
3. Draw a three input NOR gate and write the truth table.
4. How will connect NOR gates to perform the OR function.
5. Write a note on multiplexer .
6. Describe the operation of a S-R latch.
7. What do you understand by sequential and combinational logic circuits.
8. Explain the working types of memory.

**Section – C**

Answer all questions

10X2=20

9. Convert each binary number to decimal.  
110011.11
10. Using 2's compliment perform the subtractions  
110011 – 100111
11. Convert each hexa decimal number to binary.  
a) A14      b) 5C8
12. Add the hexa decimal numbers  
3A2C, 2B10
13. Sketch a circuit to implement the given equation  
 $X = A.B + C.D$
14. Write the procedure to convert from binary to BCD code.
15. What is the word size in the following ROMs.  
32X4
16. An asynchronous counter has four flip flops and the propagation delay of each flip flop is 20 ns. Calculate the maximum counting speed of the counter.
17. What will be the state of the output of encoder 74147 if the inputs are  
 $X_3, X_7, X_5$ ?
18. What will be the maximum number of outputs for a decoder with a 6 – bit data word

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# Government College:: Rajahmundry

*B.Sc III Year - Electronics*  
Semester – VI (w.e.f. 2011 – 2012)

## **PAPER – III Digital Electronics and Microprocessor 8085**

### **UNIT-III**

***Introduction to Microcomputer and Microprocessor:*** Intel 8085 Microprocessor – central processing unit CPU – arithmetic and logic unit ALU – timing and control unit – register organization – address, data and control buses- pin configuration of 8085 and its description. Timing diagrams- Instruction cycle, machine cycle, fetch and execute cycles.

***Instruction set of 8085:*** instruction and data formats- classification of instructions – addressing modes. Assembly language programming examples of 8 and 16 bit addition, subtraction, multiplication and division. Finding the largest and smallest in a data array. Programming examples using stacks and subroutines.

### **UNIT-IV**

***Interfacing peripherals and applications:*** Programmable peripheral interface (8255) - D/A and A/D converters and their interfacing to the Microprocessor. Stepper motor control- seven segment LED.

### **Reference Books:**

1. Microprocessor Architecture and Programming – Ramesh S. Goanker- Penram
2. Introduction to Microprocessor – Aditya. P. Mathur- TMH
3. Microprocessors and Microcontrollers Hardware and Interfacing- Mathivannan- PHI
4. Fundamentals of Microprocessors and Microcontrollers – B. Ram-Dhanpat Rai & Sons.
5. Advanced Microprocessor and Peripherals, Architecture, Programming and Interface- A.K.Ray and K.N. Bhurchandi- TMH
6. Microprocessor Lab Premier- K.A. Krishna Murthy

GOVERNMENT COLLEGE (AUTONOMOUS)::RAJAHMUNDRY

VI SEMESTER EXAMINATIONS – MODEL PAPER

III B.SC. ELECTRONICS – PAPER III

(W.E.F 2011 – 2012)

DIGITAL ELECTRONICS & MICROPROCESSOR 8085

Time : 3 hrs

Max.Marks:75

**Section – A**

**Answer all questions**

**4X10=40**

1. Explain the need to demultiplex the bus  $AD_7 - AD_0$   
Or  
Explain the functions of the ALE and IO/M signals of the 8085 microprocessor.
2. Explain the stack structure of 8085 in detail.  
Or  
Draw and discuss the internal block diagram of 8085.
3. Draw and discuss the read and write cycle timing diagram of 8085  
Or  
Explain the physical address formation in 8085.
4. Draw block diagram of 8255 and explain working each block.  
Or  
Explain about stepper motor and write the program to run it.

**Section – B**

**Answer any five questions**

**5X3=15**

1. Explain the function of each component of a computer.
2. Define opcode and operand and specify the opcode and the operand in the instruction MOV H,L.
3. Specify the function of the address bus and the direction of the information flow on the address bus.
4. What are the functions of program counter and stack pointer 16 bit registers.
5. If the 8085 address 87H and 79H. Specify the contents of the accumulator and the status of the S,Z and CY flags.
6. What operation can be performed by using the instruction ADD B.
7. Explain the process of A/D converter.
8. Classify the instruction set of 8085.



