Engineering Civil

VISVESVARAYA UFCHNOLOGICAL UNIVERSITY, UNANA SANGAMA, BELGAUM- 590-014



NET'S NAVODAYA INSTITUTE OF TECHNOLOGY RAICHUR – 584 103



A

PROJECT REPORT

ON

* VPERIMENTAL STUDY ON FIBER REINFORCED CONCRETE USING STEE! FIBERS"

Submitted by

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Under the Guidance of

Prof. SHWETHA PATIL

PRINCIPAL MG Navodayo Institute of Technology (1) RAICHUR-584 103

DEPARTMENT OF CIVIL ENGINEERING 2017-2018

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, JNANA SANGAMA, BELGAUM- 590 014

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NAVODAYA INSTITUTE OF TECHNOLOGY RAICHUR - 584 103

DEPARTMENT OF CIVIL ENGINEERING

CERTIFICATE

This is to certify that RAVIRAJ T K (3NA15CV429), SHIVANADA (3NA15CV438), VIJAVAKUMAR (3NA15CV449), ZAHOOR M (3NA15CV449) of B.E. 8th Semester has successfully completed the project work entitled "EXPERIMENTAL STUDY ON FIBER REINFORCED CONCRETE USING STEEL FIBERS" for the partial fulfillment of Bachelor of Engineering in CIVIL ENGINEERING as prescribed by the Visvesvaraya Technological University, Belgaum, during the academic year 2017-18.

Project Guide

Head of the Department

Principal

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Dr M V MALLIKARJUNA

ruf. SHWETHA PATIL

Name of Examiners: 1. Md. Ad!

2. Gragamon ICHU

Dr K RAJESH KUMAR

JESH KUMAR

Signature with date 15106/18

PRINCIPAL 199 Navodaya Institute of Technology (1917) RAICHUR-S84 102

DECLARATION

We hereby declare that, the Project Report entitled, "EXPERIMENTAL STUDY ON FIBER REINFORCED CONCRETE USING STEEL URERS", which is submitted here with for the award of degree of Bachelor of Engmeering in CIVIL ENGINEERING of Visvesvaraya Technological University, Belgaum during the year 2017-18 is the result of the work done by us at Department of CIVIL ENGINEERING, NAVODAYA INSTITUTE OF TECHNOLOGY, RAICHUR. Under the guidance of Prof. SHWETHA PATIL. 1 further declare that, the matter embodied in this project work have not been previously submitted by me for award of any other degree.

Date:

Place: Raichur



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ABSTRACT

Fiber reinforced concrete can offer a convenient, practical and economical method for overcoming micro-cracks and similar type of deficiencies. Since concrete is good in compressive strength and weak in tension hence some measures must be adopted to overcome this deficiency. A number of papers have already been published on the use of steel fibers in concrete and a considerable amount of research has been directed towards studying the various properties of concrete as well as reinforced concrete with the addition of steel fibers. On the other hand advancement in technology enhances not only human comforts but also damages the environment. Use of materials as containers has become popular and safe now, especially to carry foods and liquids. In spite of the inherent advantages, disadvantages exist in its disposal.

From the recent studies it is observed that, recyclable waste materials such as metal caps of soft drink bottles and other food containers are used for this intended purpose with or without admixtures. Since Disposal of these waste materials is essential as these are causing serious problems to the municipal authorities and environmental engineers. Today the construction industry is in need of finding cost effective materials for increasing the strength of concrete structures. Hence an attempt has been made in the present investigations to study the influence of soft drink bottle crown caps as a steel fiber in concrete at a dosage of 1%, 2%, 3% by weight of concrete. Experimental investigation has to be done using M25 mix and tests were carried out as per recommended procedures by relevant codes. The study parameters of this investigation include compressive strength, split tensile strength and Flexural strength of concrete and fiber reinforced concrete. The compressive strength, split tensile strength and flexural strength properties of the fiber reinforced concrete are compared with that of the conventional concrete. The comparison between with and without use of soft drink bottle caps as steel fibers will be studied.

Keywords: Natural aggregate, soft drink bottle caps, fiber reinforced concrete, mix design, workability, Compressive strength, Split tensile strength and Flexural strength.



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CHAPTER 1

INTRODUCTION

1.1 GENERAL

Concrete is a composite material containing cement, water, coarse aggregate and fine aggregate. The resulting material is a stone like structure which is formed by the chemical reaction of the cement and water. Concrete has an extensive role to play in the construction and improvement of our civil engineering and infrastructure development. Its great strength, durability and veracity are the properties that are utilized in construction of Roads, Bridges, Airports, Railways, and Tunnels, Port, Harbor's. and many other infrastructural projects.

Concrete in general weak in tensile strength and strong in compressive strength. This weakness in the concrete makes it to crack under small loads, at the tensile end. These cracks gradually propagate to the compression end of the member and finally, the member breaks. The formation of cracks in the concrete may also occur due to the drying shrinkage. These cracks are basically micro cracks. These cracks increase in size and magnitude as the time elapses and the finally makes the concrete to fail. To increase the tensile strength of concrete many attempts have been made. One of the successful and most commonly used methods is providing steel reinforcement in the form of steel Fibers or steel rods.

Fiber reinforcement gives the solution for this problem so to increase the tensile strength of concrete a technique of introduction of fibers in concrete is being used. These fibers act as crack arrestors and prevent the propagation of the cracks. The main reasons for adding fibers to concrete matrix is to improve the post-cracking response of the concrete, i.e., to improve its energy absorption capacity and apparent ductility, and to provide crack resistance and crack control. Also, it helps to maintain structural integrity and concrete, is material. This concrete is named as Fiber reinforced concrete. Fiber reinforced concrete is a composite material resulting from the addition of steel fibers to the matrix of ordinary concrete mix.

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1.2 OBJECTIVES

The main objectives of the present study are :-

- To study the behavior of the concrete strength when the soft drink bottle caps are added as steel reinforcement using M25 mix and to carry out the tests as per codal provisions.
- Soft drink bottle caps are to be added at a dosage of 1%, 2%, and 3% by weight of concrete. This project study presents a detailed experimental study on fiber reinforced concrete at the age of 7, 14, and 28 days.
- Tests to determine the compressive strength, split tensile strength, flexural strength and compare the results with conventional concrete will be carried out.
- Finally, the influence of the soft drink bottle caps in increasing the compressive strength, and split tensile strength are studied.
- And the change in strength of concrete is studied using Whole bottle cap as steel fiber.



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CHAPTER 3

FIBER REINFORCED CONCRETE

3.1 INTRODUCTION TO FRC

Fiber Reinforcement Concrete (FRC) can be defined as a composite material consisting of mixtures of cement, mortar or concrete and discontinuous. discrete. uniformly dispersed suitable fiber. Fiber reinforced concrete can offer a convenient. practical and economical method for overcoming micro-cracks and similar type of deficiencies

FRC is a concrete containing fibrous material which increases its structural integrity. It contains short discrete fibers that are uniformly distributed and randomly oriented. Fibers include steel fibers, glass fibers, synthetic fibers and natural fibers each of which lend varying properties to the concrete. In addition, the character of fiber-reinforced concrete changes with varying concretes, fiber materials, geometries, distribution, orientation, and densities. The concept of using fibers or as reinforcement is not new. Fibers have been used as reinforcement since ancient times. Historically, horse hair was used in mortar and straw in mud bricks. In the 1900s, asbestos fibers were used in concrete. In the 1950s, the concept of composite material came into being and fiber-reinforced concrete was one of the topics of interest. Once the health risks associated with asbestos were discovered, there was a need to find a replacement for the substance in concrete and other building materials. By the 1960s, steel, glass (GFRC), and synthetic fibers such as polypropylene fibers were used in concrete. Research into new fiber-reinforced concretes continues today.

3.2 DIFFERENT TYPES OFFIBERS USED

Glass Fiber Reinforced Concrete (GFRC): Glass fiber reinforced concrete has been successfully used since the last 25 years for concrete reinforcement, in addition to steel. GFRC is being manufactured into big panels with a simple configuration or into intricate shapes by using special techniques. Originally, GFRC components were anchored directly with the buildings by the use of metal studs. It was revealed that GFRC shifts considerably due to which the direct anchors are being replaced by slip anchors. Several structures use GFRC for dissimilar facing like ceramic tiles, bricks, and architectural

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purposes.

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CHAPTER 4

MATERIALS AND MATERIAL PROPERTIES

4.1 MATERIALS

Cement

The cement used is Ordinary Portland cement (OPC) of grade 53, the standard specific gravity of the OPC is 3.15 Fineness, STD Consistency. Initial and Final Setting time are to be found.

Fine Aggregate

Fine aggregate used for this entire investigation for concrete is river sand. The fineness modulus, specific gravity and bulk density are to be found.

Coarse Aggregate

Aggregates locally available are used, crushed hard granite stone of size 20 mm and down size is used for concrete. The fineness modulus, bulk density, specific gravity, and absorption are found.

Water

Water free from suspended solids and organic and inorganic salts is used.

Steel Fibers

Soft drink bottle crown caps are used as fibers; the fibers are collected from nearby hotels, bakeries and other sources. The fibers used in this experiment are:



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5.3 MIX DESIGN

Mix Design for M25 Grade Concrete as Per I.S 10262: 2009 Guidelines

A. Design stipulations for proportioning

1	Grade designation	:	M 25
2.	Type of cement	:	OPC 53 grade confirming to 1.S 8112 : 1982
1	Maximum nominal size of aggregates	;	20 mm down
4	Minimum cement content	:	320 kg/m ³ (From Table 5 of IS 456-2000)
5	Maximum water cement ratio	:	0.45 (From Table 5 of 1S 456-2000)
6	Workability	:	100 mm (slump)
7	Exposure condition	:	Mild
8	Degree of supervision	:	Good
9	. Type of aggregate	:	Crushed angular aggregate
1	0. Maximum cement content	:	450 kg/m ³

B. Test data for materials

Des	· D				Page 18
9. Sieve analysis of fine aggregate	;	1.S sieve (mm)	% passing	Standard range of values (%)	Continuing AICHUR-584 103 to Grading zone II of
14 Pr 15		2.36	0		PRINCIPAL CIS
2 3		4.75	0		Jalenery .
STE OF TRO		10	5		
mm down)	1	12.5	15	1.8.383	1970
8. Sieve analysis of coarse aggregate (20		16	40	Confirming t	o Table 2 of
		20	100		
		I.S sieve (mm)	% passing		
7. Free (surface) moisture of fine agg	:	Nil			
6. Free (surface) moisture of coarse agg	:	Nil			
5. Water absorption of fine aggregate	:	1.0%			
4. Water absorption of coarse aggregate	:	0.5%			
3. Specific gravity of fine aggregate	:	2.74			
2. Specific gravity of coarse aggregate	:	2.74			
1. Specific gravity of cement	:	3.15			

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CONCLUSION

The conclusions that can be drawn from this experimental results are as follows:

- Addition of steel fibres increases flexural and split tensile strength of concrete to larger extent
- In flexure the specimen with soft drink bottle caps as waste material was found to be good. By the addition of scrap steel fibres, the flexure strength was found to increase to a greater extent than that of the conventional concrete.
- The various percentage of fibre at a dosage of 1%, 2%, and 3%, the compression. tensile and flexural strength has been altered compared to normal concrete.
- The percentage increase in tensile strength of steel scrap fibre reinforced concrete is more as compared to its compressive strength.
- The results indicated that the compressive, split-tensile and flexural strength of fibre reinforced concrete has been increased when compared to the conventional concrete at 2% addition of steel fiber reinforced concrete (SFRC).
- Since, bottle caps of soft drinks are easily available, they can be easily collected and used as fibers and the compressive strength can be increased to it some extent

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CONCRETE AND HIGHWAY MATERIALS LABORATORY

Subject Code	: 10CVL78	IA Marks	:25	
No. of Practical Hours/Week	: 03	Exam Hours	:03	
Total No. of Practical Hours	: 42	Exam Marks	: 50	

PART - A

CEMENT: Normal Consistency, Setting time, Soundness by Autoclave method, Compression strength test and Air permeability test for fineness, Specific gravity of cement.

FRESH CONCRETE: Workability - slump, Compaction factor and Vee Bee tests.

HARDENED CONCRETE: Compression strength and Split tensile tests. Test on flexural strength of RCC beams, Permeability of concrete.

PART - B

SOIL: Density of Soil by Sand replacement method, CBR Text.

AGGREGATES: Crushing, abrasion, impact and Shape tests (Flaky, Elongation, Angularity number) Specific gravity and water absorption.

BITUMINOUS MATERIALS AND MIXES: Specific Gravity, Penetration, Ductility, Softening point, Flash and fire point, Viscosity, proportioning of aggregate mixes by Rothfutch Method, Marshall Stability tests.

REFERENCE BOOK:

.....

1. Relevant IS Codes and IRC Codes.

- Highway Material Testing Laboratory Manual by Khanna S K and Justo, CEG Nemi Chand & Bros.
- 3. M. L. Gambhir : Concrete Manual : Dhanpat Rai & sons New Delhi.



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VIII -SEMESTER

ADVANCED CONCRETE TECHNOLOGY

Subject Code	: 10CV81	IA Marks	:25
No. of Lecture Hours/Week	: 04	Exam Hours	:03
Total No. of Lecture Hours	: 52	Exam Marks	:100

PART

UNIT - 1

Importance of Bogue's compounds, Structure of a Hydrated Cement Paste, Volume of hydrated product, porosity of paste and concrete, transition Zone, Elastic Modulus, factors affecting strength and elasticity of concrete, Rheology of concrete in terms of Bingham's parameter.

7 Hour

UNIT - 2

CHEMICAL ADMIXTURES- Mechanism of chemical admixture, Plasticizers and super Plasticizers and their effect on concrete property in fresh and hardened state, Marsh cone test for optimum dosage of super plasticizer, retarder, accelerator, Air-entraining admixtures, new generation superplasticiser.

MINERAL ADMIXTURE-Fly ash, Silica fume, GCBS, and their effect on concrete property in fresh state and hardened state.

6 Hours

UNIT - 3

MIX DESIGN - Factors affecting mix design, design of concrete mix by BIS method using IS10262 and current American (ACI)/ British (BS) methods. Provisions in revised IS10262-2004. 6 Hours

UNIT - 4

DURABILITY OF CONCRETE - Introduction, Permeability of concrete, chemical attack, acid attack, efflorescence, Corrosion in concrete. Thermal conductivity, thermal diffusivity, specific heat. Alkali Aggregate Reaction, IS456-2000 requirement for durability.

7 Hours

PART - B

UNIT - 5 (1)) RMC concrete - manufacture, transporting, placing, precautions, Methods of concreting- Pumping, under water concreting, shotcrete, High volume fly ash concrete concept, properties, typical mix

Self compacting concrete concept, materials, tests, properties, application and Typical mix.

6 Hours

UNIT - 6

Fiber reinforced concrete - Fibers types and properties, Behavior of FRC in compression, tension including pre-cracking stage and post-cracking stages, behavior in flexure and shear, Ferro cement - materials, techniques of manufacture, properties and application

7 Hours

UNIT - 7

Light weight concrete-materials properties and types. Typical light weight concrete mix High density concrete and high performance concrete-materials, properties and applications, typical mix. 6 Hours

UNIT - 8

Test on Hardened concrete-Effect of end condition of specimen, capping, H/D ratio, rate of loading, moisture condition. Compression, tension and flexure tests. Tests on composition of hardened concrete-cement content, original w/c ratio. NDT tests concepts-Rebound hammer, pulse velocity



7 Hours

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ENVIRONMENTAL ENGINEERING LABORATORY

Subject Code	10CVL77	IA Marks	: 25
No. of Practical Hours/Week	: 03	Exam Hours	: 03
Total No. of Practical Hours	: 42	Exam Marks	: 50

- 1. Determination of Solids in Sewage: Total Solids, Suspended Solids, Dissolved Solids, Volatile Solids, Fixed Solids, Settleable Solids.
- 2. Electrical conductivity. Determination of Chlorides and Sulphates.
- 3. Determination of Alkalinity, Acidity and pH.
- 4. Determination of Calcium, Magnesium and Total Hardness.
- 5. Determination of Dissolved Oxygen. Determination of BOD.
- 6. Determination of COD.
- 7. Determination of percentage of available chlorine in bleaching powder, Residual Chlorine and Chlorine Demand.
- 8. Jar Test for Optimum Dosage of Alum, Turbidity determination by Nephelometer.
- 9. Determination of Iron. Phenanthroline method.
- 10. Determination of Fluorides SPANDS Method.
- 11. MPN Determination
- 12. Determination Nitrates by spectrophotometer.
- 13. Determination of sodium and potassium by flame photometer.

REFERENCES

- 1. Manual of Water and Wastewater Analysis NEERI Publication.
- Standard Methods for Examination of Water and Wastewater (1995), American Publication – Association, Water P ollution Control Federation, American Water Works Association, Washington DC.
- 3. IS Standards: 2490-1974, 3360-1974, 3307-1974.
- 4. Chemistry for Environment Engineering. Sawyer and Mc Carthy,



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2. **Relavent IRC Publications**

3. Transportation Engineering and Planning- Papa Coastas andPrevendors PHI, New Delhi.



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ESTIMATION & VALUATION

Subject Code	: 10CV73	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

ESTIMATION: Study of various drawings with estimates, important terms, units of measurement, abstract Methods of taking out quantities and cost - center line method, long and short wall method or crossing method. Preparation of detailed and abstract estimates for the following Civil Engineering works - Buildings - RCC framed structur es with flat, sloped RCC roofs with all Building components.

16 Hours

PART - B

ESTIMATE: Different type of estimates, approximate methods of estimating buildings, cost of materials. Estimation of wooden joineries such as doors, windows & ventilators.

5 Hours

ESTIMATES: Steel truss (Fink and Howe truss), manhole and septic tanks, RCC Culverts. 6 Hours

SPECIFICATIONS: Definition of specifications, objective of writing specifications, essentials in specifications, general and detail specifications of common item of works in buildings.

5 Hours

PART - C

RATE ANALYSIS: Definition and purpose. Working out quantities and rates for the following standard items of works - earth work in different types of soils, cement concrete of different mixes, bricks and stone masonry, flooring, plastering, RCC works, centering and form work for different RCC items, wood and steel works for doors, windows and ventilators.

6 Hours

MEASUREMENT OF EARTHWORK FOR ROADS: Methods for computation of earthwork cross sections - mid sec tion formula or average

end area or mean sectional area, trapezoidal & prismoidal formula with and without cross slopes. 6 Hours

CONTRACTS: Types of contract - essentials of contract agreeme nt - legal aspects, penal provisions on breach of contract. Definition of the terms - Tender, earnest money deposit, security deposit, tender forms, documents and types. Acceptance of contract documents. Termination of contract, completion certificate, quality control, right of contractor, refund of deposit. Administrative approval – Technical sanction. Nomin al muster roll, measurement books – procedure for recording and che cking measurements - preparation of bills.

Valuation- Definitions of various terms, method of valuation, Freehold & Leasehold properties, Sinking fund, depreciation and method of estimating depreciation, Outgoings.

8 Hours

REFERENCE BOOKS:

- 1.
- 2.
- Estimating & Costing, B. N. Dutta, Chand Publisher Quantity Surveying- P.L. Basin S. Chand : New Delhi, Estimating & Specification S.C. Rangwala :: Charotar publishing house, Anand. 3.
- Text book of Estimating & Costing- G.S. Birde, Dhanpath Rai and sons : New Delhi. 4.
- A text book on Estimating, Costing and Accounts- D.D. Kohli and R.C. Kohli S. 5.

PAIND W Delhi.

Estimates, B. S. Patil, University Press, 2006.



HIGHWAY GEOMETRIC DESIGN

Subject Code	: 10CV755	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT - 1

INTRODUCTION: Geometric Control factors like Topography -design speed – design vehicle – Traffic – Capacity – volum e – environment and other factors as per IRC and AASHTO standards and specifications- PCU concept – factors controlling PCU for different des ign purpose

6 Hours

UNIT - 2

CROSS SECTIONAL ELEMENTS: Pavement surface characteristics – friction – skid resistance – pavement unevenness - light reflecting characteristics – camber – objectives – types of ca mber – methods of providing cambers in the field – problems – carriag e way – kerb – median – shoulder – foot path – parking lanes – service road s – cycle tracks – Driveways – Right of way – Factors influencing rig ht of way – Design of Road humps as per latest I RC provisions.

10 Hours

UNIT - 3

SIGHT DISTANCE: Importants, types, Side distance at uncontrolled intersection, derivation, factors affecting side distance, IRC, AASHTO standards, problems on above.

6 Hours

UNIT - 4

HORIZONTAL ALIGNMENT: Definition, Checking the stability of vehicle, while moving on horizontal curve, Super elevation, Ruling minimum and maximum radius, Assumptions – problems – meth od of providing super elevation for different curves – Extra widening of pavement on curves – objectives – Mechanical widening – psychological wi dening – Transition curve – objectives – Ideal requirements – Types of transition curve – Method of evaluating length of transition curve – Setting the transition curve in the field, set back distance on horizontal curve and problems on above

8 Hours

PART - B

UNIT - 5

VERTICAL ALIGNMENT: Gradient – Types of gradient – Design criteria of summit and valley curve – Design of vertical cur ves based on SSD – OSD

- Night visibility considerations - Design standard s for hilly roads - problems on the above. 5 Hours

UNIT - 6

INTERSECTION DESIGN: Principle – Atgrade and Grade separated junctions – Types – channelization – Features of ch annelising Island – median opening – Gap in median at junction. 6 Hours

UNIT - 7

ROTARY INTERSECTION: Elements – Advantages – Disadvantages – Design guide lines – problem on the above – Grade s eparated intersection – Three legged inter section – Diamond inter change – Half clover leaf – clover leaf- Advantages- Disadvantages only 6 Hours

UNIT - 8

HIGHWAY DRAINAGE: Importance – sub surface drainage – surface drainage – Design of road side drives – Hydrologi cal – Hydraulical considerations and design of filter media, problems on above.

5 Hours

TEXT BOOKS:

- 1. Principle and practice of Highway Engineering- L R KADIYALI & N B LAL : Khanna publications
- 2. Highway Engineering Khanna S K & Justo, Nemchand & Bros.
- 3. Highway Engineering by Srinivas Kumar.

REFERENCE BOOKS

1. Highway Engineering- Kadiyali L R : Khanna publications



GEOTECHNICAL ENGINEERING LABORATORY

Subject Code		: 10CVL67	IA Marks	: 25		
No.	of	Practical	: 03	Exam Hours	: 03	
Hours/	Week					
Total N	lo. of Prac	tical Hours	: 42	Exam Marks	: 50	

1. Identification of gravel type, sand type, silt type and clay types soils, Tests for determination of Specific gravity (for coarse and fine grained soils) and Water content (Oven drying method).

3 Hours

3

2. Grain size analysis of soil sample (sieve analysis).

Hours

3. In situ density by core cutter and sand replacement methods.

3 Hours

4. Consistency Limits - Liquid Limit (Casagrande and Cone Penetration Methods), plastic limit and shrinkage limit.

3 Hours

5. Standard Proctor Compaction Test and Modified Proctor Compaction Test.

.

Hours

3

- Coefficient of permeability by constant head and variable head methods.
 3 Hours
- 7. Strength Tests
 - a. Unconfined Compression Test
 - b. Direct Shear Test 3 Hours
 - c. Triaxial Compression Test (undrained) 3 Hours
- Consolidation Test- Determination of compression index and coefficient consolidation.

3 Hours

- 9. Laboratory vane shear test 3 Hours
- 10. Determination of CBR value 3 Hours
- 11. a) Demonstration of miscellaneous equipments such as Augers, Samplers, Rapid Moisture meter, Proctor's needle.
 - b) Demonstration of Hydrometer Test.
 - c) Demonstration of Free Swell Index and Swell Pressure Test
 3 Demonstration of detormination of relative density of sands. Hours

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GEOTECHNICAL ENGINEERING – I

Subject Code	: 10CV54	IA Marks	: 25
No. of Lecture Hours/Week	: 04	Exam Hours	: 03
Total No. of Lecture Hours	: 52	Exam Marks	: 100

PART - A

UNIT-1

UNIT - 2

INTRODUCTION: History of soil mechanics, Definition, origin and formation of soil. Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Water content, Specific Gravity of soil solids and soil mass, Densities and Unit weights - Bulk, Dry, Saturated & Submerged and their inter relationships.

6 Hours

INDEX PROPERTIES OF SOIL AND THEIR DETERMINATION:

Index Properties of soil- Water content, Specific Gravity, Particle size distribution, Relative Density, Consistency limits and indices, in-situ density, Activity of Clay, Laboratory methods of determination of index properties of soil: Water content (Oven Drying method & Rapid Moisture method), Specific gravity of soil solids (Pycnometer and density bottle method), Particle size distribution (Sieve analysis and Hydrometer analysis only), Liquid Limit- (Casagrande and Cone penetration methods), Plastic limit and shrinkage limit.

7 Hours

UNIT - 3

CLASSIFICATION OF SOILS: Purpose of soil classification, Particle size classification – MIT classification and IS classification, Textural classification. IS classification - Plasticity chart and its importance, Field identification of soils.

CLAY MINERALOGY AND SOIL STUCTURE: Single grained, honey combed, flocculent and dispersed structures, Valence bonds, Soil-Water system, Electrical diffuse double layer, adsorbed water, base-exchange capacity, Isomorphous substitution. Common clay minerals in soil and their structures- Kaolinite, Illite and Montmorillonite.

8 Hours

UNIT - 4

FLOW OF WATER THROUGH SOILS: Darcy's law- assumption and validity, coefficient of permeability and its determination (laboratory and field), factors affecting permeability, permeability of stratified soils, Seepage

velocity, Superficial velocity and coefficient of percolation, quick sand phenomena, Capillary Phenomena.

PART - B

UNIT - 5

SHEAR STRENGTH OF SOIL: Concept of shear strength, Mohr-coulomb theory, conventional and modified failure envelops, Effective stress concept-total stress, effective stress and Neutral stress, Concept of pore pressure, Total and effective shear strength parameters, factors affecting shear strength of soils, Sensitivity and Thixotropy of clay.

7 Hours

6 Hours

UNIT - 6

COMPACTION OF SOIL: Definition, Principle of compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control – compactive effort & method, lift thickness and number of passes, Proctor's needle, Compacting equipment.

6 Hours

UNIT - 7

CONSOLIDATION OF SOIL: Definition, Mass-spring analogy, Terzaghi's one dimensional consolidation and limitations (no derivation), Normally consolidated, under

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consolidated and over consolidated soils, pre-consolidation pressure and its determination by Casagrande's method. Consolidation characteristics of soil (Cc, av, mv and Cv).

UNIT-8

DETERMINATION OF SHEAR STRENGTH AND CONSOLIDATION OF SOIL: Measurement of shear parameters- Direct shear test, unconfined compression test, Triaxial compression test and vane shear test, Test under different drainage conditions.

Laboratory one dimensional consolidation test, Determination of consolidation characteristics of soils-compression index and coefficient of consolidation (square root of time fitting method, logarithmic time fitting method).

6 Hours

TEXT BOOKS:

- Soil Mechanics and Foundation Engg.- Punmia B.C. (2005), 16th 1. Edition Laxmi Publications Co., New Delhi.
- Principles of Soil Mechanics and Foundation Engineering-Murthy V.N.S. (1996), 4th 2. Edition, UBS Publishers and Distributors, New Delhi.

Geotechnical Engineering; Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India

REFERENCES BOOKS:

- Foundation Analysis and Design- Bowles J.E. (1996), 5th Edition, McGraw Hill Pub. 1. Co. New York.
- 2. Soil Engineering in Theory and Practice- Alam Singh and Chowdhary G.R. (1994), CBS Publishers and Distributors Ltd., New Delhi.
- 3. Basic and Applied Soil Mechanics- Gopal Ranjan and Rao A.S.R. (2000), New Age International (P) Ltd., Newe Delhi.
- 4. Geotechnical Engineering- Donold P Coduto Phi Learning Private Limited, New Delhi
- 5. Geotechnical Engineering- Shashi K. Gulathi & Manoj Datta. (2009), " Tata Mc Graw Hill.
- 6. Text Book of Geotechnical Engineering- Iqbal H. Khan (2005),, 2nd Edition, PHI, India.
- 7. Numerical Problems, Examples and objective questions in Geotechnical Engineering- Narasimha Rao A. V. & Venkatrahmaiah C. (2000), Universities Press., Hyderabad.



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CONCRETE TECHNOLOGY (COMMON TO CV/TR/CTM)

Sub Code	:	10 CV 42	1A Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

PART - A

Unit- 1 19

ement, Chemical composition, hydration of cement, Types of cement, manufacture of OPC by wet and dry, process (flow charts only) Testing of cement - Field testing, Fineness by sieve test and Blaine's air permeability test, Normal consistency, testing time, soundness, Compression strength of cement and grades of cement, Quality of mixing water. -7 Hours

Unit-2

Fine aggregate - grading, analysis, Specify gravity, bulking, moisture content, deleterious materials. Coarse aggregate – Importanc e of size, shape and texture.Grading of aggregates - Sieve analysis, specific gravity, Flakiness and elongation index, crushing, impact and abrasion tests. - 6 Hours

Unit-3

Workability - factors affecting workability, Measurement of workability - slump, flow tests, Compaction factor and vee-bee consistometer tests, Segregation and bleeding, Process of manufactures of concrete : Batching, Mixing, Transporting, Placing, Compaction, Curing. -7 Hours

Unit-4

Chemical admixtures - plasticizers, accelerators, retarders and air entraining agents, Mineral admixtures - Fly ash, Silica fumes and rice husk ash.

-6 Hours

Part-B

Unit-5

Factors affecting strength, w/c ratio, gel/space ratio, maturity concept, Effect of aggregate properties, relation between compressive strength, and tensile strength, bond strength, modulus of rupture, Accelerated curing, aggregate - cement bond strength, Testing of hardened concrete - compressive strength, split tensile strength, Flexural strength, factors influencing strength test results. - 6Hours

Unit-6

Elasticity - Relation between modulus of elasticity and Strength, factors affecting modulus of elasticity, Poisson, Ratio, Shrinkage - plastic shrinkage and drying shrinkage, Factors affecting shrinkage, Creep - Measurement of creep, factors affecting creep, effect of creep, - 7 Hours Unit-7

Durability - definition, significance, permeability, Sulphate attack, Chloride attack, carbonation, freezing and thawing, Factors contributing to cracks in concrete - plastic shrinkage, settlement cracks, construction joints, Thermal expansion, transition zone, structural design deficiencies, - 6 Hours

Unit-8

Concept of Concrete Mix design, variables in proportioning, exposure conditions, Procedure of mix design as per IS 10262-1982, Numerical examples of Mix Design - 7 Hours TEXT BOOKS:

1. "Concrete Technology" - Theory and Practice, M.S.Shetty, S.Chand and Company, New Delhi, 2002



PRINCIPAL 76 102

Navodaya Institute of Technology (++++) RAICHUR-584 103

BASIC MATERIAL TESTING LAB

(COMMON TO CV/TR) 25 IA Marks : 03 10 CVL 37 Exam Hours : Sub Code 50 Exam Marks : 03 :

Hrs/ Week 42

Total Hrs. Compression test of Mild Steel, Cast iron and Wood.

Tension test on Mild steel and HYSD bars. 1.

- Torsion test on Mild Steel circular sections 4. Bending Test on Wood Under two point loading

- Hardness tests on ferrous and non-ferrous metals Brinell's, Rockwell and Vicker's 8. Test on Bricks and Tiles
- Tests on Fine aggregates Moisture content, Specif ic gravity, Bulk density, Sieve analysis 10. Tests on Coarse aggregates – Absorption, Moisture c ontent, specific gravity, Bulk density and
- 11. Demonstration of Strain gauges and Strain indicators

NOTE: All tests to be carried out as per relevant BIS Codes

REFERENCE BOOKS:

- Testing of Engineering Materials, Davis, Troxell and Hawk, International Student Edition -Mechanical Testing of Materials", Fenner, George Newnes Ltd. London. "Experimental Strength of Materials", Holes K A, English Universities Press Ltd. London. 1.
- 2.
- 3.
- "Testing of Metallic Materials", Suryanarayana A K, Prentice Hall of India Pvt. Ltd. New "Material Testing Laboratory Manual", Kukreja C B- Kishore K. Ravi Chawla Standard 4.
- **Relevant IS Codes**
- 5.
- Concrete Manual, M.L.Gambhir –Dhanpat Rai & Sons- New Delhi. 6.

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Group Experiments: Tension, Compression Torsion and Bending Tests Individual

Experiments: Remaining tests Two questions are to be set - one from group experiments and the other as individual experiment.



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Computer Science Engineering

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 8th edition, Wiley India, 2009. (Listed topics only from Chapters 1 to 12, 17, 21)

Reference Books:

- 1. D.M Dhamdhere: Operating systems A concept based Approach, 2nd Edition, Tata McGraw-Hill, 2002.
- 2. P.C.P. Bhatt: Introduction to Operating Systems: Concepts and Practice, 2nd Edition, PHI, 2008.
- 3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 1990.

DATABASE MANAGEMENT SYSTEMS

Subject Code:	10CS54	I.A. M	arks :	25
Hours/Week :	04	Exam	Hours:	03
Total Hours :	52	Exam	Marks:	100

PART - A

UNIT - 1

6 Hours

Introduction: Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS.

Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.

UNIT - 2

6 Hours

Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

UNIT-3

8 Hours Relational Model and Relational Algebra : Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update



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10. Write a C/C++ program to set up a real-time clock interval timer using the alarm API.

List of Experiments for Compiler Design: Design, develop, and execute the following programs.

- 11. Write a C program to implement the syntax-directed definition of "if E then S1" and "if E then S1 else S2". (Refer Fig. 8.23 in the text book prescribed for 06CS62 Compiler Design, Alfred V Aho, Ravi Sethi, and Jeffrey D Ullman: Compilers- Principles, Techniques and Tools, 2nd Edition, Pearson Education, 2007).
- 12. Write a yacc program that accepts a regular expression as input and produce its parse tree as output.

Note: In the examination each student picks one question from the lot of all 12 questions.

VII SEMESTER

OBJECT-ORIENTED MODELING AND DESIGN

Subject Code: 10CS71	I.A. Marks : 25
Hours/Week : 04	Exam Hours: 03
Total Hours : 52	Exam Marks: 100

PART - A

UNIT - 1

7 Hours Introduction, Modeling Concepts, class Modeling: What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history

Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.



UNIT - 2

6 Hours

Advanced Class Modeling, State Modeling: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips.

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State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips.

UNIT - 3

6 Hours

Advanced State Modeling, Interaction Modeling: Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips.

Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.

UNIT - 4

UNIT-5

7 Hours

Process Overview, System Conception, Domain Analysis: Process Overview: Development stages; Development life cycle.

System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement.

Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.

PART - B

7 Hours

Application Analysis, System Design: Application Analysis: Application interaction model; Application class model; Application state model; Adding operations.

Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

UNIT - 6

7 Hours

Class Design, Implementation Modeling, Legacy Systems: Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example.

Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.

Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

UNIT-7

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6 Hours

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SOFTWARE ENGINEERING

Subject Code: 10IS51 Hours/Week : 04 **Total Hours : 52**

I.A. Marks : 25 Exam Hours: 03 Exam Marks: 100

PART - A

UNIT - 1

6 Hours

Overview: Introduction: FAQ's about software engineering, Professional and ethical responsibility.

Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems.

UNIT - 2

6 Hours

Critical Systems, Software Processes: Critical Systems: A simple safetycritical system; System dependability; Availability and reliability. Software Processes: Models, Process iteration, Process activities; The Rational Unified Process; Computer Aided Software Engineering.

UNIT - 3

7 Hours

Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; The software requirements document.

Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.

UNIT - 47 Hours System models, Project Management: System Models: Context models; Behavioral models; Data models; Object models; Structured methods. Project Management: Management activities; Project planning; Project scheduling; Risk management

PART - B

UNIT - 57 Hours Software Design: Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles.

Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution.

UNIT-6 6 Hours Development: Rapid Software Development: Agile methods; Extreme programming; Rapid application development.

Software Evolution: Program evolution dynamics; Software maintenance; Evolution processes; Legacy system evolution,

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UNIT - 7

7 Hours

Verification and Validation: Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods.

Software testing: System testing; Component testing; Test case design; Test automation.

UNIT – 8

6 Hours

Management: Managing People: Selecting staff; Motivating people; Managing people; The People Capability Maturity Model.

Software Cost Estimation: Productivity; Estimation techniques; Algorithmic cost modeling, Project duration and staffing.

Text Books:

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1. Ian Sommerville: Software Engineering, 8th Edition, Pearson Education, 2007. (Chapters-: 1, 2, 3, 4, 5, 6, 7, 8, 11, 14, 17, 21, 22, 23, 25, 26)

Reference Books:

1. Roger.S.Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill, 2007.

Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India, 2009

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PROGRAMMING THE WEB

Subject Code: 10CS73 Marks : 25 Hours/Week: 04 03 Total Hours : 52 Marks: 100

UNIT - 1

Fundamentals of Web, XHTML - 1: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links.

UNIT - 2

XHTML - 2, CSS: XHTML (continued): Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and <div> tags, Conflict resolution.

UNIT - 3

Javascript: Overview of Javascript, Object orientation and Javascript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.

UNIT - 4

STITU

Javascript and HTML Documents, Dynamic Documents with Javascript: The Javascript execution environment, The Document Object Model, Element access in Javascript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification.

Introduction to dynamic documents, Positioning elements, Moving elements, Bement visibility, Changing colors and fonts, Dynamic content, Stacking elements, all ating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.

UNIT - 5

PART - B

6 Hours

XML: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

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I.A.

Hours: Exam Exam

6 Hours

6 Hours

7 Hours

7 Hours

UNIT – 6

7 Hours

Perl, CGI Programming: Origins and uses of Perl, Scalars and their operations, Assignment statements and simple input and output, Control statements, Fundamentals of arrays, Hashes, References, Functions, Pattern matching, File input and output; Examples.

The Common Gateway Interface; CGI linkage; Query string format; CGI.pm module; A survey example; Cookies. Database access with Perl and MySQL

UNIT - 7

6 Hours

PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL.

UNIT – 8

7 Hours

Ruby, Rails: Origins and uses of Ruby, Scalar types and their operations, Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterators, Pattern matching.

Overview of Rails, Document requests, Processing forms, Rails applications with Databases, Layouts.

Text Books:

- 1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson Education, 2008.
 - (Listed topics only from Chapters 1 to 9, 11 to 15)

Reference Books:

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- 1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson Education, 2004.
- 2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2007.
 - Xue Bai et al: The web Warrior Guide to Web Programming, Cengage Learning, 2003.

RAICHUR-584 103

Subject Code:	10CS53	I.A. M	arks :	25
Hours/Week :	04	Exam	Hours:	03
Total Hours :	52	Exam	Marks:	100

PART - A

UNIT - 1

Introduction to Operating Systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments.Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot.

UNIT - 2

Process Management: Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling.

UNIT - 3

Process Synchronization : Synchronization: The Critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.

UNIT - 4

Deadlocks: Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

PART - B

7 Hours

7 Hours

mory Management: Memory Management Strategies: Background; Swapping; Configuous memory allocation; Paging; Structure of page table; Segmentation. Virtual Menhany Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

UNIT - 6

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File System, Implementation of File System: File System: File concept;

Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management

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6 Hours

6 Hours

7 Hours

7 Hours

UNIT – 7

6 Hours

Secondary Storage Structures, Protection : Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability-Based systems.

UNIT - 8

6 Hours

Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory management; File systems, Input and output; Inter-process communication.

Text Books:

 Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 8th edition, Wiley India, 2009.

(Listed topics only from Chapters 1 to 12, 17, 21)

Reference Books:

- D.M Dhamdhere: Operating systems A concept based Approach, 2nd Edition, Tata McGraw- Hill, 2002.
- P.C.P. Bhatt: Introduction to Operating Systems: Concepts and Practice, 2nd Edition, PHI, 2008.

M Deital: Operating systems, 3rd Edition, Pearson Education, 1990.



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COMPUTER ORGANIZATION

Subject Code: 10CS46

Hours/Week : 04

Total Hours : 52

PART - A

UNIT - 1

6 Hours

I.A. Marks : 25

Exam Hours: 03

Exam Marks: 100

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance - Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement, Historical Perspective

Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing,

UNIT - 2

7 Hours

Machine Instructions and Programs contd.: Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions

UNIT - 3

6 Hours

Input/Output Organization: Accessing I/O Devices, Interrupts - Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses

UNIT-4

UNIT-5

Input/Output Organization contd.: Interface Circuits, Standard I/O Interfaces - PCI Bus, SCSI Bus, USB

PART - B

7 Hours

Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories - Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage

UNIT-6

UNITA 7

7 Hours

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations

6 Hours

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Microprogrammed Control

Navodaya Institute of Technology (NIT) KAIGHUR-584 103

7 Hours

UNIT - 8

6 Hours

Multicores, Multiprocessors, and Clusters: Performance, The Power Wall,

The Switch from Uniprocessors to Multiprocessors, Amdahl's Law, Shared Memory Multiprocessors, Clusters and other Message Passing Multiprocessors, Hardware Multithreading, SISD, IMD, SIMD, SPMD, and Vector.

Text Books:

- Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002. (Listed topics only from Chapters 1, 2, 4, 5, 6, 7)
- David A. Patterson, John L. Hennessy: Computer Organization and Design The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier, 2009. (Listed topics only)

Reference Books:

- 1. William Stallings: Computer Organization & Architecture, 7th Edition, PHI, 2006.
- Vincent P. Heuring & Harry F. Jordan: Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 2004.

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PRINCIPAL Mavodaya Institute of Technolous (1117) RAICHUR-584 109
Subject Code: 10AL61 Hours/Week : 04 Total Hours : 52

I.A. Marks : 25 Exam Hours: 03 Exam Marks: 100

PART-A

UNIT-1 MANAGEMENT: Introduction - Meaning - nature and characteristics of Management, Scope and functional areas of management - Management as a science, art or profession Management & Administration - Roles of Management, Levels of Management, Development of Management Thought - early management approaches - Modern management approaches.

UNIT-2

PLANNING: Nature, importance and purpose of planning process - Objectives - Types of plans (Meaning only) - Decision making - Importance of planning - steps in planning & planning premises Hierarchy of plans.

UNIT-3 ORGANIZING AND STAFFING: Nature and purpose of organization - Principles of organization - Types of organization - Departmentation - Committees - Centralization Vs Decentralization of authority and responsibility - Span of control - MBO and MBE (Meaning only) Nature and importance of Staffing - Process of Selection & Recruitment (in brief)

UNIT-4

DIRECTING & CONTROLLING: Meaning and nature of directing - Leadership styles, Motivation Theories, Communication - Meaning and importance - Coordination, meaning and importance and Techniques of Co - ordination. Meaning and steps in controlling -Essentials of a sound control system -Methods of establishing control (in brief)

PART-B-(ENTREPRENEURSHIP)

UNIT-5

Hours ENTREPRENEUR: Meaning of Entrepreneur; Evolution of the Concept, Functions of an Entrepreneur, Types of Entrepreneur, Intrapreneur - an emerging Class. Concept of Entrepreneurship - Evolution of Entrepreneurship, Development of Entrepreneurship; Stages o in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship Barriers. its

UNIT-6

Hours SMALL SCALE INDUSTRY Definition; Characteristics; Need and rationale: Objectives; Scope; role of SSI in Economic Development. Advantages of SSI Steps to start an SSI -Government policy towards SSI; Different Policies of S.S.I.; Government Support for S.S.I. during 5 year plans, Impact of Liberalization, Privatization, Globalization on S.5.1., Effect of WTO/GATT Supporting Agencies of Government for S.5.!., Meaning; Nature of Support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry (Definition only).

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RAICHUR-584 103

7 Hours

Hours 6

Hours

7

6

6

6 Hours

UNIT-7 INSTITUTIONAL SUPPORT: Different Schemes; TECKSOK; KIADB; KSSIDC; KSIMC; Window KSFC. SIDBI; DIC Single Agency: SISI; NSIC;

UNIT-8 6 Hours PREPARATION OF PROJECT : Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of Business Opportunities: Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study

TEXT

1. Principles of Management - P.C. Tripathi, P.N. Reddy - Tata McGraw Hill, 2007. 2. Dynamics of Entrepreneurial Development & Management - Vasant Desai:, Himalaya 2007. Publishing House. 3. Entrepreneurship Development - Poornima M Charantimath - Small Business Enterprises,

2006. Pearson Education.

REFERENCE

1. Management Fundamentals Concepts, Application, Skill Development - Robert Lusier -2007. .Thompson.

2. Entrepreneurship Development - S. S. Khanka, S. Chand & Co., 2007.

3. Management - Stephen Robbins: 17th Edition, Pearson Education / PHI, 2003.

4. Web Sites for the Institutions listed in the Unit 7 on Institutional Support.

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Navodaya Institute of Technology (#114 RAICHUR-584 103

BOOKS:

BOOKS:

statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL.

UNIT – 8

7 Hours

Ruby, Rails: Origins and uses of Ruby, Scalar types and their operations, Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterators, Pattern matching.

Overview of Rails, Document requests, Processing forms, Rails applications with Databases, Layouts.

Text Books:

 Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson Education, 2008. (Listed topics only from Chapters 1 to 9, 11 to 15)

Reference Books:

- 1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson Education, 2004.
- Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2007.
- 3. Xue Bai et al: The web Warrior Guide to Web Programming, Cengage Learning, 2003.

ADVANCED COMPUTER ARCHITECTURES

Subject Code: 10CS74 Hours/Week : 04 Total Hours : 52 I.A. Marks : 25 Exam Hours: 03 Exam Marks: 100

PART - A

UNIT - 1

6 Hours

Fundamentals Of Computer Design: Introduction; Classes of computers; Defining computer architecture; Trends in Technology, power in Integrated Circuits and cost; Dependability; Measuring, reporting and summarizing Performance; Quantitative Principles of computer design.

UNIT-2

6 Hours

Pipelining: Introduction; Pipeline hazards; Implementation of pipeline; What makes pipelining hard to implement?