Section - C

Answer any five questions

10X2=20

13. If the memory chip size is 1024X4 bits. How many chips are required to make up 2K (2048) bytes of memory ?

14. Identify the memory locations of that are cleared by the following instructions.

MVI B,00H

LXI H, XX75H

MOV M,B

INX H

MOV M,B

HALT

15. Explain how many times the following loop will be executed

LXI B,0007H

LOOP DCX B

JNZ LOOP

16. Write an ALP to find out multiplication of two 8-bit hexa decimal numbers.

17. Write a program to ADD the two hexa numbers 7A and 46 and to store the sum at memory location XX98H and the flag status at location XX97H.

18. Draw timing diagrams for the following 8085 instructions

MVI M,data

19. What are 8085 systems is Reset all the interrupts including the TRAP are disabled?

20. What is the definition of operating system

21. Specify the stack locations and their contents after the execution of the CALL instruction.

22. Write short note on digital to analog converter

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**Government College:: Rajahmundry**  
***B.Sc III Year - Electronics***  
**PAPER – III Digital Electronics and Microprocessor 8085**

**PRACTICAL PAPER-III**  
**Digital Electronics and Microprocessor Lab**

1. Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR gates (By using 7400-series)
2. Construction of gates using NAND, NOR gates.
3. Construction of Half and Full adders and verifying their truth tables.
4. Operation and verifying truth tables of flip- flops- RS, D, and JK using ICs.
5. Construction of Decade counters (7490).
6. Driving Stepper motor using JK flip-flop
7. Binary addition & subtraction. (8-bit & 16-bit)
8. Multiplication & division.
9. Picking up largest/smallest number.
10. Arranging –ascending/descending order.
11. Decimal addition (DAA) & Subtraction.
12. Time delay generation
13. Interfacing R-2R Ladder network (DAC) (4 bits) to generate waveforms.
14. Interfacing a stepper motor and rotating it clockwise/anti clockwise through a known angle.

Note: Students has to perform any 10 experiments

**Government College (A), Rajahmundry**  
*B.ScIII Year – Electronics*  
Paper – III Digital electronics and Microprocessors 8085  
Year End Examination ( w.e.f. 2009-2010)

**Scheme of Practical Examinations**  
**Practical question paper**

External Marks : 75M  
Internal Marks : 25M  
  
Total Marks : 100M

**Scheme of Valuation for Practicals**

	<b>External Marks</b>	<b>Internal Marks</b>
<b><u>Digital Electronics:</u></b>		
Circuit	15	05
Construction	20	10
Tables	20	05
Verification	<u>20</u>	<u>05</u>
<b>Total</b>	<b>75</b>	<b>25</b>
 <b><u>Micro processers:</u></b>		
Program	30	10
Flow chart	15	05
Execution	<u>30</u>	<u>10</u>
<b>Total</b>	<b>75</b>	<b>25</b>

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# Government College:: Rajahmundry

## *B.Sc III Year - Electronics*

Semester – VI (w.e.f. 2011 – 2012)

### **PAPER – IV EMBEDDED SYSTEM AND APPLICATIONS**

#### **Unit– I (22 Hours)**

##### **The 8051 Microcontroller**

**Introduction to microcontrollers and embedded systems:** Overview and block diagram of 8051. Architecture of 8051. Program counter and memory organisation. Data types and directives, Flag bits and PSW Register, Register banks and Stack; Pin diagram, Port organisation, I/O Programming, Bit manipulation. Interrupts and timer.

#### **Unit–II (23 Hours)**

##### **Addressing modes, instruction set and assembly language programming of 8051**

Addressing modes and accessing memory using various addressing modes. Instruction set: Arithmetic, Logical, Single Bit, Jump, Loop and Call Instructions and their usage. Time Delay Generation and Calculation; Timer/Counter Programming.