UNIT - 3 Instruction -Level Parallelism - 1: ILP: Concepts and challenges; Basic Compiler Techniques for exposing ILP; Reducing Branch costs with

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Performance Equation, Clock Rate, Performance Measurement, Historical Perspective

Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing,

UNIT - 2

7 Hours

Machine Instructions and Programs contd.: Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions

UNIT - 3

6 Hours

7 Hours

Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses

UNIT-4

Input/Output Organization *contd*.: Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB

PART – B

UNIT - 5

7 Hours

Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage

UNIT - 6

7 Hours

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations

UNIT - 7

6 Hours

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Microprogrammed Control

UNIT - 8

6 Hours

Multicores, Multiprocessors, and Clusters: Performance, The Power Wall, The Switch from Uniprocessors to Multiprocessors, Amdahl's Law, Shared Memory Multiprocessors, Clusters and other Message Passing Multiprocessors, Hardware Multithreading, SISD, IMD, SIMD, SPMD, and Vector.

Text Books:



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Navodaya Institute of Technology (NIT) RAICHUR-584 103

- Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002. (Listed topics only from Chapters 1, 2, 4, 5, 6, 7)
- David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier, 2009. (Listed topics only)

Reference Books:

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- William Stallings: Computer Organization & Architecture, 7th Edition, PHI, 2006.
- 2. Vincent P. Heuring & Harry F. Jordan: Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 2004.

DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY (Common to CSE & ISE)

Subject Code	: 10CSL47	I.A. Marks : 25	
Hours/Week	: 03	Exam Hours: 03	
Total Hours	: 42	Exam Marks: 50	

Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX / Windows environment.

- Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
- Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

Obtain the Topological ordering of vertices in a given digraph. Compute the transitive closure of a given directed graph using Warshall's algorithm.

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UNIT - 6

7 Hours

Hardware Specifications, Memory Interface – 1: Pin-Outs and the Pin Functions, Clock Generator, Bus Buffering and Latching, Bus Timings, Ready and Wait State, Minimum versus Maximum Mode. Memory Interfacing: Memory Devices

UNIT – 7

6 Hours

Memory Interface – 2, I/O Interface – 1: Memory Interfacing (continued): Address Decoding, 8088 Memory Interface, 8086 Memory Interface. Basic I/O Interface: Introduction to I/O Interface, I/O Port Address Decoding.

UNIT 8

7 Hours

I/O Interface – 2, Interrupts, and DMA: I/O Interface (continued): The Programmable Peripheral Interface 82C55, Programmable Interval Timer 8254.

Interrupts: Basic Interrupt Processing, Hardware Interrupts: INTR and INTA/; Direct Memory Access: Basic DMA Operation and Definition.

Text Book:

 Barry B Brey: The Intel Microprocessors, 8th Edition, Pearson Education, 2009.

(Listed topics only from the Chapters 1 to 13)

Reference Books:

- Douglas V. Hall: Microprocessors and Interfacing, Revised 2nd Edition, TMH, 2006.
- K. Udaya Kumar & B.S. Umashankar : Advanced Microprocessors & IBM-PC Assembly Language Programming, TMH 2003.
- 3. James L. Antonakos: The Intel Microprocessor Family: Hardware and Software Principles and Applications, Cengage Learning, 2007.

COMPUTER ORGANIZATION

(Common to CSE & ISE)

Subject Code: 10CS46 Hours/Week : 04 Total Hours : 52 I.A. Marks : 25 Exam Hours: 03 Exam Marks: 100

PART – A

UNIT - 1 6 Hours Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic

25



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2017-2018 NAVODAYA INSTITUTE OF TECHNOLOGY, RAICHUR **DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

CERTIFICATE

This is to certify that the Project on topic "SMARTFIX - A SOCIALISTIC PLATFORM TO EDUCATE AND ANALYSE" has been successfully presented at Navodaya Institute of Technology by JAYATEERTH B KULKARNI bearing USN 3NA13CS024, in partial fulfilment of the requirements for the VIII Semester degree of Bachelor of Engineering in Computer Science and Engineering of Visvesvaraya Technological A University, Belgaum during academic year 2017-2018. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The Project report has been approved as it satisfies the academic requirements in respect of Project work for the said degree.

M.T.

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M N Faruk DX Head of Department

Dr. M.V. Mallikarjuna Principal

Signature with Date

12/6/18

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VISVESVARAYA TECHNOLOGICAL UNIVERSITY

JNANA SANGAMA, BELAGAVI-590018



A Project Report On "SMARTFIX – A SOCIALISTIC PLATFORM TO EDUCATE

AND ANALYSE"

A Project report submitted in partial fulfilment of the requirements for the VIII Semester degree of **Bachelor of Engineering in Computer Science and Engineering** of Visvesvaraya Technological University, Belagavi.

Submitted By:

JAYATEERTH B KULKARNI

3NA13CS024

Ender The Guidance Of

DR. M N FARUK H.O.D & Professor Dept. Of Computer Science & Engineering Navodaya Institute Of Technology





Navodaya Institute of Technology (NIT) RAICHUR-584 103

2017-2018

NAVODAYA INSTITUTE OF TECHNOLOGY, RAICHUR DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

ABSTRACT

There are a number of clear advantages of Online Communication that need to be considered when you are planning an Online Community Engagement Strategy.

Online political debate is increasing in importance, both as a real world phenomenon and as an object of scientific study. We present a survey study exploring people's motivations for engaging in online political debate and how such debate may impact their general political engagement.

SMARTFIX will be a Socialistic Online Platform for people, which even involves mainly 3 categories Online Debate, Idea Hub, Survey which makes a person to get engage with the online portal and makes him to get connect with the Real world and educate him in all possible ways regarding the changes

This will make most of people to in to the online world and hence connects more number of people, as traffic on the portal goes on the data collected also increases due to the interactions With the application,

When we have data that can be used for Qualitative and Quantitative analysis of the data Quantitative and qualitative research are commonly considered to differ fundamentally. Yet, their objectives as well as their applications overlap in numerous ways.

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4.2MYSQL

4.5 XAMPP

4.3PHP AND MYSQL

4.4CODEIGNITOR

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INTRODUCTION

Social networking sites are varied. They can incorporate a range of new information and communication tools, operating on <u>desktops</u> and on <u>laptops</u>, on mobile devices such as <u>tablet computers</u> and <u>smartphones</u>. They may feature digital photo/video/sharing and "web logging" diary entries online (<u>blogging</u>).^{[41} <u>Online community</u> services are sometimes considered social-network services, though in a broader sense, a social-network service usually provides an individual-centered service whereas online community services are group-centered. Defined as "websites that facilitate the building of a network of contacts in order to exchange various types of content online," social networking sites provide a space for interaction to continue beyond in person interactions. These computer mediated interactions link members of various networks and may help to both maintain and develop new social ties.^[5] Social networking sites allow users to share ideas, digital photos and videos, posts, and to inform others about online or real-world activities and events with people in their network. While in-person social networking – such as gathering in a village market to talk about events – has existed since the earliest development of towns,

The project has mainly 3 wings

- Online Debate Platform
- Ideas Hub
- Survey

Web enables people to connect with others who live in different locations, ranging from across a city to across the world. Depending on the social media platform, members may be able to contact any other result. In other cases, members can contact anyone they have a connection it and subsequently anyone that contact has a connection to, and so on. The success of social approximeter provides can be seen in their dominance in society today, with Facebook having a massive 13 billion active monthly users and an average of 1.4 billion

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LITRETURE SURVEY

Around 23.1 million or 2.7% of the total eligible voters were aged 18–19 years. A total of 8,251 candidates contested for the 543 Lok Sabha seats. The average election turnout over all nine phases was around **66.38%**, the highest ever in the history of Indian general elections.

This is very Important for us to analyze this numerical percentage all the game is here, it makes us to think the aspects in all possible different ways and arises some questions Why the voting rate is not above 90%? How to increase the size of the voting rate? and how educated are the voters

To find out where you stand when it comes to public opinion, you need to find out what people are thinking, and for those opinions to count they need to be strong enough to bring people to the polls. Before that happens, you and potential voters need to get to know one another. A good way to get a baseline of what the public is thinking is by conducting political research surveys or polls.

Defined as "websites that facilitate the building of a network of contacts in order to exchange various types of content online," social networking sites provide a space for interaction to continue beyond in person interactions. These computer mediated interactions link members of various networks and may help to both maintain and develop new social ties.^[5] Social networking sites allow users to share ideas, digital photos and videos, posts, and to inform others about online or real-world activities and events with people in their network.

number of smartphone users in India is expected to grow by 15.6% to reach 337 18, according to the report. Surprisingly, it is the highest estimated growth by any country in the world. The key factors behind this growth are the smartphone usage and the demand for more affordable smartphones in urban

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OBJECTIVE OF THE PROJECT

The main objective of the project is to Connect the people on one online platform where they can understand and start thinking of the political movements happening this is done in various ways, we work on getting the traffic to the site where people starts their discussions and give their value able feedback to us

We have designed our website in such a way that we will collect the data in both Qualitative and also in Quantitative which helps is in making the Predictive analysis.

<u>Quantitative Analysis</u>. The main purpose of quantitative research and analysis is to quantify the data and assess it from the angle of numbers and other commonly adopted metrics. Such kind of approach gives the ability to generalize the examples let it be a separate sample of something or the entire population such. At the same time, such kind of research in most cases is followed by the qualitative research for specifying the studying the findings more closely

<u>Qualitative Analysis</u>. That kind of research is used for getting the larger, more closeup picture of the issue in order to understand something deeper and dig the problem until the cause is found. At the same time, the qualitative research may be a preceding one to the quantitative for generating ideas

Predictive Analysis is a process that uses data mining and probability to forecast outcomes. Each model is made up of a number of predictors, which are variables that are likely to influence future results. Once data has been collected for relevant predictors, a

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SMARTFIX

Connecting Problems and solutions Social problem-solving might also be called 'problem-solving in real life'. In other words, it is a rather academic way of describing the systems and processes that we use to solve the problems that we encounter in our everyday lives. The word 'social' does not mean that it only applies to problems that we solve with other people, or, indeed, the contact we feel are caused by others. The word is simply used to indicate the 'real life' nature of the problems, and the way that we approach them.

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SOFTWARE REQUIDRMENTS

SMATFIX project is a web applications Which is hosted in a local host and the application is also mobile compatible and responsive for all the screens we have used the following languages and platforms in developing the web application

- PHP
- MYSQL
- CODE IGNITOR
- XAMPP (PLATFORM)

4.1 PHP

PHP is a simple yet powerful language designed for creating HTML content. This chapter covers essential background on the PHP language. It describes the nature and history of PHP, which platforms it runs on, and how to configure it. This chapter ends by showing you PHP in action, with a quick walkthrough of several PHP programs that illustrate common tasks, such as processing form data, interacting with a database, and creating graphics.

What Does PHP Do?

PHP can be used in three primary ways:

Server-side scripting

PHP was originally designed to create dynamic web content, and it is still best suited for that task. To generate HTML, you need the PHP parser and a web server through which to send the coded documents. PHP has also become popular for generating XML documents, graphes, Flash animations, PDF files, and so much more

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Command-line scripting

PHP can run scripts from the command line, much like Perl, awk, or the Unix shell. You might use the command-line scripts for system administration tasks, such as backup and log parsing; even some CRON job type scripts can be done this way (nonvisual PHP tasks).

Client-side GUI

Applications Using PHP-GTK, you can write full-blown, cross-platform GUI applications in PHP.





The PHP software works with the web server, which is the software that delivers web pages to the world. When you type a URL into your web browser's address bar, you're sending a message to the web server at that URL, asking it to send you an HTML file. The web server responds by sending the requested file. Your browser reads the HTML file and displays the

You also request a file from the web server when you click a link in a web page. In addition, the web server processes a file when you click a web page button that submits a form. This process is essentially the same when PHP is installed. You request a file, the web server

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4.2MYSQL

MySQL is the world's most popular open source database. With its proven performance, reliability and ease-of-use, MySQL has become the leading database choice for web-based applications, used by high profile web properties including Facebook, Twitter, YouTube, Yahoo! and many more.

Oracle drives MySQL innovation, delivering new capabilities to power next generation web, cloud, mobile and embedded applications.

- MySQL is a freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL).
- **SQL** is the most popular language for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use. **MySQL** is an essential part of almost every open source **PHP** application. Good examples for PHP & MySQL-based scripts are <u>WordPress</u>, Joomla, Magento and Drupal.

One of the most important things about using MySQL is to have a MySQL specialized host. Here are some of the things SiteGround can offer:

- We have long experience in providing technical support for MySQL-based web sites. Thanks to it our servers are perfectly optimized to offer the best overall performance for most MySQLapplications.
- We offer a lot of free MySQL tools including CMS systems, forums, galleries, blogs, shopping carts and more.

e support MySQL 5 and we provide unlimited MySQL databases on all our hosting plans.

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SMARTFIX

4.3PHP AND MYSQL

MySQL works very well in combination of various programming languages like PERL, C, C++, JAVA and PHP. Out of these languages, PHP is the most popular one because of its web application development capabilities.

This tutorial focuses heavily on using MySQL in a PHP environment. If you are interested in MySQL with PERL, then you can consider reading the <u>PERL</u>Tutorial.

PHP provides various functions to access the MySQL database and to manipulate the data records inside the MySQL database. You would require to call the PHP functions in the same way you call any other PHP function.

PHP is the most popular scripting language for web development. It is free, open source and server-side (the code is executed on the server). MySQL is a Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). It is also free and open source.

MySQL is a relational database management system based on SQL – Structured Query Language. The application is used for a wide range of purposes, including data warehousing, e-commerce, and logging applications. The most common usefor mySQL however is for the purpose of a web database.



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SMARTFIX

MVC, or Model-View-Controller is a software architecture, or design pattern, that is used in software engineering, whose fundamental principle is based on the idea that the logic of an application should be separated from its presentation

CodeIgniter is based on the Model-View-Controller (MVC) development pattern. MVC is a software approach that separates application logic from presentation. In practice, it permits your web pages to contain minimal scripting since the presentation is separate from the PHP scripting.



FIG 4.4.1 MVC

- The Model represents your data structures. Typically, your model classes will contain functions that help you retrieve, insert and update information in your database.
- The View is information that is being presented to a user. A View will normally be a web page, but in CodeIgniter, a view can also be a page fragment like a header or footer. It can also be an RSS page, or any other type of "page".
- The Controller serves as an intermediary between the Model, the View, and any other resources needed to process the HTTP request and generate a web page.

CodeIgniter has a fairly loose approach to MVC since Models are not required. If you don't need the added separation on the fact maintaining models requires more complexity than you want, you can ignore them and build your application minimally using Controllers and Views. CodeIgniter also the added you to incorporate your own existing scripts, or even

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MODULES AND FUNCTIONALITIES

Modules and functionalities will include the different Operations that can be performed in the web application this will make the user to interact with the application and spend some time

SMARTFIX have 3 major domains which are as follows

- Online Debate
- Ideas Hub
- Survey

5.1 Online Debate

Online Debate is the virtual debate platform, normally when people are in conversation and healthy discussion about certain topic there is always a possibility of looking the topic in two different perspective, a topic might be true to one, another may be against the topic when two individuals are participating in debate will lead to exchange of more data and exchange of knowledge

Whether the Users meet face-to-face or online, the assumption is that by making their covert ideas overt, user support each other in the construction of their understanding of the topic and concepts under discussion

Normally people talk their experience and kind of knowledge they have accumulated so far and try to relate with the current topic and it opens up the horizons of the person more and structures him to explore more about the current issues and acquire more knowledge

Amonline, xirtual debating application was developed to help users acquire and improve argument and critical assessment skills on polarizing topics and could be used to promote engagement by participating schools. The main objective was to use the tool as an introduction to illustrate the wide range of views and the complexity



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SMARTFIX

Opinions are important because they help shape our ideas. Reading is also important because we learn about other opinions and ideas in the process. We can't form our own conclusions if we don't read about other ideas out there.

In this Ideas hub, SMARTFIX will act as socialistic platform in connecting the problem and the people who are ready to help and help the social initiation

The user will login and if he has an new idea he can share it or he can see the ideas while submitting the idea he/she should specify the location of the place where the problem exists which will authenticate the person and it will help for geographical approach and reach out to the place information

When user is willing to submit idea, he should follow the "design thinking" method while submitting the idea which will brief about the project and makes clear to the investor

Three important stages while submitting the idea :-

- Define
- Ideate
- Prototype

DEFINE :-

In the Define stage you synthesise your observations about your users from the first stage, the Empathise stage. A great definition of your problem statement will guide you and your team's work and kick start the ideation process (third stage) in the right direction. The five stages are not always sequential — they do not have to follow any specific order and they can often occur in parallel and be repeated iteratively. As such, the stages should be White composes that contribute to a project, rather than sequential steps understood

Born how to master the definition of your problem, problem statement, or design IDEAT Recally improve your Design Thinking process and result. Why? A great When yo Page 31 challenge, if

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Social entrepreneurship is attracting growing amounts of talent, money, and attention. But along with its increasing popularity has come less certainty about what exactly a social entrepreneur is and does. As a result, all sorts of activities are now being called social entrepreneurship. Some say that a more inclusive term is all for the good, but the authors argue that it's time for a more rigorous definition

About applying Directical, innovative and sustainable approaches to benefit society in general, with an emphasis on thuse who are marginalized and poor. A term that captures a unique approach to economic and social problems, an approach that cuts that captures a unique approach to economic and social problems, an approach that to each social-entrepreneur, independent of whether his/ her area of focus has been education. Department Of CSE MIT among the consoler of the social problems institute of Technology (Mage 33 Department Of CSE MIT among the consoler of the social problems institute of Technology (Mage 33 RAICHUR-584 103 SMARTFIX

and longitude coordinates. Therefore, by using latitude and longitude we can specify virtually any point on earth.

5.5 SURVEY

Surveys collect data from a targeted group of people about their opinions, behavior or knowledge. Common types of surveys are written questionnaires, face-to-face or telephone interviews, focus groups and electronic (e-mail or Web site) surveys.

Online (Internet) surveys are becoming an essential research tool for a variety of research fields, including marketing, social and official statistics research. According to <u>ESOMAR</u> online survey research accounted for 20% of global data-collection expenditure in 2006

They offer capabilities beyond those available for any other type of self-administered questionnaire.^[14] Online consumer panels are also used extensively for carrying out surveys but the quality is considered inferior because the panelists are regular contributors and tend to be fatigued. However, when estimating the measurement quality (defined as product of reliability and validity)

Survey data collection. ... The methods involved insurvey data collection are any of a number of ways in which data can be collected for a statistical survey. These are methods that are used to collect information from a sample of individuals in a systematic way.

Public opinion is important in a democracy because the people are the ultimate source of power. ... So, public opinion is important in a democracy because the people have the right to remove their representatives from office. Therefore, the representatives must at least pay attention to public opinion.

One purpose of public opinion in a democracy is to inform public policymaking. Opinion polls provide a mechanism for succinctly presenting the views of the mass public to government leaders who are making decisions that will affect society. Leaders often monitor the public pulse when making policy decisions, especially when they face an election

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SMARTFIX

5.6 ADVANTAGES OF ONLINE SURVEY

- Web surveys are faster, simpler, and cheaper. However, lower costs are not so straightforward in practice, as they are strongly interconnected to errors. Because response rate comparisons to other survey modes are usually not favourable for online surveys, efforts to achieve a higher response rate (e.g., with traditional solicitation methods) may substantially increase costs.
- The entire data collection period is significantly shortened, as all data can be collected and processed in little more than a month
- Interaction between the respondent and the questionnaire is more dynamic compared to e-mail or paper surveys. Online surveys are also less intrusive, and they suffer less from social desirability effects.
- Complex skip patterns can be implemented in ways that are mostly invisible to the respondent.
- Pop-up instructions can be provided for individual questions to provide help with . questions exactly where assistance is required.
- Questions with long lists of answer choices can be used to provide immediate coding of answers to certain questions that are usually asked in an open-ended fashion in paper questionnaires.
- Online surveys can be tailored to the situation (e.g., respondents may be allowed save a partially completed form, the questionnaire may be preloaded with already available information, etc.).

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Communication Electronics and Engineering

MICROCONTROLLERS (Common to EC/TC/EE/IT/BM/ML)

Sub Code	:	10ES42	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	;	52	Exam Marks	:	100

PART - A

UNIT 1:

Microprocessors and microcontroller. Introduction, Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, Computer software.

The 8051 Architecture: Introduction, Architecture of 8051, Pin diagram of 8051, Memory organization, External Memory interfacing, Stacks.

6 Hours

UNIT 2:

Addressing Modes: Introduction, Instruction syntax, Data types, Subroutines, Addressing modes: Immediate addressing , Register addressing, Direct addressing, Indirect addressing, relative addressing, Absolute addressing, Long addressing, Indexed addressing, Bit inherent addressing, bit direct addressing.

Instruction set: Instruction timings, 8051 instructions: Data transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation instruction.

UNIT 3:

6 Hours

8051 programming: Assembler directives, Assembly language programs and Time delay calculations. **6** Hours UNIT 4:

8051 Interfacing and Applications? Basics of I/O concepts, I/O Port

Operation, Interfacing 8051 to LCD, Keyboard, parallel and serial ADC, DAC, Stepper motor interfacing and DC motor interfacing and programming

PART-B

UNIT 5:

8051 Interrupts and Timers/counters: Basics of interrupts, 8051 interrupt structure, Timers and Counters, 8051 timers/counters, programming 8051 timers in assembly and C.

6 Hours

7 Hours



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Head of Department

Electronics & Communication Engineering Navodaya Institute of Technology (NIT) RAICHUR-584 103

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UNIT 6:

8051 Serial Communication: Data communication, Basics of Serial Data Communication, 8051 Serial Communication, connections to RS-232, Serial communication Programming in assembly and C.

8255A Programmable Peripheral Interface:, Architecture of 8255A, I/O addressing., I/O devices interfacing with 8051 using 8255A.

6 Hours

Course Aim - The MSP430 microcontroller is ideally suited for development of low-power embedded systems that must run on batteries for many years. There are also applications where MSP430 microcontroller must operate on energy harvested from the environment. This is possible due to the ultra-low power operation of MSP430 and the fact that it provides a complete system. solution including a RISC CPU, flash memory, on-chip data converters and/ on-chip peripherals.

UNIT 7:

Motivation for MSP430microcontrollers - Low Power embedded systems, On-chip peripherals (analog and digital), low-power RF capabilities. Target applications (Single-chip, low cost, low power, high performance system design).

2 Hours

MSP430 RISC CPU architecture, Compiler-friendly features, Instruction set, Clock system, Memory subsystem. Key differentiating factors between different MSP430 families.

2 Hours

Introduction to Code Composer Studio (CCS v4). Understanding how to use CCS for Assembly, C, Assembly+C projects for MSP430 microcontrollers. Interrupt programming.

Digital I/O - I/O ports programming using C and assembly, Understanding **3 Hours** the muxing scheme of the MSP430 pins. 2 Hours

UNIT 8:

On-chip peripherals. Watchdog Timer, Comparator, Op-Amp, Basic Timer, Real Time Clock (RTC), ADC, DAC, SD16, LCD, DMA.

Using the Low-power features of MSP430. Clock system, low-power modes, Clock request feature, Low-power programming and Interrupt.

23

2 Hours



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Head of Department Electronics & Communication Engineering Navodaya Institute of Technology (Nil), RAICHUR-584.103

Interfacing LED, LCD, External memory. Seven segment LED modules interfacing. Example - Real-time clock.

2 Hours

3 Hours

Case Studies of applications of MSP430 - Data acquisition system, Wired Sensor network, Wireless sensor network with Chipcon RF interfaces.

TEXT BOOKS:

 "The 8051 Microcontroller and Embedded Systems - using assembly and C "-, Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006

2. "MSP430 Microcontroller Basics", John Davies, Elsevier, 2010 (Indian edition available)

REFERENCE BOOKS:

- "The 8051 Microcontroller Architecture, Programming & Applications", 2e Kenneth J. Ayala ;, Penram International, 1996 / Thomson Learning 2005.
 "The 8051 Microcontroller", Microcontroller
- 2. "The 8051 Microcontroller", V.Udayashankar and MalikarjunaSwamy, TMH, 2009
- MSP430 Teaching CD-ROM, Texas Instruments, 2008 (can be requested http://www.uniti.in)
 Microcontrollers: Architector D
- Microcontrollers: Architecture, Programming, Interfacing and System Design", Raj Kamal, "Pearson Education, 2005

CONTROL SYSTEMS (Common to EC/TC/EE/IT/BM/ML)

Sub Code	:	10ES43	TA M. J		
Hrs/ Week		04	IA Marks	:	25
Total Hrs.		52	Exam Hours	:	03
	30 . 3	54	Exam Marks	:	100

PART-A

UNIT 1:

Modeling of Systems: Introduction to Control Systems, Types of Control Systems, Effect of Feedback Systems, Differential equation of Physical Systems -Mechanical systems, Friction, Translational systems (Mechanical accelerometer, systems excluded), Rotational systems, Gear trains, Electrical systems, Analogous systems. 7 Hours

UNIT 2:

Block diagrams and signal flow graphs: Transfer functions, Block diagram algebra, Signal Flow graphs (State variable formulation excluded), 6 Hours

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UNIT 3:

Time Response of feed back control systems: Standard test signals, Unit step response of First and second order systems, Time response specifications, Time response specifications of second order systems, steady - state errors and error constants. Introduction to PID Controllers(excluding 7 Hours

UNIT 4:

Stability analysis: Concepts of stability, Necessary conditions for Stability, Routh- stability criterion, Relative stability analysis; More on the Routh stability criterion. 6 Hours

PART-B

UNIT 5:

Root-Locus Techniques: Introduction, The root locus concepts, Construction of root loci. 6 Hours

UNIT 6:

:

Frequency domain analysis: Correlation between time and frequency response, Bode plots, Experimental determination of transfer functions, Assessment of relative stability using Bode Plots. Introduction to lead, lag and lead-lag compensating networks (excluding design). 7 Hours

UNIT 7:

Stability in the frequency domain: Introduction to Polar Plots, (Inverse Polar Plots excluded) Mathematical preliminaries, Nyquist Stability criterion, Assessment of relative stability using Nyquist criterion, (Systems with transportation lag excluded). 7 Hours

UNIT 8:

Introduction to State variable analysis: Concepts of state, state variable and state models for electrical systems, Solution of state equations.

6 Hours

TEXT BOOK :

1. J. Nagarath and M.Gopal, "Control Systems Engineering", New Age International (P) Limited, Publishers, Fourth edition - 2005.

REFERENCE BOOKS:

1. "Modern Control Engineering ", K. Ogata, Pearson Education Asia/ PHI, 4th Edition, 2002.

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MICROCONTROLLERS LAB (Common to EC/TC/EE/IT/BM/ML)

Sub Code	:	10ESL47	IA Marks	:	25
Hrs/ Week	:	03	Exam Hours	:	03
Total Hrs.	:	42	Exam Marks	:	50

I. PROGRAMMING

- Data Transfer Block move, Exchange, Sorting, Finding largest element in an array.
- Arithmetic Instructions Addition/subtraction, multiplication and division, square, Cube - (16 bits Arithmetic operations - bit addressable).

3. Counters.

- 4. Boolean & Logical Instructions (Bit manipulations).
- 5. Conditional CALL & RETURN.
- Code conversion: BCD ASCII; ASCII Decimal; Decimal ASCII; HEX - Decimal and Decimal - HEX.

 Programs to generate delay, Programs using serial port and on-Chip timer / counter.

Note: Programming exercise is to be done on both 8051 & MSP430.

II. INTERFACING:

Write C programs to interface 8051 chip to Interfacing modules to develop single chip solutions.

 Simple Calculator using 6 digit seven segment displays and Hex Keyboard interface to 8051.

9. Alphanumeric LCD panel and Hex keypad input interface to 8051.

10. External ADC and Temperature control interface to 8051.

 Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC interface to 8051; change the frequency and amplitude.

- 12. Stepper and DC motor control interface to 8051.
- 13. Elevator interface to 8051.



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UNIT 6:

Power Amplifiers: Definitions and amplifier types, series fed class A amplifier, Transformer coupled Class A amplifiers, Class B amplifier operations, Class B amplifier circuits, Amplifier distortions. Designing of Power amplifiers. 7 Hours

UNIT 7:

Oscillators: Oscillator operation, Phase shift Oscillator, Wienbridge Oscillator, Tuned Oscillator circuits, Crystal Oscillator. (BJT Version Only) Simple design methods of Oscillators. 6 Hours

UNIT 8:

FET Amplifiers: FET small signal model, Biasing of FET, Common drain common gate configurations, MOSFETs, FET amplifier networks.

6 Hours

TEXT BOOK:

1. "Electronic Devices and Circuit Theory", Robert L. Boylestad and Louis Nashelsky, PHI/Pearson Education. 9TH Edition.

REFERENCE BOOKS:

- 'Integrated Electronics', Jacob Millman & Christos C. Halkias, Tata - McGraw Hill, 2nd Edition, 2010
- "Electronic Devices and Circuits", David A. Bell, PHI, 4th Edition, 2004
- 3. "Analog Electronics Circuits: A Simplified Approach", U.B. Mahadevaswamy, Pearson/Saguine, 2007.

LOGIC DESIGN

(Common to EC/TC/EE/IT/BM/ML)

Sub Code	:	10ES33	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks		100

PART-A

UNIT 1:

Principles of combinational logic-1: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables,



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Karnaugh maps-3, 4 and 5 variables, Incompletely specified functions (Don't Care terms), Simplifying Max term equations. 6 Hours

UNIT 2:

Principles of combinational Logic-2: Quine-McCluskey minimization technique- Quine-McCluskey using don't care terms, Reduced Prime Implicant Tables, Map entered variables. 7 Hours

UNIT 3:

Analysis and design of combinational logic - I: General approach, Decoders-BCD decoders, Encoders. 6 Hours UNIT 4:

Analysis and design of combinational logic - II: Digital multiplexers-Using multiplexers as Boolean function generators. Adders and subtractors Cascading full adders, Look ahead carry, Binary comparators. Design methods of building blocks of combinational logics.

7 Hours

PART-B

UNIT 5:

Sequential Circuits – 1: Basic Bistable Element, Latches, SR Latch, Application of SR Latch, A Switch Debouncer, The SR Latch, The gated SR Latch, The gated D Latch, The Master-Slave Flip-Flops (Pulse-Triggered Flip-Flops): The Master-Slave SR Flip-Flops, The Master-Slave JK Flip-Flop, Edge Triggered Flip-Flop: The Positive Edge-Triggered D Flip-Flop, Negative-Edge Triggered D Flip-Flop. 7 Hours

UNIT 6:

Sequential Circuits – 2: Characteristic Equations, Registers, Counters – Binary Ripple Counters, Synchronous Binary counters, Counters based on Shift Registers, Design of a Synchronous counters, Design of a Synchronous Mod-6 Counter using clocked JK Flip-Flops Design of a Synchronous Mod-6 Counter using clocked D, T, or SR Flip-Flops 7 Hours

UNIT 7:

Sequential Design - I: Introduction, Mealy and Moore Models, State Machine Notation, Synchronous Sequential Circuit Analysis and Design. 6 Hours



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UNIT-8

Spread Spectrum Modulation: Pscudo noise sequences, notion of spread spectrum, direct sequence spread spectrum, coherent binary PSK, frequency 7 Hours hop spread spectrum, applications.

TEXT BOOK:

1. Digital communications, Simon Haykin, John Wiley India Pvt. Ltd, 2008.

REFERENCE BOOKS:

- 1. Digital and Analog communication systems, Simon Haykin, John Wildy India Lts, 2008
- 2. An introduction to Analog and Digital Communication, K. Sam Shanmugam, John Wiley India Pvt. Ltd, 2008.
- 3. Digital communications Bernard Sklar: Pearson education 2007

MICROPROCESSOR

Subject Code	: 10EC62	IA Marks	: 25
No. of Lecture Hrs/	Week: 04	Exam Hours	: 03
Total no. of Lecture	Hrs. : 52	Exam Marks	:100

PART-A

8086 PROCESSORS: Historical background, The microprocessor-based personal computer system, 8086 CPU Architecture, Machine language instructions, Instruction execution timing. 6 Hours

UNIT-2

UNIT-1

INSTRUCTION SET OF 8086: Assembler instruction format, data transfer and arithmetic, branch type, loop, NOP & HALT, flag manipulation, logical and shift and rotate instructions. Illustration of these instructions with example programs, Directives and operators. 6 Hours

UNIT-3

BYTE AND STRING MANIPULATION: String instructions, REP Prefix, Table translation, Number format conversions, Procedures, Macros, Programming using keyboard and video display. 7 Hours

UNIT - 4

8086 INTERRUPTS: 8086 Interrupts and interrupt responses, Hardware interrupt applications, Software interrupt applications, Interrupt examples. 7 Hours

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PART - B

UNIT-5

8086 INTERFACING: Interfacing microprocessor to keyboard (keyboard lypes, keyboard circuit connections and interfacing, software keyboard interfacing, keyboard interfacing with hardware), Interfacing to alphanumeric displays (interfacing LED displays to microcomputer), Interfacing a microcomputer to a stepper motor. 7 Hours

UNIT-6

8086BASEDMULTIPROCESSINGSYSTEMS:Coprocessorconfigurations, The 8087 numeric data processor: data types, processorarchitecture, instruction set and examples.6 Hours

UNIT - 7

SYSTEM BUS STRUCTURE: Basic 8086 configurations: minimum mode, maximum mode, Bus Interface: peripheral component interconnect (PCI) bus, the parallel printer interface (LPT), the universal serial bus (USB)

UNIT - 8

80386, 80486 AND PENTIUM PROCESSORS: Introduction to the 80386 microprocessor, Special 80386 registers, Introduction to the 80486 microprocessor, Introduction to the Pentium microprocessor. 7 Hours

TEXT BOOKS:

- Microcomputer systems-The 8086 / 8088 Family Y.C. Liu and G. A. Gibson, 2E PHI -2003
- 2. The Intel Microprocessor, Architecture, Programming and Interfacing-Barry B. Brey, 6e, Pearson Education / PHI, 2003

REFERENCE BOOKS:

- 1. Microprocessor and Interfacing- Programming & Hardware, Douglas hall, 2nd, TMH, 2006.
- Advanced Microprocessors and Peripherals A.K. Ray and K.M. Bhurchandi, TMH, 2nd, 2006.
- 8088 and 8086 Microprocessors Programming, Interfacing, Software, Hardware & Applications - Triebel and Avtar Singh, 4e, Pearson Education, 2003



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6 Hours

Electronics & Communication Engineering Navodaya Institute of Technology (NIT) Navodaya Institute of Technology (NIT) RAICHUR-584 103 TEXT BOOKS:

- 1. Antennas and Wave Propagation, John D. Krauss, 4th Edn, McGraw-Hill International edition, 2010.
- 2. Antennas and Wave Propagation Harish and Sachidananda: Oxford Press 2007.

REFERENCE BOOKS:

- 1. Antenna Theory Analysis and Design C A Balanis, 3rd Edn, John Wiley India Pvt. 2td, 2008.
- 2. Antennas and Propagation for Wireless Communication Systems - Sincon R Saunders, John Wiley, 2003.
- 3. Antennas and wave propagation G S N Raju: Pearson Education 2005.

OPERATING SYSTEMS

Subject Code	: 10EC65	IA Marks	: 25
No. of Lecture Hrs/We	ek:04	Exam Hours	: 03
Total no. of Lecture Hi	rs. : 52	Exam Marks	: 100

PART-A

UNIT-1

INTRODUCTION AND OVERVIEW OF OPERATING SYSTEMS: Operating system, Goals of an O.S, Operation of an O.S, Resource allocation and related functions, User interface related functions, Classes of operating systems, O.S and the computer system, Batch processing system, Multi programming systems, Time sharing systems, Real time operating systems, 6 Hours distributed operating systems.

UNIT - 2

STRUCTURE OF THE OPERATING SYSTEMS: Operation of an O.S, Structure of the supervisor, Configuring and installing of the supervisor, Operating system with monolithic structure, layered design, Virtual machine operating systems, Kernel based operating systems, and Microkernel based operating systems. 7 Hours



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UNIT-3

PROCESS MANAGEMENT: Process concept, Programmer view of processes, OS view of processes, Interacting processes, Threads, Processes in UNIX, Threads in Solaris. 6 Hours

UNIT-4

MEMORY MANAGEMENT: Memory allocation to programs, Memory allocation preliminaries, Contiguous and noncontéguous allocation to programs, Memory allocation for program controlled data, kernel memory allocation. 7 Hours

PART-B

UNIT - 5

VIRTUAL MEMORY: Virtual memory basics, Virtual memory using paging, Demand paging, Page replacement, Page replacement policies, Memory allocation to programs, Page sharing, UNIX virtual memory.

UNIT-6

6 Hours

FILE SYSTEMS: File system and IOCS, Files and directories, Overview of I/O organization, Fundamental file organizations, Interface between file system and IOCS, Allocation of disk space, Implementing file access, UNIX file system. 7 Hours

UNIT - 7

SCHEDULING: Fundamentals of scheduling, Long-term scheduling, Medium and short term scheduling, Real time scheduling, Process scheduling in UNIX. 6 Hours

UNIT - 8

MESSAGE PASSING: Implementing message passing, Mailboxes, Inter process communication in UNIX. 7 Hours

TEXT BOOK:

 "Operating Systems - A Concept based Approach", D. M. Dhamdhare, TMH, 3rd Ed, 2010.

REFERENCE BOOK:

- Operating Systems Concepts, Silberschatz and Galvin, John Wiley India Pvt. Ltd, 5th Edition, 2001.
- Operating System Internals and Design Systems, Willaim Stalling, Pearson Education, 4th Ed, 2006.
- 3. Design of Operating Systems, Tennambhaum, TMH, 2001.

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ADVANCED COMMUNICATION LAB

Subject Code	: 10ECL67	IA Marks	: 25
No. of Practical Hrs	/Week: 03	Exam Hours	:03
Total no. of Practice	1 Hrs.: 42	Exam Marks	: 50

LIST OF EXPERIMENTS USING DESCERTE COMPONENTS and LABVIEW - 2009 can be used for verification and testing.

- 1. TDM of two band limited signals.
- 2. ASK and FSK generation and detection
- 3. PSK generation and detection
- 4. DPSK generation and detection
- QPSK generation and detection
 PCM generation and detection using a CODEC Chip
- Measurement of losses in a given optical fiber (propagation loss, 7. bending loss) and numerical aperture
- 8. Analog and Digital (with TDM) communication link using optical fiber.
- 9. Measurement of frequency, guide wavelength, power, VSWR and attenuation in a microwave test bench
- 10. Measurement of directivity and gain of antennas: Standard dipole (or printed dipole), microstrip patch antenna and Yagi antenna (printed).
- 11. Determination of coupling and isolation characteristics of a stripline (or microstrip) directional coupler
- 12. (a) Measurement of resonance characteristics of a microstrip ring resonator and determination of dielectric constant of the substrate. (b) Measurement of power division and isolation characteristics of a microstrip 3 dB power divider.

MICROPROCESSOR LAB

Subject Code	: 10ECL68	IA Marks	: 25
No. of Practical Hrs/Week: 03		Exam Hours	: 03
Total no. of Practica	al Hrs.: 42	Exam Marks	: 50

I) Programs involving

- 1) Data transfer instructions like:
 - Byte and word data transfer in different addressing i] modes.



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- ii] Block move (with and without overlap)
- iii] Block interchange
- 2) Arithmetic & logical operations like:
 - i] Addition and Subtraction of multi precision nos. ii] Multiplication and Division of signed and unsigned
 - Hexadecimal nos.
 - iii] ASCII adjustment instructions
 - iv] Code conversions v] Arithmetic programs to find square cube, LCM, GCD,
 - factorial
- Bit manipulation instructions like checking:
 - Whether given data is positive or negative i]
 - ii] Whether given data is odd or even
 - iii] Logical I's and 0's in a given data
 - iv] 2 out 5 code
 - v] Bit wise and nibble wise palindrome
- Branch/Loop instructions like:
 - Arrays: addition/subtraction of N nos. i]
 - Finding largest and smallest nos.
 - Ascending and descending order Near and Far Conditional and Unconditional jumps,
 - ii] Calls and Returns
- 5) Programs on String manipulation like string transfer, string reversing, searching for a string, etc.
- 6) Programs involving Software interrupts Programs to use DOS interrupt INT 21h Function calls for Reading a Character from keyboard, Buffered Keyboard input, Display of character/ String on console
- II) Experiments on interfacing 8086 with the following interfacing modules

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- through DIO (Digital Input/Output-PCI bus compatible) card
 - a) Matrix keyboard interfacing
 - b) Seven segment display interface
 - c) Logical controller interface
 - d) Stepper motor interface
- III) Other Interfacing Programs
 - a) Interfacing a printer to an X86 microcomputer
 - b) PC to PC Communication



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UNIT - 7

DC CHOPPERS: Introduction, Principles of step down and step up choppers. Step down chopper with RL loads, Chopper classification, Switch mode regulators - buck, boost and buck - boost regulators. 6 Hours

UNIT - 8

INVERTORS: Introduction, Principles of operation, Performance parameters, 1 p bridge inverter, voltage control of 1 p invertors, current source invertors, Variable DC link inverter.

TEXT BOOKS:

- "Power Electronics" M. H. Rashid 3^{nl} edition, PHI / Pearson publisher 1. 2004.
- 2. "Power Electronics" M. D. Singh and Kanchandani K.B. TMH publisher, 2nd Ed. 2007.

REFERENCE BOOKS:

- 1. "Power Electronics, Essentials and Applications", L Umanand, John Wiley India Pvt. Ltd, 2009.
- "Power Electronics", Daniel W. Hart, McGraw Hill, 2010.
 "Power Electronics", V Nattarasu and R.S. Anandamurhty, Pearson/Sanguine Pub. 2006.

EMBEDED SYSTEM DESIGN

Subject Code	: 10EC74	IA Marks	: 25
No. of Lecture Hrs/Week	: 04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

PART - A

UNIT 1: 3

1

Introduction to Embedded System: Introducing Embedded. Systems, Philosophy, Embedded Systems, Embedded Design and Development Process. **5 Hours**

UNIT 2:

The Hardware Side: An Introduction, The Core Level, Representing Information, Understanding Numbers, Addresses, Instructions, Registers-A



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7 Hours

First Look, Embedded Systems-An Instruction Set View, Embedded Systems-A Register View, Register View of a Microprocessor The Hardware Side: Storage Elements and Finite-State Machines (2 hour)

The concepts of State and Time, The State Diagram, Finite State Machines-A Theoretical Model.

8 Hours

UNIT 3:

Memories and the Memory Subsystem: Classifying Memory, A General Memory Interface, ROM Overview, Static RAM Overview, Dynamic RAM Overview, Chip Organization, Terminology, A Memory Interface in Detail, SRAM Design, DRAM Design, DRAM Memory Interface, The Memory Map, Memory Subsystem Architecture, Basic Concepts of Caching, Designing a Cache System, Dynamic Memory Allocation.

7 Hours

UNIT 4:

Embedded Systems Design and Development : System Design and Development, Life-cycle Models, Problem Solving-Five Steps to Design, The Design Process, Identifying the Requirements, Formulating the Requirements Specification, The System Design Specification, System Specifications versus System Requirements, Partitioning and Decomposing a System, Functional Design, Architectural Design, Functional Model versus Architectural Model, Prototyping, Other Considerations, Archiving the Project. 6 Hours

PART – B

UNIT 5 & 6:

Real-Time Kernels and Operating Systems: Tasks and Things, Programs and Processes, The CPU is a resource, Threads – Lightweight and heavyweight, Sharing Resources, Foreground/Background Systems, The operating System, The real time operating system (RTOS), OS architecture, Tasks and Task control blocks, memory management revisited.

UNIT 7 & 8:

Performance Analysis and Optimization: Performance or Efficiency Measures, Complexity Analysis, The methodology, Analyzing code, Instructions in Detail, Time, etc. – A more detailed look, Response Time, Time Loading, Memory Loading, Evaluating Performance, Thoughts on Performance Optimization, Performance Optimization, Tricks of the Trade, Hardware Accelerators, Caches and Performance.

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12 Hours

12 Hours



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REAL-TIME SYSTEMS

Subject Code	: 10EC762	IA Marks	: 25
No. of Lecture Hrs/We	ck : 04	Exam Hours	: 03
Total no. of Lecture Hi	s. : 52	Exam Marks	: 100

PART – A

UNIT - 1

INTRODUCTION TO REAL-TIME SYSTEMS: Historical background, RTS Definition, Classification of Real-time Systems, Time constraints, Classification of Programs. 6 Hours

UNIT - 2

CONCEPTS OF COMPUTER CONTROL: Introduction, Sequence Control, Loop control, Supervisory control, Centralised computer control, Distributed system, Human-computer interface, Benefits of computer control systems.

6 Hours

UNIT - 3

COMPUTER HARDWARE REQUIREMENTS FOR RTS: Introduction, General purpose computer, Single chip microcontroller, Specialized processors, Process-related Interfaces, Data transfer techniques, Communications, Standard Interface. 7 Hours

UNTT - 4

LANGUAGES FOR REAL-TIME APPLICATIONS: Introduction, Syntax layout and readability, Declaration and Initialization of Variables and Constants, Modularity and Variables, Compilation, Data types, Control Structure, Exception Handling, Low-level facilities, Co routines, Interrupts and Device handling, Concurrency, Real-time support, Overview of real-time languages. 7 Hours

PART – B

UNIT - 5 & 6

OPERATING SYSTEMS: Introduction, Real-time multi-tasking OS, Scheduling strategies, Priority Structures, Task management, Scheduler and real-time clock interrupt handles, Memory Management, Code sharing, Resource control, Task co-operation and communication, Mutual exclusion, Data transfer, Liveness, Minimum OS kernel, Examples. 14 Hours

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UNIT - 7

DESIGN OF RTSS - GENERAL INTRODUCTION: Introduction, Specification documentation, Preliminary design, Single-program approach, Foreground/background, Multi-tasking approach, Mutual exclusion, Monitors. 6 Hours

UNIT-8

RTS DEVELOPMENT METHODOLOGIES: Introduction, Yourdon Methodology, Requirement definition for Drying Oven, Ward and Mellor Method, Hately and Pirbhai Method. 6 Hours

TEXT BOOKS:

1. Real - Time Computer Control- An Introduction, Stuart Bennet, 2nd Edn. Pearson Education. 2005.

REFERENCE BOOKS:

- Real-Time Systems Design and Analysis, Phillip. A. Laplante, second 1. cdition, PHI, 2005.
- 2. Real-Time Systems Development, Rob Williams, Elsevier. 2006.
- 3. Embedded Systems, Raj Kamal, Tata Mc Graw Hill, India, 2005.