**Programming examples:** Addition, multiplication, subtraction, division, arranging a given set of numbers in ascending / descending order, picking the smallest / largest number among a given set of numbers, Accessing a specified port terminal and generating a rectangular waveform.

#### **Reference Books:**

1. The 8051 Microcontrollers and Embedded Systems – By Muhammad Ali Mazidi and Janice Gillispie Mazidi- Pearson Education Asia, 4<sup>th</sup> Reprint, 2002
2. Microcontrollers – Theory and applications by Ajay V. Deshmukh-Tata McGraw-Hill
3. The 8051 Microcontroller - architecture, programming & applications By Kenneth J. Ayala- Penram International Publishing, 1995
4. Programming and Customizing the 8051 Microcontroller – By Myke Predko- TMH, 2003
5. Design with Microcontrollers By - J B Peatman- TMH.
6. The 8051 Microcontroller - Programming, interfacing and applications by Howard Boyet and Ron Katz - (MII) Microprocessors Training Inc.
7. The concepts & features of Microcontrollers by Rajkamal – Wheeler Pub.

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**DEPARTMENT OF ELECTRONICS**  
**ADDITIONAL INPUTS**

**CLASS : III B.Sc.**  
**SEMESTER : V**  
**PAPER : IV**  
**TITLE OF THE PAPER : EMBEDDED SYSTEM AND APPLICATIONS**

TOPICS IN THE UNIVERSITY SYLLABUS	ADDITIONAL TOPICS INCLUDED UNDER AUTONOMOUS SET UP
<p><b>The 8051 Microcontroller</b></p> <p><i>Introduction to microcontrollers and embedded systems:</i> Overview and block diagram of 8051. Architecture of 8051. Program counter and memory organisation. Data types and directives, Flag bits and PSW Register, Register banks and Stack; Pin diagram, Port organisation, I/O Programming, Bit manipulation. Interrupts and timer.</p> <p><b>Addressing modes, instruction set and assembly language programming of 8051</b></p> <p>Addressing modes and accessing memory using various addressing modes. Instruction set: Arithmetic, Logical, Single Bit, Jump, Loop and Call Instructions and their usage. Time Delay Generation and Calculation; Timer/Counter Programming.</p> <p><b>Programming examples:</b> Addition, multiplication, subtraction, division, arranging a given set of numbers in ascending / descending order, picking the smallest / largest number among a given set of numbers, Accessing a specified port terminal and generating a rectangular waveform.</p>	<p>Using keil software write program for all arithmetic programmes</p>

**Government College(A) :: Rajahmundry**  
B.Sc III year – Electronics  
Paper – IV Embedded system and applications

External Marks	: 75M
Internal Marks	: 25M
(Theory	: 15M
Viva-Voce	: 10M)

**External Examination Model Question Paper**

Duration: 3hrs

Max Marks :75

**Section – A**

Essay type questions 4 x 10 = 40 Marks

(One question from each unit with internal choice)

**Section – B**

Short type questions 5 x 3 = 15 Marks

(Four questions from each unit

Total questions: 08

Answer any FIVE questions.)

**Section – C**

Very short questions 10 x 2 = 20 Marks

( Answer all questions)

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GOVERNMENT COLLEGE, RAJAHMUNDRY  
III B.Sc. – ELECTRONICS - VTH SEMESTER  
MODERL QUESTION PAPER  
(W.E.F 2011 – 2012)

PAPER IV – EMBEDDED SYSTEMS AND APPLICATIONS

Time : 3 Hrs

Max Marks: 75

SECTION – A

Answer **all** questions

4x10 = 40

1. a. Explain about architecture of 8051 with block diagram  
or  
b. What are data types and directives in 8051 microcontroller and explain.
2. a. Draw the pin diagram of 8051 microcontroller and explain their function  
Or  
b. Explain in detail about Register banks and stack
3. a. What are addressing modes in 8051 microcontroller and explain with example.  
Or  
b. Explain about time delay generation and calculation with an example.
4. a. Write a program to arrange a given set of numbers in ascending order.  
Or  
b. Write a program to generate a rectangular waveform by accessing port.