IMAGE PROCESSING

Subject Code	: 10EC763	IA Marks	: 25
No. of Lecture Hrs/Wee	k : 04	Exam Hours	: 03
Iotal no. of Lecture Hrs	. : 52	Exam Marks	· 100

PART-A

UNIT-1

DIGITAL IMAGE FUNDAMENTALS: What is Digital Image Processing. fundamental Steps in Digital Image Processing, Components of an Image processing system, elements of Visual Perception. **6** Hours

UNIT - 2

Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, Linear and Nonlinear Operations.

6 Hours



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VIII SEMESTER WIRELESS COMMUNICATION

Subject Code	: 10EC81	IA Marks	: 25
No. of Lecture Hrs/	Week:04	Exam Hours	: 03
Total no. of Lecture	Hrs. : 52	Exam Marks	: 100

PART-A

UNIT-1

Introduction to wireless telecommunication systems and Networks, History and Evolution Different generations of wireless cellular networks 1G, 2g,3G and 4G networks. **6 Hours**

UNIT-2

Common Cellular System components, Common cellular network components, Hardware and software, views of cellular networks, 3G cellular systems components, Cellular component identification Call establishment.

UNIT-3

Wireless network architecture and operation, Cellular concept Cell fundamentals, Capacity expansion techniques, Cellular backbone networks, Mobility management, Radio resources and power management Wireless network security. 7 Hours

UNIT-4

GSM and TDMA techniques, GSM system overview, GSM Network and system Architecture, GSM channel concepts, GSM identifiers

6 Hours

7 Hours

PART-B

UNIT - 5

GSM system operation, Traffic cases, Cal handoff, Roaming, GSM protocol architecture. TDMA systems. 6 Hours

UNIT-6

CDMA technology, CDMA overview, CDMA channel concept CDMA operations. 6 Hours

UNIT - 7

Wireless Modulation techniques and Hardware, Characteristics of air interface, Path loss models, wireless coding techniques, Digital modulation

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techniques, OFDM, UWB radio techniques, Diversity techniques, Typical GSM Hardware. 7 Hours

UNIT-8

Introduction to wireless LAN 802.11X technologies, Evolution of Wireless LAN Introduction to 802.15X technologies in PAN Application and architecture Bluctooth Introduction to Broadband wircless MAN, 802.16X technologies. 7 Hours

TEXT BOOK:

1. Wireless Telecom Systems and networks, Mullet: Thomson Learning 2006.

REFERENCE BOOKS:

- 1. Mobile Cellular Telecommunication, Lec W.C.Y, MGH, 2nd, 2009.
- 2. Wireless communication - D P Agrawal: 2nd Edition Thomson learning 2007.
- 3. Fundamentals of Wireless Communication, David Tse, Pramod Viswanath, Cambridge 2005.
- 4. S. S. Manvi, M. S. Kakkasageri, "Wireles and Mobile Network concepts and protocols", John Wiley India Pvt. Ltd, 1" edition, 2010.
- 5. "Wireless Communication - Principles & Practice", T.S. Rappaport, PHI 2001.

DIGITAL SWITCHING SYSTEMS

Subject Code	:10EC82	IA Marks	: 25
No. of Lecture Hrs/Week	:04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

PART-A

UNIT - 1

Developments of telecommunications, Network structure, Network services, terminology, Regulation, Standards. Introduction to telecommunications transmission, Power levels, Four wire circuits, Digital transmission, FDM, TDM, PDH and SDH, Transmission performance.

7 Hours



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POWER ELECTRONICS

Subject Code	:10EC73	IA Marks	: 25
No. of Lecture Hrs/Week	:04	Exam Hours	: 03
Total no. of Lecture Hrs.	: 52	Exam Marks	: 100

PART - A

UNIT - 1

Introduction, Applications of power electronics, Power semiconductor devices, Control characteristics, Types of power electronics circuits, Peripheral effects. 6 Hours

UNIT - 2

POWER TRANSISTOR: Power BJT's, Switching characteristics, Switching limits, Base derive control, Power MOSFET's, Switching characteristics, Gate drive, IGBT's, Isolation of gate and base drives.

UNIT-3

6 Hours

INTRODUCTION TO THYRISTORS: Principle of operation states anode-cathode characteristics, Two transistor model. Turn-on ·Methods, Dynamic Turn-on and turn-off characteristics, Gate characteristics, Gate trigger circuits, di / dt and dv / dt protection, Thyristor firing circuits.

UNIT-4

7 Hours

CONTROLLED RECTIFIERS: Introduction, Principles of phase controlled converter operation, 1φ fully controlled converters, Duel converters, 1φ semi converters (all converters with R & RL load).

7 Hours

PART-B

UNIT-5

Thyristor turn off methods, natural and forced commutation, self commutation, class A and class B types, Complementary commutation, auxiliary commutation, external pulse commutation, AC line commutation, numerical problems. 7 Hours

UNIT-6

AC VOLTAGE CONTROLLERS: Introduction, Principles of on and off control, Principles of phase control, Single phase controllers with restive loads and Inductive loads, numerical problems.

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6 Hours



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UNIT-7

DC CHOPPERS: Introduction, Principles of step down and step up choppers, Step down chopper with RL loads, Chopper classification, Switch mode regulators - buck, boost and buck - boost regulators.

6 Hours

UNIT - 8

INVERTORS: Introduction, Principles of operation, Petformance parameters, 1 pbridge inverter, voltage control of 1 p invertors, current source invertors, Variable DC link inverter.

TEXT BOOKS:

7 Hours

- 1. "Power Electronics" M. H. Rashid 3rd edition, PHI / Pearson publisher
- 2. "Power Electronics" M. D. Singh and Kanchandani K.B. TMH publisher, 2nd Ed. 2007.

REFERENCE BOOKS:

- 1. "Power Electronics, Essentials and Applications", L Umanand, John Wiley India Pvt. Ltd, 2009.
- 2. "Power Electronics", Daniel W. Hart, McGraw Hill, 2010. 3. "Power Electronics", V Nattarasu and R.S. Anandamurhty, Pearson/Sanguine Pub. 2006.

EMBEDED SYSTEM DESIGN

Subject Code No. of Lecture Hrs/Week Total no. of Lecture Hrs.	: 10EC74 : 04 : 52	IA Marks Exam Hours Exam Marks	: 25 : 03
Total no. of Lecture Hrs.	: 52 -	Exam Ho Exam Ma	ours arks

PART-A

UNIT 1:

Introduction to Embedded System: Introducing Embedded Systems, Philosophy, Embedded Systems, Embedded Design and Development Process. 5 Hours

UNIT 2:

The Hardware Side: An Introduction, The Core Level, Representing Information, Understanding Numbers, Addresses, Instructions, Registers-A



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NAVODAYA INSTITUTE OF TECHNOLOGY

BIJJJENAGERE ROAD, RAICHUR-584 103 (Affiliated to Visvesvaraya Technological University, Belgaum)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the project work entitled "IOT BASED INTELLIGENT FARMING USING ARDUINO MEGA 2560" carried out by Mr PRAVEEN KUMAR (3NA12EC402), Mr K VISHAL (3NA13EC012), Mr SHARANABASAVA (3NA13EC024) and Mr UDAY KUMAR B (3NA14EC406) are bonafide students of NAVODAYA INSTITUTE OF TECHNOLOGY, RAICHUR in partial fulfillment for the award of Bachelor of Engineering in Electronics and Communication Engineering of the Visvesvaraya Technological University, Belgavi during the year 2017-18. It is certified that all corrections suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it setsifies the academic requirements in respect of Project work prescribed for the said Degree.

2

Prof Amarappa B Pagi

Dr.K.M Pallani Swamy

1211 Ca

Dr.M.V Mallikarjuna

External Viva Name of the examiners

1. H Gargedhar

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Signature with date

Head of Department PRINCIPAL Electronics & Communication Engineeri@Navodaya Institute of Technology (NII) Navodaya Institute of Technology (NII) RAICHUR-584 103

ABSTRACT

The use of innovative tools based on digital technologies in farming is expected to bring a number of benefits, such as increased productivity, increased profitability, and reduced environmental footprint, just to name a few. The use of digital technologies facilitating a higher productivity is recommended by the Food and Agricultural Organization of the UN (FAO), as the associated increase in productivity can help reduce the food security risk faced in some regions of the world. If we focus on the Indian case, where food security is a major concern, digital technologies have the potential of helping Indian farmers face other important challenges that are more specific to nation, such as profitability, environmental footprint and sustainability of their exploitations and businesses.

By smart farming we understand the application of data gathering (edge intelligence), data processing, data analysis, Smart Irrigation and automation technologies on the overall value chain, that jointly orchestrated allow operation and management improvement (analytics) of a farm with respect to standard operations (near real time) and re-use of these data (animal-plant-soil) in improved chain transparency (food safety) and chain optimization (smart data). Such capabilities will be necessarily supported by Internet of Things (IoT) technologies using Aurduino ATMEGA 2560.



Head of Department

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Electronics & Communication EngineeringRAICHUR-584 103 Navodaya Institute of Technology (NI); RAICHUR-584 103

CHAPTER 1:

INTRODUCTION

From the farmer's point of view, smart farming should provide the farmer with added value in the form of better decision making or more efficient exploitation operations and management. In this sense, smart farming is strongly related, but not limited, to the concepts of Precision Agriculture and Precision Livestock Farming. Farming modalities may include the production of vegetables, cattle (including dairy production) and others. Smart farming applications do not target only large, conventional farming exploitations, but could also be new levers to boost other common or growing trends in agricultural exploitations, such as family farming (small or complex spaces, specific cultures and/or cattle, preservation of high quality or peculiar varieties,...), organic farming, and enhance a very respectful and transparent farming accordingly to European consumer, society and market consciousness. Smart farming can also provide great benefits in terms of environmental issues, for example, through more efficient use of water, or optimization of treatments.

The term food safety refers to the awareness, prevention and risk-based measures of food borne illnesses, from food production to consumption.1 Consumers' demands are currently the main drivers encouraging food industries to produce healthier and safe food products that being at their highest possible quality specifications. The challenge is that transparency of food safety should become data-driven and near real time so that new applications and chain cooperation can lead to a more dynamic and responsive food production network. This terminology includes: - "Food loss", which refers to food that spills, spoils, incurs an abnormal reduction in quality such as bruising or wilting, or

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CHAPTER 3:

OVERVIEW OF THE PROJECT



3.3.1 Arduino MEGA 2560:



Fig 3.3 Aurdino Mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. The ATmega2560 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega2560 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. The Mega 2560 is an update to the Arduino Mega, which it replaces.

Arduino Mega 2560 has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.

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Components of a typical linear power supply

Fig 3.3 5V regulated power supply

Transformer:

A transformer is an electrical device which is used to convert electrical power from one Electrical circuit to another without change in frequency.

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase in output voltage, step-down transformers decrease in output voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage to a safer low voltage. The input coil is called the primary and the output coil is called the secondary. There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the cone Navodaya Institute of Technology (Mille 17



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Electrical and Engineering Electronics

Analysis of Linear Systems, David K. Cheng, Narosa Publishing House, 11th reprint, 2002 3.

ELECTRICAL and ELECTRONIC MEASUREMENTS and 10EE35 INSTRUMENTATION

Subject Code	: .	10EE35	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT 1:

1-(a) Units and Dimensions: Review of fundamental and derived units. S.I. units. Dimensional equations, problems. 3 Hours

1-(b) Measurement of Resistance: Wheatstone's bridge, sensitivity, limitations. Kelvin's double bridge. Earth resistance, measurement by fall of potential method and by using Megger. 3 Hours

UNIT 2:

Measurement of Inductance and Capacitance:' Sources and detectors, Maxwell's inductance bridge, Maxwell's inductance &capacitance bridge, Hay's bridge, Anderson's bridge, Desauty's bridge, Schering bridge. Shielding of bridges. Problems. 07 Hours

UNIT 3:

Extension of Instrument Ranges: Shunts and multipliers. Construction and theory of instrument transformers, Equations for ratio and phase angle errors of C.T. and P.T (derivations excluded). Turns compensation, illustrative examples (excluding problems on turns compensation), Silsbees's method of 07 Hours testing CT.

UNIT 4:

Measurement of Power and Energy: Dynamometer wattmeter. UPF and LPF wattmeters, Measurement of real and reactive power in three-phase circuits. Induction type energy meter -- construction, theory, errors, adjustments and calibration. Principle of working of electronic energy meter. **06 Hours**

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RAICHUR-584 103



PART – B

UNIT 5:

(a) Construction and operation of electro-dynamometer single-phase power factor meter. Weston frequency meter and phase sequence indicator.
 (b) Electronic Instrumental Interduction T = 1010

(b) Electronic Instruments: Introduction. True RMS responding voltmeter. Electronic multimeters. Digital voltmeters. Q meter. UNIT 6: 04 Hours

Dual trace oscilloscope — front panel details of a typical dual trace oscilloscope. Method of measuring voltage, current, phase, frequency and period. Use of Lissajous patterns. Working of a digital storage oscilloscope. Brief note on current probes. 06 Hours

UNIT 7:

Transducers: Classification and selection of transducers. Strain gauges. LVDT. Measurement of temperature and pressure. Photo-conductive and photo-voltaic cells. 06 Hours

UNIT 8:

(a) Interfacing resistive transducers to electronic circuits. Introduction to data acquisition systems. 2 Hours

(b) Display Devices and Signal Generators: X-Y recorders. Nixie tubes. LCD and LED display. Signal generators and function generators. 4 Hours

Text Books

- 1. Electrical and Electronic Measurements and Instrumentation, A. K. Sawhney, Dhanpatrai and Sons, New Delhi.
- 2. Modern Electronic Instrumentation and Measuring Techniques, Cooper D. and A.D. Heifrick, PHI, 2009 Edition.

References

1. Electronic Instrumentation and Measurement, David A. Bell, oxford Publication ,2nd Edition, 2009.

2. Electrical Measurements and Measuring Instruments, Golding and Widdies, Pitman

10EE36 ELECTRIC POWER GENERATION

Subject Code	:	10EE36	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART – A

UNIT 1:

Sources of Electrical Power: Wind, solar, fuel cell, tidal, geo-thermal, hydro-electric, thermal-steam, diesel, gas, nuclear power plants (block diagram approach only). Concept of co-generation. Combined heat and power distributed generation. 06 Hours

UNIT 2:

Diesel electric plants. Gas turbine plants. Mini, micro, and bio generation. Concept of distributed generation. 06 Hours



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UNIT 3:

(a) Hydro Power Generation: Selection of site. Classification of hydro-electric plants. General arrangement and operation. Hydroelectric plant power station structure and control. 5 Hours (b) Thermal Power Generation: Introduction. Main parts of a thermal power plant. Working. Plant layout. **3 Hours**

· UNIT 4:

Nuclear Power Station: Introduction. Pros and cons of nuclear power generation. Selection of site, cost, components of reactors. Description of fuel sources. Safety of nuclear power reactor. 6 Hours

PART-B

UNIT 5 and 6:

(a) Economics Aspects: Introduction. Terms commonly used in system operation. Diversity factor, load factor, plant capacity factor, plant use factor, plant utilization factor and loss factor, load duration curve. Cost of generating station, factors influencing the rate of tariff designing, tariff, types of tariff. Power factor improvement.

(b) Substations: Introduction, types, Bus bar arrangement schemes, Location of substation equipment. Reactors and capacitors. Interconnection of power stations. 14 Hours

UNIT 7 and 8:

Grounding Systems: Introduction, grounding systems. Neutral grounding. Ungrounded system. Resonant grounding. Solid grounding, reactance grounding, resistance grounding. Earthing transformer. 12 Hours Neutral grounding transformer. **Text Books**

1. Power System Engineering, A. Chakrabarti, M. L. Soni, and P.V. Gupta, Dhanpat Rai and Co.,NewDelhi.

2. Electric Power Generation, Transmission and Distribution, S. N. Singh, PHI, 2nd Edition, 2009.

References

1. Elements of Electrical Power System Design, M. V. Deshpande, PHI,2010

ANALOG ELECTRONICS LAB 1

(Common to EC/TC/EE/IT/BM/ML)

Sub Code	40ESL37	IA Marks	:	25
Hrs/ Week	 03	Exam Hours	1	03
Total Hrs	00	Exam Marks	:	50

NOTE: Use the Discrete components to test the circuits. LabView can be used for the verification and testing along with the above.

1. Wiring of RC coupled Single stage FET & BJT amplifier and determination of the gain-frequency response, input and output impedances.

2. Wiring of BJT Darlington Emitter follower with and without bootstrapping and determination of the gain, input and output impedances (Single circuit) (One Experiment)

TE OF JO	for two stage BIT Voltage series feed back an printer and determination of	of the gain Frequency
response.	input and output impedances will advoct on epilack (One Experiment)	Galeillay 195
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2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

Reference Book:

- 1. B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
- Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers

MICROCONTROLLERS

(Common to EC/TC/EE/IT/BM/ML)

Sub Code	:	10ES42	IA Marks	•	25
Hrs/ Week	:	04	Exam Hours		03
Total Hrs.	:	'52	Exam Marks	:	100

UNIT 1:

Microprocessors and microcontroller. Introduction, Microprocessors and Microcontrollers, RISC & CISC CPU Architectures, Harvard & Von-Neumann CPU architecture, Computer software.

The 8051 Architecture: Introduction, Architecture of 8051, Pin diagram of 8051, Memory organization, External Memory interfacing, Stacks.

6 Hours

UNIT 2:

Addressing Modes: Introduction, Instruction syntax, Data types, Subroutines, Addressing modes: Immediate addressing, Register addressing, Direct addressing, Indirect addressing, relative addressing, Absolute addressing, Long addressing, Indexed addressing, Bit inherent addressing, bit direct addressing.

Instruction set: Instruction timings, 8051 instructions: Data transfer instructions, Arithmetic DF Logical instructions, Branch instructions, Subroutine instructions, Bit manipulation Head of the Department



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UNIT 3:

8051 programming: Assembler directives, Assembly language programs and Time delay 6 Hours calculations.

UNIT 4: 1 "

8051 Interfacing and Applications: Basics of I/O concepts, I/O Port Operation, Interfacing 8051 to LCD, Keyboard, parallel and serial ADC, DAC, Stepper motor interfacing and DC motor interfacing and programming

7 Hours

UNIT 5: ·

8051 Interrupts and Timers/counters: Basics of interrupts, 8051 interrupt structure, Timers and Counters, 8051 timers/counters, programming 8051 timers in assembly and C . 6 Hours

UNIT 6:

8051 Serial Communication: Data communication, Basics of Serial Data Communication, 8051 Serial Communication, connections to RS-232, Serial communication Programming in assembly and C.

8255A Programmable Peripheral Interface:, Architecture of 8255A, I/O addressing,, I/O devices interfacing with 8051 using 8255A.

6 Hours

Course Aim - The MSP430 microcontroller is ideally suited for development of low-power embedded systems that must run on batteries for many years. There are also applications where MSP430 microcontroller must operate on energy harvested from the environment. This is possible due to the ultralow power operation of MSP430 and the fact that it provides a complete system solution including a RISC CPU, flash memory, on-chip data converters and on-chip peripherals.

UNIT 7:

Motivation for MSP430microcontrollers - Low Power embedded systems, On-chip peripherals (analog and digital), low-power RF capabilities. Target applications (Single-chip, low cost, low power, high performance system design).

2 Hours

MSP430 RISC CPU architecture, Compiler-friendly features, Instruction set, Clock system, Memory subsystem. Key differentiating factors between different MSP430 families.

> Electronics Engineering Navodaya Institute of Technology. RAICHUR-584 103. Karnataka

ably+C projects for MSP430 mid Denardmentine ingleptricanaina

2 Hours

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10EE61 POWER SYSTEM ANALYSIS AND STABILITY

Subject Code	:	10EE61	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

. UNIT - 1

REPRESENTATION OF POWER SYSTEM COMPONENTS: Circuit models of Transmission line, Synchronous machines, Transformers and load. Single line diagram, impedance and reactance diagrams. 8 Hours Per unit system, per unit impedance diagram of power system.

UNIT-2

SYMMETRICAL 3 - PHASE, FAULTS: Analysis of Synchronous machines and Power system. Transients on a transmission line, Short-Circuit currents and the reactance of synchronous machines with 6 Hours and without load

UNIT - 3 & 4

SYMMETRICAL COMPONENTS: Introduction, analysis of unbalanced load against balanced Threephase supply, neutral shift. Resolution of unbalanced phasors into their symmetrical components, Phase shift of symmetrical components in star-delta transformer bank, Power in terms of symmetrical components, Analysis of balanced and unbalanced loads against unbalanced 3 phase supply, Sequence impedances and networks of power system elements (alternator, transformer and transmission line) Sequence networks of power systems. Measurement of sequence impedance of synchronous generator. 12 Hours •

Part - B

UNIT - 5 & 6

UNSYMMETRICAL FAULTS: L-G, L-L, L-L-G faults on an unbalanced alternator with and without fault impedance. Unsymmetrical faults on a power system with and without fault impedance. Open **14 Hours** conductor faults in power system.

UNIT - 7

STABILITY STUDIES: Introduction, Steady state and transient stability. Rotor dynamics and the swing equation. Equal area criterion for transient stability evaluation and its applications. 8 Hours

UNIT-8

UNBALANCED OPERATION OF THREE PHASE INDUCTION MOTRORS: Analysis of three phase induction motor with one line open., Analysis of three phase induction motor with unbalanced 4 Hours voltage.

TEXT BOOKS:

- 1.
- 2.
- Elements of Power System Analysis, W.D.Stevenson, TMH,4th Edition Modern Power System Analysis, I. J. Angrath and D.P.Kothari- TMH, 3rd Edition,2003. Symmetrical Components and Short Circuit Studies, Dr.P.N.Reddy, Khanna Publishers ENCE BOOKS: Head of the Department 3. RENCE BOOKS:

Power System Analysis, Hadpadtm That of Bleiotnical and

Power system Analysis, R. Begectrohios Eligh Bering publications, 2nd edition, 2006

Navodaya Institute of Technology RAICHUR-584 103. Karnataka

Computer Alded Power system analysis, G.L., Kusic, PHI.Indian Edition, 2010 . Power System Analysis, W.D.Stevenson & Grainger, TMH, First Edition, 2003.

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10EE62 SWITCHGEAR & PROTECTION

WITCHChatter	T	10EE62 >	1 IA Marks	1:	25
Subject Code	-	04	Exam Hours	1:	03
No. of Lecture 118.7 week		52	Exam Marks	:	100
Total No. of Lecture IIIs.	1	36	and the second se		

PART - A

SWITCHES AND FUSES: Introduction, energy management of power system, definition of switchgear, switches - isolating, load breaking and earthing. Introduction to fuse, fuse law, cut -off characteristics,: Time current characteristics, fuse material, HRC fuse, liquid fuse, Application of fuse 4 Hours

PRINCIPLES OF CIRCUIT BREAKERS: Introduction, requirement of a circuit breakers, difference between an isolator and circuit breaker, basic principle of operation of a circuit breaker, phenomena of arc, properties of are, initiation and maintenance of are, are interruption theories - slepian's theory and energy balance theory, Restriking voltage, recovery voltage, Rate of rise of Restriking voltage, DC circuit breaking, AC circuit breaking, current chopping, capacitance switching, resistance switching, Rating of Circuit breakers.

CIRCUITS BREAKERS: Air Circuit breakers - Air break and Air blast Circuit breakers, oil Circuit breakers - Single break, double break, minimum OCB, SF₆ breaker - Preparation of SF₆ gas, Puffer and non Puffer type of SF₆ breakers. Vacuum circuit breakers - principle of operation and constructional details. Advantages and disadvantages of different types of Circuit breakers, Testing of Circuit breakers, Unit testing, synthetic testing, substitution test, compensation test and capacitance test.

LIGHTNING ARRESTERS: Causes of over voltages - internal and external, lightning, working

principle of different types of lightning arresters. Shield wires. **12 Hours**

PART - B

PROTECTIVE RELAYING: Requirement of Protective Relaying, Zones of protection, primary and backup protection, Essential qualities of Protective Relaying, Classification of Protective Relays 4 Hours

INDUCTION TYPE RELAY: Non-directional and directional over current relays, IDMT and Directional characteristics. Differential relay - Principle of operation, percentage differential relay, bias characteristics, distance relay - Three stepped distance protection, Impedance rolay, Reactance relay, Mho relay, Buchholz relay, Negative Sequence relay, Microprocessor based over current relay - block diagram approach. **10 Hours**

PROTECTION SCHEMES: Generator Protection - Merz price protection, prime mover faults, stator and rotor faults, protection against abnormal conditions - unbalanced loading, loss of excitation, over speeding. Transformer Protection - Differential protection, differential relay with harmonic restraint, Inter turn faults tion motor protection - protection against crespiral faults, such as phase fault, ground fault, and operating conditions such as single phasing phase fault, over load. 12 Hours OFIC

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10 Hours

10EE71 COMPUTER TECHNIQUES IN POWER SYSTEM ANALYSIS

Subject Code	:	10EE71	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	1:	52	Exam Marks	:	100

PART - A

UNIT-1

NETWORK TOPOLOGY: Introduction, Elementary graph theory - oriented graph, tree, co-tree, basic cut-sets, basic loops; Incidence matrices - Element-node, Bus incidence, Tree-branch path, Basic cut-set, Augmented cut-set, Basic loop and Augmented loop, Primitive network - impedance form and admittance **6** Hours form.

UNIT - 2

NETWORK MATRICES: Introduction, Formation of YBUS by method of inspection (including transformer off-nominal tap setting) and method of singular transformation ($Y_{BUS} = A^{T}yA$), Formation of Bus Impedance matrix by step by step building algorithm (without mutual coupling elements). 6 Hours

UNIT - 3 & 4

LOAD FLOW STUDIES: Introduction, Power flow equations, Classification of buses, Operating constraints, Data for load flow, Gauss-Seidal Method - Algorithm and flow chart for PQ and PV buses (numerical problem for one iteration only), Acceleration of convergence; Newton Raphson's Method -Algorithm and flow chart for NR method in polar coordinates (numerical problem for one iteration only). Algorithm for Fast Decoupled load flow method, Comparison of Load Flow Methods. 14 Hours

PART - B

UNIT - 5 & 6

ECONOMIC OPERATION OF POWER SYSTEM: Introduction, Performance curves, Economic generation scheduling neglecting losses and generator limits, Economic generation scheduling including generator limits and neglecting losses; Iterative techniques; Economic Dispatch including transmission losses - approximate penalty factor, iterative technique for solution of economic dispatch with losses; Derivation of transmission loss formula; Optimal scheduling for Hydrothermal plants - problem formulation, solution procedure and algorithm. 12 Hours

UNIT - 7 & 8

with flow charts.

TRANSIENT STABILITY STUDIES: Numerical solution of Swing Equation - Point-by-point method. Modified Euler's method, Runge-Kutta method, Ailne's predictor corrector method. Representation of r system for transient stability studies - load representation, network performance equations. Solution

14 Hours

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TEXT BOOKS:

- 1. Computer Methods in Power System Analysis, Stag, G. W., and El-Abiad, A. H.- McGraw Hill International Student Edition. 1968
- Computer Techniques in Power System Analysis, Pai, M. A- TMH, 2nd edition, 2006. 2.

REFERENCE BOOKS:

- 1. Modern Power System Analysis, Nagrath, I. J., and Kothari, D. P., TMH,3rd Edition, 2003.
- 2. Advanced Power System Analysis and Dynamics, Singh, L. P,
 - New Age International (P) Ltd, New Delhi, 2001.
- 3. Computer Aided Power System Operations and Analysis"- Dhar, R. N, TMH, 1984.
- 4. Power System Analysis, Haadi Sadat, TMH, 2nd Edition, 12th reprint, 2007

10EE72 ELECTRICAL POWER UTILIZATION

. 1.

Subject Code	:	10EE72	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

UNIT - 1

HEATING AND WELDING: Advantages and methods of electric of heating, resistance ovens, induction heating, dielectric heating, the arc furnace, heating of building. Electric welding, resistance and arc welding, control devices and welding equipment. 10 Hours

UNIT - 2

ELECTROLYTIC PROCESS: Fundamental principles, extraction, refining of metals and electroplating. Factors affecting electro deposition process, power supply for electrolytic process. 6 Hours

UNIT - 3 & 4

ILLUMINATION: Laws of illumination, lighting calculation, factory lighting, flood lighting, street lighting, different types of lamps-incandescent, fluorescent, vapor, CFL and LED lamps and their working, **10 Hours** comparision, Glare and its remedy.

PART - B

UNIT - 5, 6 & 7

ELECTRIC TRACTION: Introduction, requirements of an ideal traction, systems of traction, speed time curve, tractive effort, co-efficient of adhesion, selection of traction motors, method of speed control, energy saving by series parallel control, ac traction equipment. AC series motor, characteristics, regenerative braking, linear induction motor and their use. AC traction, diesel electric equipment, trains lighting system, specific energy, factors affecting specific energy consumption. 20 Hours

UNIT - 8

INTRODUCTION TO ELECTRIC AND HYBRID VEHICLES: Configuration and performance of electrical vehicles, traction motor characteristics, tractive effort, transmission requirement, vehicle performance and energy consumption. 6 Hours

TEXT BOOKS:

- 1. Utilization Of Electric Energy, E Openshaw Taylor, 12th Impression, 2009, Universities Press.
- 2. Modern Electric, Hybrid Electric and Fuel Cell Vehicles, Mchrdad, Ehsani, Yimin Gao, Sabastien. E. Gay, Ali Emadi- CRC Press.

REFERENCE BOOKS: Course in Electrical Power, Soni Gunta and Bhatnager-Dhanapat Rai & sons. trical Power, Dr. S.L. Uppal, Khanna Publications **Electronics Engineering** Navodaya Instructs of Technology, RAICHUR .58-1 10. . Karnataka

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PART-B

UNIT 5:

Controlled Rectifiers: Introduction. Principle of phase controlled converter operation. Single- phase semi-converters. Full converters. Three-phase half-wave converters. Three-phase full-wave converters. 7 Hours

UNIT 6:

Choppers: Introduction. Principle of step-down and step-up chopper with R-L load. Performance parameters. Chopper classification. Analysis of impulse commutated thyristor chopper (only qualitative analysis) 6 Hours

UNIT 7:

Inverters: Introduction. Principle of operation. Performance parameters. Single-phase bridge inverters. Threephase inverters. Voltage control of single-phase inverters - single pulse width, multiple pulse width, and sinusoidal pulse with modulation. Current source inverters. 7 Hours

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UNIT S:

(a)AC Voltage Controllers: Introduction. Principle of ON-OFF and phase control. Single-phase, bidirectional controllers with resistive and R-L loads.

(b) Electromagnetic Compatibility: Introduction, effect of power electronic converters and remedial measures.

6 Hours

Text Book:

1. Power Electronics, M.H.Rashid, , Pearson, 3rd Edition, 2006.

2. Power Electronics, M.D. Singh and Khanchandani K.B., T.M.H., 2nd Edition, 2001

References

1. Power Electronics Essentials and Applications, L. Umanand, Wiley India Pvt Ltd, Reprint, 2010

2. Thyristorised Power Controllers, G.K. Dubey, S.R. Doradla, A. Joshi and R.M.K. Sinha, New Age International Publishers.

3. Power Electronics - Converters, Applications and Design, Ned Mohan, Tore M. Undeland, and William P. Robins, Third Edition, John Wiley and Sons, 2008.

4. Power Electronics: A Simplified Approach, R.S. Ananda Murthy and V. Nattarasu, pearson/Sanguine Technical Publishers.

10EE46 TRANSFORMERS AND INDUCTION MACHINES

Subject Code	:	10EE46	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT 1:

Basic Concepts: Principle of operation of transformer Constructional details of shell type and core type single-phase and three-phase transformers. Eff operational details of shell type and core type Head of the Electrical power transformer under Head of the Electrical Department of Engineering Department of Technology, Department of Kamalaka Electronics Engineering Navodaya Institute of Technology, avou aya manule of feormonys RAICHUR-584 103. Kamataka

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no load and on load (with phasor diagrams). Concept of ideal transformers, current inrush in transformers.

UNIT 2:

Single-phase Transformers: Equivalent circuit, losses, efficiency, condition for maximum efficiency, all day efficiency. Open circuit and Short circuit tests, calculation of parameters of equivalent circuit. Regulation, predetermination of efficiency and regulation. Polarity test, Sumpner's test. **6** Hours

UNIT 3:

Parallel operation - need, conditions to be satisfied for parallel operation. Load sharing in case of similar and dissimilar transformers. Auto-transformers, copper economy. Brief discussion on constant voltage transformer, constant current transformer. 6 Hours UNIT 4:

Three-phase Transformers: Introduction, choice between single unit three-phase transformer and bank of single-phase transformers. Transformer connection for three phase operation -

star/star,delta/delta,star/delta,zigzag/star and vec/vec,choice of connection. Phase conversion - Scott connection for three-phase to two-phase conversion. Labeling of three-phase transformer terminals, phase shift between primary and secondary and vector groups. Conditions for parallel operation of three-phase transformers, load sharing. Equivalent circuit of three-phase transformer. 8 Hours PART-B

UNIT 5:

Basic Concepts of three phase Induction Machines: Concept of rotating magnetic field. Principle of operation, construction, classification and types - single-phase, three-phase, squirrel-cage, slip-ring. Slip, torque, torque-slip characteristic covering motoring, generating and braking regions of operation. Maximum torque. 7 Hours

UNIT 6:

Three-phase Induction Motor: Phasor diagram of induction motor on no-load and on load. equivalent circuit Losses, efficiency, No-load and blocked rotor tests. Circle diagram and performance evaluation of the motor. Cogging and crawling. 6Hours UNIT 7:

High torque rotors-double cage and deep rotor bars. Equivalent circuit and performance evaluation of double cage induction motor. Induction generator - externally excited and self excited. Importance of induction generators in windmills. **6** Hours

UNIT 8:

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(a) Starting and speed Control of Three-phase Induction Motors: Need for starter. Direct on line (DOL), Star-Delta and autotransformer starting. Rotor resistance starting. Soft(electronic) starters. Speed control - voltage, frequency, and rotor resistance. 4 Hours

(b) Single-phase Induction Motor: Double revolving field theory and principle of operation. Types of single-phase induction motors: split-phase, capacitor start, shaded pole motors. Applications. 3 Hours **Text Books**

1. Electric Machines, I. J. Nagrath and D. P. Kothari, T.M.H.4th Edition.2010.

2. Electric Machines, Mulukuntla S.Sarma, Mukesh K.Pathak, Cengage Learing, First edition, 2009. References

Performance and Design of A.C. Machines, M. G. Say, C.B.S. Publishers, 3rd Edition, 2002. Theory of Alternating Current Machines, Alapiter Langsdorf, T.M.H, 2rd edition, 2001.. Electrical Machines and Transformers provision, 1rd edition, 2007. Transformers, BHEL, TMH, 2rd Holton, Eight fenzing 2008, Head of the Engine of Technology, Head of the Engine of Technology, Department of Engine of Technology, LUR, 2rd Holton, 2rd Holton, 2rd edition, 2007. Mavodaya, 103. Karnataka Navodaya, 103. Karnataka Navodaya, 103. Karnataka 1.

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UNIT -2 and 3

TIME – DOMAIN REPRESENTATIONS FOR LTI SYSTEMS-Convolution, impulse response, properties, solution of differential and difference equations, block diagram representation. 10 Hours UNIT - 4

FOURIER REPRESENTATION OF PERIODIC SIGNALS-Introduction, Fourier representation of continuous-time periodic signals (FS), properties of continuous-time Fourier series (excluding derivation of defining equations for CTFS), Fourier representation of discrete-time periodic signals, properties of discrete-time Fourier series (DTFS).

PART - B

UNIT - 5

THE CONTINUOUS-TIME FOURIER TRANSFORM-Representation of a periodic signals: continuous-time Fourier transform (FT), Properties of continuous-time Fourier transform. Application; frequency response of LTI systems, Solutions of differential equations. 7 Hours

UNIT - 6

THE DISCRETE-TIME FOURIER TRANSFORM-Representations of periodic signals: The discretetime Fourier transform (DTFT), Properties of DTFT. Application; frequency response of LTI systems, Solutions of differential equations. 7 Hours

UNIT -7 and 8

Z-TRANSFORMS-Introduction, Z-transform, properties of ROC, properties of Z-transforms, inversion of Z-transform methods - power series and partial expansion, Transforms analysis of LTI systems, transfer function, stability and causality, unilateral Z-transform and its application to solve difference equations. 12 Hours

TEXT BOOKS:

Signals and Systems- Simon Haykin and Barry Van Veen, John Wiley & Sons, 2nd Edition 2008.
 Fundamentals of Signals and Systems - Michel J Roberts, TMH, 2nd Edition, 2010.

- **REFERENCE BOOKS:**
- Signals and Systems, Alan V Oppenheim, Alan S. Willsky and S. Hamid Nawab, PHI, 2nd edition, 2009.
- 2. Signals and Systems, H P Hsu and others, Schaums Outline Series, TMH,2nd Edition,2008.

10EE53 TRANSMISSION AND DISTRIBUTION

Subject Code	:	10EE53	IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

TYPICAL TRANSMISSION & DISTRIBUTION SYSTEMS SCHEME-General layout of power system, Standard voltages for transmission, advantages of high voltage transmission. Transmission line efficiency and line drop. Feeders, distributors & service mains.; ⁵¹ 5 Hours

UNIT - 2

UNIT - 1

OVERHEAD TRANSMISSION LINES- Types of supporting structures and line conductors used. Sag calculation- supports at same level and at different levels. Effect of wind and ice, Sag at erection, Stringing chart and sag templates. Line vibrators. 5 Hours



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UNIT-3

INSULATORS- Introduction, materials used, types, potential distribution over a string of suspension insulators. String efficiency & methods of increasing strings efficiency, grading rings and arcing horns. Testing of insulators. 6 Hours

UNIT-4

(A)CORONA- Phenomena, disruptive and visual critical voltages, corona power loss. Advantages and disadvantages of corona. 4 Hours

Part - B

(B)UNDERGROUND CABLES- Types, material used, insulation resistance, thermal rating of cables, charging current, grading of cables, capacitance grading & inter sheath grading, testing of cables. 6 Hours

UNIT-5 and 6

Line parameters: calculation of inductance of single phase line, 3phase lines with equilateral spacing, unsymmetrical spacing, double circuit and transposed lines. Inductance of composite conductor lines. Capacitance- of single-phase line, 3phase lines with equilateral spacing, unsymmetrical spacing, double circuit and transposed lines. Capacitance of composite conductor lines. **12 Hours**

UNIT - 7

Performance of power transmission lines- Short transmission lines, medium transmission lines- nominal T, end condenser and π models, long transmission lines, ABCD constants of transmission lines, Ferranti effect, line regulation. 8 Hours

UNIT - 8

Distribution- Requirements of power distribution, radial & ring main systems, ac and dc distribution: calculation for concentrated loads and uniform loading. 6 Hours TEXT BOOKS:

- 1
 - A Course in Electrical Power- Soni Gupta & Bhatnaagar, Dhanpat Rai & Sons. 2.
 - Electrical Power Systems- C. L. Wadhwa, New Age International,5th Edition, 2009.

REFERENCE BOOKS:

- 1. Elements of Power System Analysis- W.D. Stevenson, TMH,4th Edition
- Electric power generation Transmission & Distribution- S. M. Singh, PHI,2nd Edition, 2009. 2.

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3. Electrical Power- Dr. S. L. Uppal, Khanna Publications

10EE54 D.C. MACHINES AND SYNCHRONOUS MACHINES

Subject Code	:	10EE54	- IA Marks	:	25
No. of Lecture Hrs./ Week	:	04	Exam Hours	:	03
Total No. of Lecture Hrs.	:	52	Exam Marks	:	100

PART - A

UNIT - 1

DC GENERATOR-Review of basics of DC machines, classification of DC generator, types of armature winding, EMF equation, no-load characteristic, armature reaction, load characteristics. Commutation, types of Commutation, commutation difficulties interpoles, compensating winding and equalizer rings (only qualitative treatment). Head of the Department Head of the Department



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8 Hours

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NAVODAYA INSTITUTE OF TECHNOLOGY

Navodaya Institute of Technology

Bijangera Road, Raichur – 584101, Karnataka. (Affiliated to Visvesvaraya Technological University, Belagum)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

CERTIFICATE

Certified that the project work entitled "MINIMIZING PENALTY IN INDUSTRIAL POWER CONSUMPTIONS BY ENGAGING APFC USING ARDUINO" carried out by NAGALINGAMMA (3NA15EE407), NAUSHIFTA KHANAM (3NA15EE408), VEENA (3NA15EE417), SARASWAT1 (3NA14EE413), are bonafide students of FOURTH YEAR (8th sem) in partial fulfillment for the award of Bachelor of Engineering in Navodaya Institute of Technology, Raichur of the Visveswaraiah Technological University, Belagavi during the year 2017-18. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

Signature o

of the examiners

Dr. M.SRINIVASAN

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Signature of the HOD Dr.M.SRINIVASAN

Signature of the Principal

Dr. M.V MALLIKARJUNA

External Viva

Signature with date Head of the Department Department of Electrical and Electronics Engineering avoidaya Institute of Vechnology RAICHUR-584 103

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ABSTRACT

In the present technological revolution power is very precious so we need to find out the cause of power loss and improve the power system. Due to industrialization the use of inductive load increases and hence power system losses its efficiency. So we need to improve the power factor with a suitable method. Whenever we are thinking about any programmable device then the embedded technology comes into forefront. The embedded is nowadays very much popular and most of the product are developed with microcontroller based embedded technology. The project is designed to minimize penalty for industrial units by using automatic power factor correction unit. Power factor is defined as the ratio of real power to apparent power. This definition is often mathematically represented as kW/kVA, where the numerator is the active (real) power and the denominator is the (active + reactive) or apparent power. Reactive power is the non-working power generated by the magnetic and inductive loads, to generate magnetic flux. The increase in reactive power increases the apparent power, so the power factor also decreases. Having low power factor, the industry needs more energy to meet its demand, so the efficiency decreases. In this proposed system the time lag between the zero voltage pulse and zero current pulse duly generated by suitable operational amplifier circuits in comparator mode are fed to two interrupt pins of the microcontroller. It displays the time lag between the current and voltage on an LCD. The program takes over to actuate appropriate number of relays from its output to bring shunt capacitors into the load circuit to get the power factor till it reaches near unity. The microcontroller used in the (m project belongs to Atmega family.



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Minimizing penalty in Industrial power consumption by engaging APFC using Arduino

CHAPTER 1 INTRODUCTION

POWER FACTOR THEORY:

In any AC system the current, and therefore the power, is made up of a number of components based on the nature of the load consuming the power. These are resistive, inductive and capacitive components. In the case of a purely resistive load, for example, electrical resistance heating, incandescent lighting, etc., the current and the voltage are in phase that is the current follows the voltage. Whereas, in the case of inductive loads, the current is out of phase with the voltage and it lags behind the voltage. Except for a few purely resistive loads and synchronous motors, most of the equipment and appliances in the present day consumer installation are inductive in nature, for example, inductive motors of all types, welding machines, electric are and induction furnaces, choke coils and magnetic systems, transformers and regulators, etc. In the case of a capacitive load the current and voltage are again out of phase but now the current leads the voltage. The most common capacitive loads are the capacitors installed for the correction of power factor of the load.

The inductive or the capacitive loads are generally termed as the reactive loads. The significance of these different types of loads is that the active (or true or useful) power can only be consumed in the resistive portion of the load, where the current and the voltage are in phase. (Watt less or) reactive power which is necessary for energizing the magnetic circuit of the equipment (and is thus not available for any useful work). Inductive loads require two forms of power - Working/Active power (measured in kW) to perform the actual work of creating heat, light, motion, machine output, etc., and Reactive power (measured in kVAr) to sustain the electromagnetic field. The current known as wattles current is required to produce the magnetic field around an electric motor. If there was no watt-less current then an electric motor would not turn. The problems arise due to the fact that we can sometimes have too much watt-less current, in those cases we need to remove some of it. The vector combination of these two power components (active and reactive) is termed as Apparent Power (measured in kVA), the value of which varies considerably for the same active power

depending upon the reactive power drawn by the compment.

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CHAPTER 2

BLOCK DIAGRAM



The ac voltage and current is measured using PT and CT circuit respectively. Then these signals are used to measure power factor of a system. All these measurements are done by Arduino microcontroller.

All ac power parameters such as voltage, current, active power, apparent power, frequency, power factor etc. is calculated by Arduino microcontroller. Same can be fed to PC using

U.S.B cable.

Whenever system detects low power factor its connects capacitors in parallel with load using Head of the Department Department of Electrical and switching relays. Electronics Engineering Navodaya metitine of Technology, RAICHUR RAICHUR-584 103. Namalaka tavodaya Institute of Technology (NIT) RAICHUR-584 108 3 2 Page 6

Ninimizing penalty in Industrial power consumption by engaging APFC using Ardulno

3.5 Arduino UNQ microcontroller :-



This microcontroller is used to measure power factor. It also generate control commands to

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include capacitor whenever power factor is low.



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Mechanical Engineering

TEXT BOOKS:

- 1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers
- 2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

REFERENCE BOOK:

- B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
- 2. Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers.

APPLIED THERMODYNAMICS

Subject Code	: 10ME43	IA Marks	: 25
Hours/Week	:04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	: 100

PART-A

UNIT - 1

Combustion thermodynamics: Theoretical (Stoichiometric) air and excess air for combustion of fuels. Mass balance, actual combustion. Exhaust gas analysis. A./ F ratio, Energy balance for a chemical reaction, enthalpy of formation, enthalpy and internal energy of combustion, Combustion efficiency, adiabatic flow temperature.

07 Hours

UNIT-2

Gas power cycle: Air Standard cycles: Carnot, Otto, Diesel, Dual and Stirling cycles, P-V and T-S diagrams, description, efficiencies and mean effective pressures, Comparison of Otto, Diesel and dual cycles.

06 Hours



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UNIT - 3

I.C. Engine: Testing of two stroke and four stroke SI and CI engines for performance Related numerical problems, heat balance, Motoring Method, Willian's line method, swinging field dynamometer, Morse test.