SECTION – B

Answer any **Five** questions.

5x3 = 15

5. Write the steps to create a program
6. Explain about program status word register
7. Write about unconditional jump instructions
8. Write a program for addition of two individual bytes
9. How to use port 0 as input
10. What is bit manipulation. Explain with an example
11. When is the OV flag set, explain with example
12. Write a program to clear 16 RAM locations starting at RAM address 0000H.

5

SECTION - C

Answer **All** questions

10x2 = 20M

13. What are the differences between microprocessor and microcontroller.
14. What is the largest hex value that can be moved into 8-bit register. What is the decimal equivalent of the hex value.
15. Write a simple program in which the value of 55H is added 5 times.
16. What are the uses of PUSH instructions in subroutines.
17. Explain about CALL.
18. For an 8051 system of 11.0592 MHz., find how long it takes to execute the instruction DJNZ R<sub>2</sub>, target.
19. What are the parts in delay subroutines
20. What are the contents of SP register upon RESET 8051.
21. Write address modes of a).MOV A, R<sub>4</sub>; b) MOV @R<sub>12</sub>, B.
22. What is POP up?



# **Government College:: Rajahmundry**

## ***B.Sc III Year - Electronics***

Semester – VI syllabus (w.e.f. 2011 – 2012)

### **PAPER – IV EMBEDDED SYSTEM AND APPLICATIONS**

#### **Unit – I**

##### **Interfacing of peripherals to Microcontroller**

8051 interfacing to 8255, Programming the 8255, Interfacing other modes of the 8255, Basics of serial communication, 8051 connection to RS232, 8051 serial communication Programming, modes and protocols

#### **Unit – II**

##### **Applications of Embedded Systems**

Temperature measurement, Interfacing an LCD to the 8051, Interfacing to ADC, sensors, Interfacing a keyboard and generation different types of waveforms. Interfacing stepper motor , interfacing a DAC to the 8051

#### **Reference Books:**

1. The 8051 Microcontrollers and Embedded Systems – By Muhammad Ali Mazidi and Janice Gillispie Mazidi- Pearson Education Asia, 4<sup>th</sup> Reprint, 2002
2. Microcontrollers – Theory and applications by Ajay V. Deshmukh-Tata McGraw-Hill
3. The 8051 Microcontroller - architecture, programming & applications By Kenneth J. Ayala- Penram International Publishing, 1995
4. Programming and Customizing the 8051 Microcontroller – By Myke Predko- TMH, 2003
5. Design with Microcontrollers By - J B Peatman- TMH.
6. The 8051 Microcontroller - Programming, interfacing and applications by Howard Boyet and Ron Katz - (MII) Microprocessors Training Inc.
7. The concepts & features of Microcontrollers by Rajkamal - Wheeler Pub.

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**DEPARTMENT OF ELECTRONICS**  
**ADDITIONAL INPUTS**

**CLASS : III B.Sc.**

**SEMESTER : VI**

**PAPER : IV**

**TITLE OF THE PAPER : EMBEDDED SYSTEMS AND APPLICATIONS**

UNIVERSITYSYLLABUS	Excess Input
<p><b>Interfacing of peripherals to Microcontroller</b></p> <p>8051 interfacing to 8255, Programming the 8255, Interfacing other modes of the 8255, Basics of serial communication,8051 connection to RS232, 8051 serial communication Programming, modes and protocols</p> <p><b>Applications of Embedded Systems</b></p> <p>Temperature measurement, Interfacing an LCD to the 8051, Interfacing to ADC, sensors, Interfacing a keyboard and generation different types of waveforms.</p> <p>Interfacing stepper motor , interfacing a DAC to the 8051</p>	<p>Using keil software write program To write interfacing programmes.</p>