06 Hours

UNIT - 4

Vapour Power Cycles: Carnot vapour power cycles, drawbacks as a reference cycle, Simple Rankine cycle, description, T- S diagram, analysis for performance, comparison of Carnot and Rankine cycles. Effects of pressure and temperature on Rankine cycle performance. Actual vapour power cycles. Ideal and practical regenerative Rankine cycle, open and closed feed water heaters, Reheat Rankine cycle.

07 Hours

PART-B

UNIT - 5

Reciprocating Compressors: Operation of a single stage reciprocating compressors, work input through P-V diagram and steady state steady flow analysis. Effect of clearance and volumetric efficiency. Adiabatic, isothermal and mechanical efficiencies. Multistage compressor, saving in work, optimum intermediate pressure, inter- cooling, minimum work for compression.

06 Hours

UNIT - 6

Gas turbine and Jet propulsion: Classification of Gas turbines, Analysis of open cycle gas turbine cycle. Advantages and disadvantages of closed cycle. Methods to improve thermal efficiency, Jet propulsion and Rocket propulsion.

07 Hours

UNIT - 7

Refrigeration: Vapour compression refrigeration system ; description, analysis, refrigerating effect, capacity, power required, units of refrigeration, COP, Refrigerants and their desirable properties. Air cycle refrigeration;

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reversed Carnot cycle, reversed Brayton cycle, Vapour absorption refrigeration system, steam jet refrigeration.

06 Hours

UNIT - 8

Psychometry: Atmospheric air and psychometric properties; Dry bulb temperature, wet bulb temperature, dew point temperature; partial pressures, specific and relative humidities and the relation between the two enthalpy and adiabatic saturation temperature. Construction and use of psychometric chart . Analysis of various processes; heating, cooling , dehumidifying and humidifying. Adiabatic mixing of moist air. Summer and winter air conditioning.

07 Hours

Data Hand Book :

- 1. Thermodynamic data hand book, B.T. Nijaguna.
- Properties of Refrigerant & Psychometric (tables & Charts in SI Units), Dr. S.S. Banwait, Dr. S.C. Laroiya, Birla Pub. Pvt. Ltd., Delhi, 2008

TEXT BOOKS:

- Basic and applied Thermodynamics, P.K. Nag, 2nd Ed., Tata McGraw Hill Pub.Co,2002
- 2. Applied Thermodynamics, Rajput, Laxmi Publication
- Applied Thermodynamics, B.K. Venkanna, Swati B. Wadavadagi, PHI, New Delhi, 2010

REFERENCE BOOKS:

- Thermodynamics, An engineering approach, Yunus, A. Cengel and Michael A.Boies, 6th Ed., Tata McGraw Hill pub. Co., 2002,
- Fundamental of Classical Thermodynamics, G.J. Van Wylen and R.E. Sontang Wiley eastern.



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REFERENCE BOOKS:

- 1. Engineering Metrology, I.C. Gupta, Dhanpat Rai Publications, Delhi.
- 2. Mechanical Measurements, R.K. Jain Khanna Publishers, 1994
- 3. Industrial Instrumentation, Alsutko, Jerry. D. Faulk, Cengage Asia Pvt. Ltd. 2002.
- 4. Measurement Systems Applications and Design, Ernest O. Doebelin, 5th Ed., McGraw Hill Book Co.
- 5. Metrology & Measurement, Anand K. Bewoor & Vinay A. Kulkarni, Tata McGraw Hill Pvt. Ltd., New-Delhi

BASIC THERMODYNAMICS (Common to ME/IP/AU/IM/MA)

Subject Code	: 10ME33	IA Marks	: 25
Hours/Week	: 04	Exam Hours	:03
Total Hours	: 52	Exam Marks	: 100

PART-A

UNIT-1

Fndamental Concepts & Definitions: Thermodynamics definition and scope, Microscopic and Macroscopic approaches. Some practical applications of engineering thermodynamic Systems, Characteristics of system boundary and control surface, examples. Thermodynamic properties; definition and units, intensive and extensive properties. Thermodynamic state, state point, state diagram, path and process, quasi-static process, cyclic and non-cyclic ;rocesses; Thermodynamic equilibrium; definition, mechanical equilibrium; diathermic wall, thermal equilibrium, chemical equilibrium, Zeroth law of thermodynamics, Temperature; concepts, scales, fixed points and measurements.

06 Hours

UNIT-2

Work and Heat: Mechanics, definition of work and its limitations. Thermodynamic definition of work; examples, sign convention. Displacement work; as a part of a system boundary, as a whole of a system boundary, expressions for displacement work in various processes through p-v diagrams.



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Shaft work; Electrical work. Other types of work. Heat; definition, units and sign convention.

06 Hours

UNIT-3

First Law of Thermodynamics: Joules experiments, equivalence of heat and work. Statement of the First law of thermodynamics, extension of the First law to non - cyclic processes, energy, energy as a property, modes of energy, pure substance; definition, two-property rule, Specific heat at constant volume, enthalpy, specific heat at constant pressure. Extension of the First law to control volume; steady state-steady flow energy equation, important applications, analysis of unsteady processes such as film and evacuation of vessels with and without heat transfer.

07 Hours

UNIT-4

Second Law of Thermodynamics: Devices converting heat to work; (a) in a thermodynamic cycle, (b) in a mechanical cycle. Thermal reservoir. Direct heat engine; schematic representation and efficiency. Devices converting work to heat in a theromodynamic cycle; reversed heat engine, schematic representation, coefficients of performance. Kelvin - Planck statement of the Second law of Thermodynamics; PMM I and PMM II, Clausius statement of Second law of Thermodynamics,Equivalence of the two statements; Reversible and irrevesible processes; factors that make a process irreversible, reversible heat engines, Carnot cycle, Carnot principles.

07 Hours

PART-B

UNIT-5

Entropy: Clasius inequality; Statement, proof, application to a reversible cycle. Entropy; definition, a property, change of entropy, principle of increase in entropy, entropy as a quantitative test for irreversibility, calculation of entropy using Tds relations, entropy as a coordinate. Available and unavailable energy.

06 Hours



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UNIT-6

Pure Substances: P-T and P-V diagrams, triple point and critical points. Subcooled liquid, saturated liquid, mixture of saturated liquid and vapour, saturated vapour and superheated vapour states of pure substance with water as example. Enthalpy of change of phase (Latent heat). Dryness fraction (quality), T-S and H-S diagrams, representation of various processes on these diagrams. Steam tables and its use. Throttling calorimeter, separating and throttling calorimeter.

07 Hours

UNIT-7

Thermodynamic relations: Maxwell relation, Clausius Clayperon's equation. Ideal gas; equation of state, internal energy and enthalpy as functions of temperature only, universal and particular gas constants, specific heats, perfect and semi-perfect gases. Evaluation of heat, work, change in internal energy. enthalpy and entropy in various quasi-static processes.

07 Hours

06 Hours

UNIT-8

Ideal gas mixture : Ideal gas mixture; Dalton's laws of partial pressures, Amagat's law of additive volumes, evaluation of properties, Analysis of various processes. Real Gases: Introduction. Van-der Waal's Equation of state, Van-der Waal's constants in terms of critical properties, Law of corresponding states, compressibility factor; compressibility chart

Data Handbooks :

- 1. Thermodynamic data hand book, B.T. Nijaguna.
- Properties of Refrigerant & Psychometric (tables & Charts in SI Units), Dr. S.S. Banwait, Dr. S.C. Laroiya, Birla Pub. Pvt. Ltd., Delhi, 2008

TEXT BOOKS:

- Basic Engineering Thermodynamics, A.Venkatesh, Universities Press, 2008
- Basic and Applied Thermodynamics, P.K.Nag, 2nd Ed., Tata McGraw Hill Pub. 2002



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UNIT - 8

Central Processing Unit of Microprocessors: Introduction, timing and control unit basic concepts, Instruction and data flow, system timing, examples of INTEL 8085 and INTEL 4004 register organization.

06 Hours

TEXT BOOKS:

- Mechatronics, W.Bolton, Longman, 2Ed, Pearson Publications, 2007.
- Microprocessor Architecture, Programming And Applications With 8085/8085A, R.S. Ganokar, Wiley Eastern.

REFERENCE BOOKS:

- Mechatronics and Microprocessors, K.P.Ramchandran, G.K.Vijayraghavan, M.S.Balasundran, Wiley, 1st Ed, 2009
- Mechatronics Principles, Concepts and applications Nitaigour and Premchand Mahilik - Tata McGraw Hill- 2003.
- 3. Mechatronics Principles & applications, Godfrey C. Onwubolu, Elsevier..
- 4. Introduction Mechatronics & Measurement systems, David.G. Aliciatore & Michael. B. Bihistaned, Tata McGraw Hill, 2000.

HEAT & MASS TRANSFER LABORATORY

Subject Code	: 10MEL67	IA Marks	: 25
Hours/Week	: 03	Exam Hours	: 03
Total Hours	: 42	Exam Marks	: 50

PART - A

- 1. Determination of Thermal Conductivity of a Metal Rod.
- 2. Determination of Overall Heat Transfer Coefficient of a Composite wall.
- 3. Determination of Effectiveness on a Metallic fin.
- 4. Determination of Heat Transfer Coefficient in a free Convection on a vertical tube.



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- 5. Determination of Heat Transfer Coefficient in a Forced Convention Flow through a Pipe.
- 6. Determination of Emissivity of a Surface.

21 Hours

21 Hours

PART – B

- 1. Determination of Steffan Boltzman Constant.
- 2. Determination of LMDT and Effectiveness in a Parallel Flow and Counter Flow Heat Exchangers
- 3. Experiments on Boiling of Liquid and Condensation of Vapour
- 4. Performance Test on a Vapour Compression Refrigeration.
- 5. Performance Test on a Vapour Compression Air Conditioner
- 6. Experiment on Transient Conduction Heat Transfer

Scheme for Examination:

Senerice for Battinitation		
One Question from Part A	-	20 Marks (05 Write up +15)
One Question from Part B	12	20 Marks (05 Write up +15)
Viva-Voce	1077	10 Marks
Tota	al	50 Marks

COMPUTER AIDED MODELING AND ANALYSIS LABORATORY

Subject Code	: 10MEL68	IA Marks	: 25
Hours/Week	: 03	Exam Hours	:03
Total Hours	: 42	Exam Marks	: 50

PART - A

Study of a FEA package and modeling stress analysis of

- a. Bars of constant cross section area, tapered cross section area and stepped bar
- b. Trusses (Minimum 2 exercises)

6 Hours 3 Hours

c. Beams – Simply supported, cantilever, beams with UDL, beams with varying load etc (Minimum 6 exercises)

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12 Hours

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PART - B

a)	Stress a	nalysis of a rectangular plate with a circular hole
		3 Hours
b)	Therma	I Analysis - 1D & 2D problem with conduction and
	convect	ion boundary conditions(Minimum 4 exercises)
		9 Hours
c)	Dynam	c Analysis
	1)	Fixed - fixed beam for natural frequency determination
	2)	Bar subjected to forcing function
	3)	Fixed - fixed beam subjected to forcing function
		9 Hours

REFERENCE BOOKS:

- 1. A first course in the Finite element method, Daryl L Logan, Thomason, Third Edition
- 2. Fundaments of FEM, Hutton McGraw Hill, 2004
- 3. Finite Element Analysis, George R. Buchanan, Schaum Series

Scheme for Examination:

One Question from Part A	5	20 Marks (05 Write up +15)
One Question from Part B	-	20 Marks (05 Write up +15)
Viva-Voce	Ť	10 Marks

Total

50 Marks



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of business opportunities: Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study.

7 Hours

TEXT BOOKS:

- Principles of Management P. C. Tripathi, P.N. Reddy Tata McGraw Hill,
- 2 Dynamics of Entrepreneurial Development & Management Vasant Desai - Himalaya Publishing House
- 3 Entrepreneurship Development Poornima. M. Charantimath Small Business Enterprises - Pearson Education - 2006 (2 & 4).

REFERENCE BOOKS:

- 1 Management Fundamentals Concepts, Application, Skill Development - Robers Lusier - Thomson
- 2 Entrepreneurship Development S.S.Khanka S.Chand & Co.
- 3 Management Stephen Robbins Pearson Education/PHI 17th Edition, 2003.

DESIGN OF MACHINE ELEMENTS-I

Subject Code	: 10ME52	IA Marks	: 25
Hours/Week	:04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	:100

PART-A

UNIT-1

Introduction: Definitions: normal, shear, biaxial and tri axial stresses, Stress tensor, Principal Stresses. Engineering Materials and their mechanical properties, Stress-Strain diagrams, Stress Analysis, Design considerations: Codes and Standards.

05 Hours



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UNIT-2

Design For Static & Impact Strength:

Static Strength: Static loads and factor of safety, Theories of failure: Maximum normal stress theory, Maximum shear stress theory, Maximum strain theory, Strain energy theory, Distortion energy theory. Failure of brittle and ductile materials, Stress concentration, Determination of Stress concentration factor.

Impact Strength: Introduction, Impact stresses due to axial, bending and torsional loads, effect of inertia.

07 Hours

UNIT - 3

Design For Fatigue Strength: Introduction- S-N Diagram, Low cycle fatigue, High cycle fatigue, Endurance limit, Modifying factors: size effect, surface effect, Stress concentration effects, Fluctuating stresses, Goodman and Soderberg relationship, stresses due to combined loading, cumulative fatigue damage.

08 Hours

UNIT - 4

Threaded Fasteners: Stresses in threaded fasteners, Effect of initial tension, Design of threaded fasteners under static, dynamic and impact loads, Design of eccentrically loaded bolted joints.

06 Hours

PART – B

UNIT - 5

Design Of Shafts: Torsion of shafts, design for strength and rigidity with steady loading, ASME codes for power transmission shafting, shafts under fluctuating loads and combined loads.

07 Hours

UNIT-6

Cotter And Knuckle Joints, Keys And Couplings: Design of Cotter and Knuckle joints, Keys: Types of keys, Design of keys, Couplings: Rigid and flexible couplings, Flange coupling, Bush and Pin type coupling and Oldham's coupling.

07 Hours



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UNIT - 7

Riveted and Welded Joints – Types, rivet materials, failures of riveted joints, Joint Efficiency, Boiler Joints, Lozanze Joints, Riveted Brackets. Welded Joints – Types, Strength of butt and fillet welds, eccentrically loaded welded joints.

07 Hours

UNIT - 8

Power Screws: Mechanics of power screw, Stresses in power screws, efficiency and self-locking, Design of Power Screw, Design of Screw Jack: (Complete Design).

05 Hours

TEXT BOOKS:

- Mechanical Engineering Design, Joseph E Shigley and Charles R. Mischke. McGraw Hill International edition, 6th Edition 2009.
- Design of Machine Elements, V.B. Bhandari, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2nd Edition 2007.

DESIGN DATA HANDBOOK:

- 1. Design Data Hand Book, K. Lingaiah, McGraw Hill, 2nd Ed.
- 2. Data Hand Book, K. Mahadevan and Balaveera Reddy, CBS Publication
- Design Data Hand Book, H.G. Patil, I. K. International Publisher, 2010.

REFERENCE BOOKS:

- 1. Machine Design, Robert L. Norton, Pearson Education Asia, 2001.
- Design of Machine Elements, M. F. Spotts, T. E. Shoup, L. E. Hornberger, S. R. Jayram and C. V. Venkatesh, Pearson Education, 2006.
- Machine Design, Hall, Holowenko, Laughlin (Schaum's Outlines series) Adapted by S.K. Somani, Tata McGraw Hill Publishing Company Ltd., New Delhi, Special Indian Edition, 2008.
- Fundamentals of Machine Component Design, Robert C. Juvinall and Kurt M Marshek, Wiley India Pvt. Ltd., New Delhi, 3rd Edition, 2007.



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UNIT - 8

Energy From Bio Mass: Photosynthesis, photosynthetic oxygen production, energy plantation.

Bio Chemical Route: Biogas production from organic wastes by anaerobic fermentation, classification of bio gas plants, factors affecting bio gas generation.

Thermo Chemical Route: Thermo chemical conversion on bio mass, types of gasifiers.

06 Hours

TEXT BOOKS:

- 1. Power Plant Engineering, P. K. Nag Tata McGraw Hill 2nd edn 2001.
- 2. Power Plant Engineering, Domakundawar, Dhanpath Rai sons. 2003

REFERENCE BOOKS:

- 1. Power Plant Engineering, R. K. Rajput, Laxmi publication, New Delhi.
- 2. Principles of Energy conversion, A. W. Culp Jr., McGraw Hill. 1996
- 3. Non conventional Energy sources, G D Rai Khanna Publishers.
- 4. Non conventional resources, B H Khan TMH 2007

DYNAMICS OF MACHINES

Subject Code	: 10ME54	IA Marks	: 25
Hours/Week	:04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	: 100

PART – A

UNIT - 1

Static Force Analysis: Introduction: Static equilibrium. Equilibrium of two and three force members. Members with two forces and torque. Free body diagrams. Principle of virtual work. Static force analysis of four bar mechanism and slider-crank mechanism with and without friction.

06 Hours



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UNIT – 2

Dynamic Force Analysis: D'Alembert's principle, Inertia force, inertia torque. Dynamic force analysis of four-bar mechanism and slider crank mechanism. Dynamically equivalent systems. Turning moment diagrams and flywheels. Fluctuation of Energy. Determination of size of flywheels.

08 Hours

UNIT-3

Friction and Belt Drives: Definitions: Types of friction: laws of friction, Friction in pivot and collar bearings. Belt drives: Flat belt drives. ratio of belt tensions, centrifugal tension, power transmitted.

06 Hours

UNIT - 4

Balancing of Rotating Masses: Static and dynamic balancing. Balancing of single rotating mass by balancing masses in same plane and in different planes. Balancing of several rotating masses by balancing masses in same plane and in different planes.

06 Hours

PART – B

UNIT-5

Balancing of Reciprocating Masses: Inertia effect of crank and connecting rod, single cylinder engine, balancing in multi cylinder-inline engine (primary & secondary forces), V-type engine; Radial engine – Direct and reverse crank method.

08 Hours

UNIT - 6

Governors: Types of governors; force analysis of Porter and Hartnell governors. Controlling force. stability, sensitiveness. Isochronism, effort and power.

06 Hours



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UNIT - 7

Gyroscope: Vectorial representation of angular motion. Gyroscopic couple. Effect of gyroscopic couple on ship, plane disc, aeroplane, stability of two wheelers and four wheelers.

06 Hours

06 Hours

UNIT-8

Analysis of Cams: Analysis of Tangent cam with roller follower and Circular are cam operating flat faced and roller followers. Undercutting in Cams

TEXT BOOKS:

- Theory of Machines, Sadhu Singh, Pearson Education. 2nd edition. 2007.
- 2. Theory of Machines, Rattan S.S. Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2009.

REFERENCE BOOKS:

- "Theory of Machines & Mechanisms", J.J. Uicker, G.R. Pennock, J.E. Shigley. OXFORD 3rd Ed. 2009
- 2. Mechanism and Machine Theory, A.G.Ambekar PHI, 2007

MANUFACTURING PROCESS – III

(METAL FORMING PROCESS)

Subject Code	: 10ME55	IA Marks	: 25
Hours/Week	: 04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	: 100

PART – A

UNIT - 1

Introduction And Concepts: Classification of metal working processes, characteristics of wrought products, advantages and limitations of metal working processes.Concepts of true stress, true strain, triaxial & biaxial

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- a. Orifice Plate meter
- b. Nozzle
- c. Venturimeter
- d. V-notch

18 Hours

PART - B

5. Performance testing of Turbines

- a. Pelton wheel
- b. Francis Turbine
- c. Kaplan Turbines

6. Performance testing of Pumps

- a. Single stage / Multi stage centrifugal pumps
- b. Reciprocating pump

7. Performance test of a two stage Reciprocating Air Compressor

8. Performance test on an Air Blower

		24 Hours
Scheme for Examination:		
One Question from Part A	-	15 Marks (05 Writeup + 10)
One Question from Part B	-	25 Marks (05 Writeup + 20)
Viva-Voce	-	10 Marks
Tot	al	50 Marks

ENERGY CONVERSION ENGINEERING LABORATORY

Subject Code	:10MEL58	IA Marks	: 25
Hours/Week	: 03	Exam Hours	: 03
Total Hours	: 42	Exam Marks	: 50

PART - A

1. Determination of Flash point and Fire point of lubricating oil using Abel Pensky and Marten's (closed) / Cleavland's (Open Cup) Apparatus.



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- 2. Determination of Calorific value of solid, liquid and gaseous fuels.
- 3. Determination of Viscosity of a lubricating oil using Redwoods, Saybolt and Torsion Viscometers.
- 4. Valve Timing/port opening diagram of an I.C. engine (4 stroke/2 stroke).
- 5. Use of planimeter

21 Hours

- PART B
- Performance Tests on I.C. Engines, Calculations of IP, BP, Thermal efficiencies, Volumetric efficiency, Mechanical efficiency, SFC, FP, A:F Ratio heat balance sheet for

(a) Four stroke Diesel Engine

(b) Four stroke Petrol Engine

(c) Multi Cylinder Diesel/Petrol Engine, (Morse test)

(d) Two stroke Petrol Engine

(e) Variable Compression Ratio I.C. Engine.

21 Hours

Scheme for Examination:

One Question from Part A	12	15 Marks (05 Writeup+10)
One Question from Part B	-	25 Marks (05 Writeup+20)
Viva-Voce		10 Marks
Total		50 Marks



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VI SEMESTER

COMPUTER INTEGRATED MANUFACTURING

Subject Code	: 10ME61	IA Marks	: 25
Hours/Week	: 04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	:100

PART-A

UNIT - 1

Computer Integrated Manufacturing Systems: Introduction, Automation definition, Types of automation, CIM, processing in manufacturing, Production concepts, Mathematical Models-Manufacturing lead time, production rate, components of operation time, capacity, Utilization and availability, Work-in-process, WIP ratio, TIP ratio, Problems using mathematical model equations.

8 Hours

UNIT - 2

High Volume Production System: Introduction Automated flow linesymbols, objectives, Work part transport-continuous, Intermittent, synchronous, Pallet fixtures, Transfer Mechanism-Linear-Walking beam,. roller chain drive, Rotary-rack and pinion, Rachet & Pawl, Geneva wheel, Buffer storage, control functions-sequence, safety, Quality, Automation for machining operation.

6 Hours

UNIT - 3

Analysis Of Automated Flow Line & Line Balancing: General terminology and analysis, Analysis of Tranfer Line without storage upper bound approach, lower bound approach and problems, Analysis of Transfer lines with storage buffer, Effect of storage, buffer capacity with simple problem, Partial automation-with numerical problems, flow lines with more than two stages, Manual Assembly lines, line balancing problem.

6 Hours



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VII SEMESTER

ENGINEERING ECONOMY

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Total Hours . 57		100 million (100 m
Hours/Week : 04	Exam Hours	: 03
Subject Code : 10ME71	IA Marks	: 25

PART – A

UNIT - 1

Introduction: Engineering Decision-Makers, Engineering and Economics, Problem solving and Decision making, Intuition and Analysis, Tactics and Strategy. Engineering Economic Decision, Maze. Law of demand and supply, Law of returns, Interest and Interest factors: Interest rate, Simple interest, Compound interest, Cash - flow diagrams, Personal loans and EMI Payment, Exercises and Discussion.