GOVERNMENT COLLEGE, RAJAHMUNDRY  
III B.Sc. – ELECTRONICS – VI-TH SEMESTER  
MODERL QUESTION PAPER  
(W.E.F 2011 – 2012)

PAPER IV – EMBEDDED SYSTEMS AND APPLICATIONS

Time ; 3 Hrs

Max Marks: 75

**SECTION – A**

Answer **all** questions

4x10 = 40M

- 1: a) Mention the differences between synchronous, versus asynchronous Communications  
Or  
b) Explain the importance of different registers in the 8051 serial communication program.
2. a) Describe the function of the pins of a typical LCD  
or  
b) Describe the function of the pins of a typical ADC chip
3. a) How to interface temperature sensor to the 8051  
Or  
b) What are the features of 8255 and explain with pin diagram including mode selector of 8255.
4. a) Explain how a stepper motor interface with 8051 microcontroller  
or  
b) Explain how a key board can be interfaced with 8051 microcontroller.

**SECTION – B**

Answer any **Five** questions.

5x3 = 15M

5. What is the importance of TI Flag
6. Write the importance of RI flag bit
7. Explain about inside MAX 232
8. What are the steps to program ADC808/809
9. Explain how Digital to Analog Converter works
10. Write a program to produce a crude sine wave
11. Define the term memory mapped I/O and describe its application
12. Describe briefly how to expand the I/O ports of the 8051 by connecting to an 8255 chip

SECTION – C

Answer **All** questions

10x2 = 20M

13. Why do you use the MOVX instruction to access the ports of the 8255
14. What are address aliases
15. Describe the handshaking feature of 8255 application in printer interfacing
16. What is the purpose of the ULN 2003 placed between the 8051 and the stepper motor.  
Can we use that for 3A motors
17. Indicate the steps to detect the key press
18. Calculate the number of steps per revolution for a step angle of 7,5 degree
19. For 16x2 LCD, the location of the last character of the line 1 is 8FH (its command code). Show how this value was calculated.
20. What is the difference between the  $V_{CC}$  and  $V_{EE}$  pins in LCD
21. State the absolute minimum number of signals needed to transfer data between two PCs connected. What are those.
22. What is the baud rate if use 'MOV TH1, #-1' to program the baud rate.

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**DEPARTMENT OF ELECTRONICS**  
**Paper – IV : PRACTICALS**

**Embedded Systems and Applications Lab**

**Microcontroller Experiments using 8051 kit**

1. Multiplication of two numbers using MUL command (later using counter method for repeated addition )
2. Division of two numbers using DIV command (later using counter method for repeated subtraction )
3. Pick the smallest number among a given set of numbers
4. Pick the largest number among a given set of numbers
5. Arrange 'n' numbers in ascending order
6. Arrange 'n' numbers in descending order
7. Generate a specified time delay
8. Interface a ADC and a temperature sensor to measure temperature
9. Interface a DAC & Generate a stair case wave form – with step duration and no. of steps as variables
10. Flash a LED connected at a specified out put port terminal
11. Interface a stepper motor – and rotate it clock wise or anti clock wise through given angle steps
12. Using Keil software write a program to pick the smallest among a given set of numbers
13. Using Keil software write a program to pick the largest among a given set of numbers
14. Using Keil software write a program to arrange a given set of numbers in ascending order
15. Using Keil software write a program to arrange a given set of numbers in descending order
16. Using Keil software write a program to generate a rectangular wave form at a specified port terminal

**Government College (A), Rajahmundry**  
*B.ScIII Year – Electronics*  
Paper – IV EMBEDDED SYSTEMS AND APPLICATIONS

**Scheme of Practical Examinations**  
**Practical question paper**

External Marks : 75M  
Internal Marks : 25M  
  
Total Marks : 100M

**Scheme of Valuation for Practicals**

	<b>External Marks</b>	<b>Internal Marks</b>
Program	30	10
Flow chart	15	05
Execution	<u>30</u>	<u>10</u>
<b>Total</b>	<b>75</b>	<b>25</b>

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