08 Hours

UNIT - 2

Present-Worth Comparisons: Conditions for present worth comparisons, Basic Present worth comparisons, Present-worth equivalence, Net Presentworth, Assets with unequal lives, infinite lives, Future-worth comparison, Pay-back comparison, Exercises, Discussions and problems.

06 Hours

UNIT-3

Equivalent Annual-Worth Comparisons: Equivalent Annual-Worth Comparison methods, Situations for Equivalent Annual-Worth Comparisons, Consideration of asset life, Comparison of assets with equal and unequal lives, Use of shrinking fund method, Annuity contract for guaranteed income, Exercises, Problems.

06 Hours

UNIT - 4

Rate-Of-Return Calculations And Depreciation: Rate of return, Minimum acceptable rate of return, IRR, IRR misconceptions, Cost of capital concepts.



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Causes of Depreciation, Basic methods of computing depreciation charges, Tax concepts, corporate income tax.

06 Hours

PART - B

UNIT - 5

Estimating and Costing: Components of costs such as Direct Material Costs, Direct Labor Costs, Fixed Over-Heads, Factory cost, Administrative Over-Heads, First cost, Marginal cost, Selling price, Estimation for simple components.

05 Hours

UNIT - 6

Introduction, Scope Of Finance, Finance Functions: Statements of Financial Information: Introduction, Source of financial information, Financial statements, Balance sheet, Profit and Loss account, relation between Balance sheet and Profit and Loss account. Simple Numericals

08 Hours

UNIT - 7

Financial Ratio Analysis: Introduction, Nature of ratio analysis, Liquidity ratios, Leverage ratios, Activity ratios, Profitability ratios, Evaluation of a firm's earning power. Comparative statements analysis. Simple numericals

06 Hours

UNIT - 8

Financial And Profit Planning: Introduction, Financial planning, Profit planning, Objectives of profit planning, Essentials of profit planning, Budget administration, type of budgets, preparation of budgets, advantages, problems and dangers of budgeting. Introduction to Bench Marking of Manufacturing Operation.

07 Hours

TEXT BOOKS:

- 1. Engineering Economy, Riggs J.L., 4TH ed., McGraw Hill, 2002
- 2. Engineering Economy, Thuesen H.G. PHI, 2002



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REFERENCE BOOKS:

- 1. Engineering Economy, Tarachand, 2000.
- 2. Industrial Engineering and Management, OP Khanna, Dhanpat Rai & Sons. 2000
- 3. Financial Mangement, Prasanna Chandra, 7th Ed., TMH, 2004
- 4. Finacial Management, IM PANDEY, Vikas Pub. House, 2002

MECHANICAL VIBRATIONS

Subject Code	: 10ME72	IA Marks	: 25
Hours/Week	:04	Exam Hours	:03
Total Hours	: 52	Exam Marks	: 100

PART-A

UNIT - 1

Introduction: Types of vibrations, Definitions, Simple Harmonic Motion (S.H.M.), Work done by harmonic force, Principle of super position applied to SHM, Beats, Fourier theorem and problems.

06 Hours

UNIT -2

Undamped (Single Degree of Freedom) Free Vibrations: Derivations for spring mass systems, Methods of Analysis, Natural frequencies of simple systems, Springs in series and parallel, Torsional and transverse vibrations, Effect of mass of spring and Problems.

07 Hours

UNIT - 3

Damped free vibrations (1DOF): Types of damping, Analysis with viscous damping - Derivations for over, critical and under damped systems, Logarithmic decrement and Problems.

06 Hours

UNIT - 4

Forced Vibrations (1DOF): Introduction, Analysis of forced vibration with constant harmonic excitation - magnification factor, rotating and

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TEXT BOOKS:

- 1. B.S. Grewal, Higher Engineering Mathematics, Latest edition, Khanna Publishers.
- 2. Erwin Kreyszig, Advanced Engineering Mathematics, Latest edition, Wiley Publications.

REFERENCE BOOKS:

- B.V. Ramana, Higher Engineering Mathematics, Latest edition, Tata Mc. Graw Hill Publications.
- Peter V. O'Neil, Engineering Mathematics, CENGAGE Learning India Pvt Ltd.Publishers.

MATERIAL SCIENCE AND METALLURGY

Subject Code	: 10ME32A /42A	IA Marks	: 25
Hours/Week	:04	Exam Hours	:03
Total Hours	: 52	Exam Marks	: 100

PART – A

UNIT - 1

Crystal Structure: BCC, FCC and HCP Structures, coordination number and atomic packing factors, crystal imperfections -point line and surface imperfections. Atomic Diffusion: Phenomenon, Ficks laws of diffusion, factors affecting diffusion.

06 Hours

UNIT - 2

Mechanical Behaviour: Stress-strain diagram showing ductile and brittle behaviour of materials, linear and non linear elastic behaviour and properties, mechanical properties in plastic range, yield strength offset yield strength, ductility, ultimate tensile strength, toughness. Plastic deformation of single crystal by slip and twinning.

06 Hours

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Fracture: Type I, Type II and Type III.

Creep: Description of the phenomenon with examples, three stages of creep, creep properties, stress relaxation.

Fatigue: Types of fatigue loading with examples, Mechanism of fatigue, fatigue properties, fatigue testing and S-N diagram.

07 Hours

UNIT - 4

Solidification: Mechanism of solidification, Homogenous and Heterogeneous nucleation, crystal growth, cast metal structures.

Phase Diagram I: Solid solutions Hume Rothary rule substitutional, and interstitial solid solutions, intermediate phases, Gibbs phase rule.

07 Hours

PART - B

UNIT - 5

Phase Diagram II: Construction of equilibrium diagrams involving complete and partial solubility, lever rule. Iron carbon equilibrium diagram description of phases, solidification of steels and cast irons, invariant reactions.

06 Hours

UNIT - 6

Heat treating of metals: TTT curves, continuous cooling curves, annealing and its types. normalizing, hardening, tempering, martempering, austempering, hardenability, surface hardening methods like carburizing, cyaniding, nitriding, flame hardening and induction hardening, age hardening of aluminium-copper alloys.

07 Hours

UNIT - 7

Ferrous and non ferrous materials: Properties, Composition and uses of

- · Grey cast iron, malleable iron, SG iron and steel
- Copper alloys-brasses and bronzes.
 Aluminium alloys-Al-Cu,Al-Si,Al-Zn alloys.

06 Hours



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UNIT - 8

Composite Materials: Definition, classification, types of matrix materials & reinforcements, fundamentals of production of FRP's and MMC's advantages and application of composites.

07 Hours

TEXT BOOKS:

- 1. Foundations of Materials Science and Engineering, Smith, 4th Edition McGraw Hill, 2009
- Materials Science, Shackleford., & M. K. Muralidhara, Pearson Publication – 2007.

REFERENCE BOOKS:

- An Introduction to Metallurgy; Alan Cottrell, Universities Press India Oriental Longman Pvt. Ltd., 1974.
- 2. Engineering Materials Science, W.C.Richards, PHI, 1965
- 3. Physical Metallurgy; Lakhtin, Mir Publications
- 4. Materials Science and Engineering, V.Raghavan, PHI, 2002
- Elements of Materials Science and Engineering, H. VanVlack, Addison-Wesley Edn., 1998
- Materials Science and Engineering, William D. Callister Jr., John Wiley & Sons. Inc, 5th Edition, 2001.
- The Science and Engineering of Materials, Donald R. Askland and Pradeep.P. Phule, Cengage Learning, 4th Ed., 2003.

MECHANICAL MEASUREMENTS AND METROLOGY

Subject Code	: 10ME32B /42B	IA Marks	: 25
Hours/Week	:04	Exam Hours	: 03
Total Hours	: 52	Exam Marks	: 100

UNIT-1

PART-A

Standards of measurement: Definition and Objectives of metrology, Standards of length-International prototype meter, Imperial standard yard, Wave length standard, subdivision of standards, line and

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ENGINEERING CHEMISTRY

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Course Objectives : Course Objectives : To provide students with knowledge of engineering chemistry for building To provide students with knowledge of engineering chemistry for building To provide suidents whit suit industries, research and development in the social competence in industries, research and development in the

Pleetschemistry & Battery Technology. following fields

- Corrosion & Metal Finishing.
- Fuels & Solar energy.

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Water Technology & Nano Materials.

Module - 1

Electrochemistry and Battery Technology :

Electrochemistry: Introduction, Derivation of Nernst equation for electrole potential. Types of electrodes: metal-metal ion, metal-metal salt ion, gas amaigam, redox & ion selective. Reference electrodes: Introduction; construction, working and applications of calomel and Ag / AgCl electrodes, Measurement of standard electrode potential using calomel electrode. Construction and working of glass electrode, determination of pH using glass electrode. Concentration cells: Electrode & Electrolyte, numerical problems on electrolyte concentration cells.

Battery Technology : Introduction, classification - primary, secondary and reserve batteries. Characteristics - cell potential, current, capacity, electricity storage density, energy efficiency, cycle life and shelf life. Construction, working and applications of Zinc-Air, Nickel- metal hydride batteries. Lithium batteries: Introduction, Li-MnO, and Li-ion batteries,

Fuel Cells: Introduction, difference between conventional cell and fuel cell limitations & advantages. Classification of fuel cells based on temperature, fuel and electrolyte; construction & working of methanol-oxygen fuel cell with H₂SO₄ electrolyte. 10 Hours

Module - 2

sion and Metal Finishing :

sion : Introduction, electrochemical theory of corrosion, galvanic series.

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manage at problems. (Hass transition temperature (Tg): Factors inter-manage at the problem of the problem of the static In the studies, inter molecular forces, molecular mass, branching & the In the studies, inter molecularity. Significance of Tg. Structure & the main and atereo regularity, tensile strength, clasticity, plastic dec. pro-The the dulity, inter molecular to each significance of Tg. Structure & the structure of th In the dollar, and alereo regularity, such astrongth, elasticity, plastic deformation of property and material regulations of property and polycarbonate. Elastomers, the following the second polycarbonate in the second the method restativity. By the sis, properties and applications of property the method restativity. By the sister and polycarbonate. Elastomers: Introduces and applications of Silicone rubbas alamination in the properties and applications of Silicone rubber. Adhesian chamber in the Polymethane and applications of Silicone rubber. Introduction glass), it flow, Polymethane and applications of Silicone rubber. Adhesive combosite, properties and applications of epoxy resin, Polymethesis, properties applications of epoxy resin, Polymethesi marketic, properties and applications of epoxy resin Polynet anothetical application, synthesis, properties and applications of the polynetic polynet introduction of the polynet introduction of the polynetic polynet polynetic polynetic tomposites: Introduction, synthesis, properties and applications of keyles tomposites: Introduction, symmetry introduction, introduction, mechanism of keyls and carbon fiber. Conducting polyaniline and applications of conducting polyaniline of polyaniline and applications of conducting polyaniline of the polyanili and earbon fiber, examine and applications of conducting polyaniline,

Module - 5

10 Houn

Water Technology and Nanomaterials :

Water Technology: Introduction, sources and impurities of water; boiler feel water, boiler troubles with disadvantages -scale and sludge formation, pining and foaming, boiler corrosion(due to dissolved O₂, CO₂ and MgCI) Determination of DO, BOD and COD, numerical problems. Sewage treatment Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis & electrodialysis (ion selective) ..

Nano Materials : Introduction, properties (size dependent). Synthesis-bottom up approach (sol-gel, precipitation, gas condensation, chemical vapour condensation, hydro thermal & thermolysis processes). Nano scale materiale nano crystals & clusters, nano crystalline, fullerenes, carbon nano toba nano wires, nano rods, dendrimers & nano composites. 10 Hours

Course Outcomes :

On completion of this course, students will have knowledge in:

- Types of electrodes, electrochemical and concentration cells. Classical & modern batteries and fuel cells.
- Causes & effects of corrosion of metals and control of corrosion Modification of surface properties of metals to develop resistance corresion, wear, tear, impact etc. by electroplating and electro less plate
- Production & consumption of energy for industrialization of county and living stor deal living standards of people. Utilization of solar energy for different used

formes of energy. Replacement of conventional materials by polymere for an Nevedays (astitute at Technology (NIT) 2Atophin sations. Stoubles; sewage treatment and desalination of sea watered 103 Boiler

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Over viewing of synthesis, properties and applications of nanomaterials. Scheme of examination :

- Two full questions (with a maximum of four sub questions) of twenty marks each to be set from each module. Each questions) of twenty
- . Students have to answer five full questions choosing one full question

Text Books :

- 1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah & Pushpa Iyengar., "Chemistry for Engineering Students", Subhash Publications, Bangalore.
- 2 R.V.Gadag & A.Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi.
- 3. P.C.Jain & Monica Jain., "Engineering Chemistry", Dhanpat Rai Publications, New Delhi.

Reference Books :

- 1. O.G.Palanna,"Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.
- 2. G.A.Ozin & A.C. Arsenault, "Nanochemistry A Chemical Approach to Nanomaterials", RSC publishing, 2005.
- 3. "Wiley Engineering Chemistry", Wiley India Pvt. Ltd. New Delhi. Second Edition.
- 4. V.R.Gowariker, N.V.Viswanathan & J.Sreedhar., "Polymer Science", Wiley-Eastern Ltd.
- 5. M.G.Fontana., "Corrosion Engineering", Tata McGraw Hill Publishing Pvt. Ltd. New Delhi.



Mechanico Empletering Navodaya Institute of Jeenn 200, RAICHUR-584 103

ELEMENTS OF MECHANICAL ENGINEERING

14EME14/14 EME 24 Subject Code : IA Marks :25 Hours/Weck : 04 Exam. Hours :03 Total Hours : 50 Exam. Marks: 100

Course Objectives : Course Objects Students belonging to all branches of Engineering are made to learn certain Students octantical topics related to mechanical engineering so that they will have fundamental understanding of mechanical systems, equipment and process.

Module - 1

Energy Resources : Non-renewable and renewable energy resources, Petroleum based solid, liquid and gaseous fuels, Calorific values of fuels, Combustion and combustion products of fuels, Solar Power : Solar Radiation, Solar constant (definition only), Solar Thermal energy harvesting, ex: liquid flat plate collectors, solar ponds (principle of operation only), Solar photovoltaic principle. Wind Power : principle of operation of a typical windmill. Hydro Power : Principles of electric power generation from hydropowerplants, Nuclear Power : Principles of Nuclear power plants, Bio Fuels : introduction to bio fuels, examples of various biofuels used in engineering applications, Comparison of biofuels with petroleum fuels in terms of calorific value and emission. Steam Formation and Properties : Classification of boilers, Lancashire boiler, Babcock and Wilcox boiler, boiler mountings and accessories (No sketches for mountings and accessories), wet steam, saturated and superheated steam, specific volume, enthalpy and internal energy. (No numerical problems in this module) 10 Hours

Module - 2

Turbines and IC Engines and Pumps Steam turbines : Classification, Principle of operation of Impulse and reaction turbines, Delaval's turbine, Parson's turbine. (No compounding of turbines).

Gas turbines : Classification, Working principles and Operations of Open reycle and closed cycle gas turbines.

Water turbines : Classification, Principles and operations of Pelton wheel, is turbine and Kaplan turbine Internal Combustion Engines : Classification, I.C. Engines parts, 2

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PAICHUnd Stroke Petrohengines, 4 stroke diesel engines. T-V diag

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and Diesel cycles. and Diesel cycles. In thermal efficiency, mechanical efficiency, indi-thermal efficiency, brake thermal efficiency, mechanical efficiency, and the thermal efficiency, for the former of the second s fuel consumption, [numericals on IC Engines].

Module - 3

Machine Tools and Automation Machine Tools Operations : Machine Tools and Automation Thread cutting, Taper Turning by swivelling, Turning, facing, knurling, Thread cutting, Tapping, Counter Sinking, Otto alers Sinking, Otto Turning, facing, knurling, Tinead earling, Tapping, Counter Sinking, Counter Sinking, Compound rest, Drilling, Boring, Reaming, Slot milling. (No sketches of M. compound rest, Drilling, Bornig, Slot milling. (No sketches of Marine, C. Boring, -Plane milling, End milling, Slot explaining operations. Student Boring, -Plane milling, End minutes Boring, -Plane milling, End milling operations. Students of Mart tools, sketches to be used only for explaining operations. Students tools, sketches to be machine tools in the Machine Shop of the tools, sketches to be used only tools in the Machine Shop of the collisions) before explaining the operations)

Robotics and Automation :

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Robotics and Automation. Robotics : Introduction, classification based on robots configuration; P. Robotics : Introduction, Clacerton and spherical. Application, Advantages, even cylindrical, Cartesian Coordinate and spherical. disadvantages

disadvantages Automation : Definition, types –Fixed, Programmable & Flexible automatic NC/ CNC machines: Basic elements with simple block diagrams, advantes and disadvantages. 10 Hog

Module – 4

Engineering materials and joining processes :

Engineering Materials:

Types and applications of Ferrous & Nonferrous metals and alloys, Composites : Introduction: Definition, Classification and applications (A: craft and Automobiles)

Soldering, Brazing and Welding :

Definitions, classification and method of soldering, Brazing and welding Differences between soldering, Brazing and Welding. Description of Electric Arc Welding and Oxy-Acetylene Welding. 10 Hour

Module - 5

Refrigeration, Air-Conditioning :

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Refrigerants : properties of refrigerants, list of commonly used refrigerants

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COP Rentine COD ming effect, Ton of Refrigeration, Ice making of the COP, unit of Refrigeration. Principle and working of Martine 103

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compression refrigeration and vapour absorption refrigeration: Principles and compressions of air conditioners, Room air conditioner. 10 Hours

Course Outcomes :

Course shall demonstrate knowledge associated with,

- Smocines Energy sources; Boilers, Prime movers such as turbines and IC engines, refrigeration and air-conditioning systems
- 2 Metal removal process using Lathe, drilling, Milling Robotics and Automation.
- 3. Fair understanding of application and usage of various engineering materials.

Scheme of examination :

- Two full questions (with a maximum of four sub questions) of twenty marks each to be set from each module. Each question should cover all the contents of the respective module.
- · Students have to answer five full questions choosing one full question from each module

Text Books :

- 1. V.K.Manglik, "Elements of Mechanical Engineering", PHI Publications, 2013. (Module-1,2,4,5)
- 2. Mikell P.Groover, "Automation, Production Systems & CIM", 3rd Edition, PHI (Module -3)
- 3. K.R.Gopalkrishna, "A text Book of Elements of Mechanical Engineering"-Subhash Publishers, Bangalore. (Module -1,2,3,4,5)

Reference Books:

1. S.TrymbakaMurthy, "A Text Book of Elements of Mechanical Engineering", 4th Edition 2006, Universities Press (India) Pvt Ltd, Hyderabad.

K.P.Roy, S.K.Hajra Choudhury, Nirjhar Roy, "Elements of Mechanical Regineering", Media Promoters & Publishers Pvt Ltd, Mumbai, 7th Edition.2012

Alchu Pravin Kumar, "Basic Mechanical Engineering", 2013 Edition, Pearson

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DEPARTMENT OF MECHANICALENGINEERING

CERTIFICATE

Certified that the project work entitled "PERFORMANCE, COMBUSTION & EMISSION CHARACTERISTICS OF A SINGLE CYLINDER CI ENGINE FUELLED WITH THE BLENDS OF NEEM OIL METHYL ESTER & COTTON SEED OIL METHYL ESTER WITH DIESEL" carried out by SUMIT TIWARI .(3NA14ME039), SHAHEEN BEGUM (3NA14ME033), SURESH KUMAR (3NA13ME041), H ROHITH (3NA13ME011), are the bonafide students of FOURTH YEAR (8th sem) in partial fulfillment for the award of Bachelor of Engineering in Navodaya Institute of Technology, Raichur of the Visveswaraiah Technological University, Belagavi during the year 2017-18. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

Signature of the Guide Prof. VENKAT REDDY

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Signature of the HOD Dr. P RATHNA KUMAR

External Viva

Signature of the Principal Dr. M.V MALLIKARJUNA

RAICHUANAIRE of the examiners

2. Prof. DN Sandamerh.

Signature with

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Signature of the Guide Prof. VENKAT REDDY



Signature of the Head of organization

Head of Department

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ABSTRACT

Continuous rise in the conventional fuel prices and shortage of its supply have increased the interest in the field of the alternative sources for petroleum fuels. Biodiesel is one such alternative source which provides advantage of pollution control. In the present work, experimentation is carried out to study the performance, emission and combustion characteristics of Neem & Cotton seed biodiesel and diesel. In this experiment a single cylinder, four stroke, naturally aspired, direct injection, water cooled, eddy current dynamometer, CI engine is used at constant speed condition. Crude oil is converted into biodiesel and characterization has been done. The experiment is conducted at variable load condition. The engine performance parameters studied were brake power, brake specific fuel consumption, brake thermal efficiency. The emission characteristics studied are CO, CO2, and UBHC & NOx. The combustion characteristics studied are cylinder pressure, net heat release rate. These results are compared to those of pure diesel. These results are again compared to the corresponding results of the diesel. From the graph it has been observed that, there is a reduction in emissions except NO_x & improvement in combustion characteristics and performance characteristics compared to the diesel. The present experimental results show that Neem & Cotton seed biodiesel can be used as an alternative fuel in diesel engine.

Keywords: Biodiesel, Neem & Cotton seed biodiesel, Diesel, Alternate fuel, Transesterification, Performance, Emission, Combustion.



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Fig 4.9: Heating of biodiesel

Fig 4.10: Pure biodiesel



Fig 4.11a: Diesel, Neem & cotton seed biodiesel

4.6 Fuel Properties

The fuels (Mineral diesel, Neem biodiesel and cotton biodiesel) were tested for several physical, chemical and thermal properties in Vision labs Environmental coasultant from hytical Services, Musarambagh, Malakpet, Hyderabad Telangana state and also in Energy Conversion Lab, Department of Mechanical Engineering Heud of Department Mechanical Engineering Mechanical Engineering, NPT, Balchurg-584 103 Page 19

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Performance, Combustion & Emissions characteristics of Single cylinder CI engine fuelled with the blends Penoise & CSOME with diesel.

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Table 4.2: Properties of blends of biodiesel.

perties	B10	Pag	
Property	825	D20	B30
Density (kg/m3)		827	830
Kinematic viscosity	3.76	4.08	4 41
(cSt)	41290.22		
Calorific Value		39942.07	39251.25
which point (°C)	46	56	50
Fire point (°C)	47-55	57-55	59-67

4.6.5 Experimental setup:

A Kirloskar make, single cylinder, air cooled, direct injection, DAF 8 model diesel engine (Product 240PE) was selected for the present research work, which is primarily used for agricultural activities and household electricity generations. It was a single cylinder, naturally aspirated, vertical, air-cooled engine. The detailed technical specifications of the engine are given in Table 3. The schematic diagram of the experimental setup along with all instrumentation is shown in Fig. 4.15. The engine trial was conducted as specified by IS: 10,000. The main parameters desired from the engine were power produced by the engines, engine speed (rpm), fuel consumption, exhaust gas analysis, crank angle measurement by crankshaft encoder, in-cylinder gas pressure measurement and heat release rate by using pressure transducers. The transducer and thermocouples were fitted at the suitable positions to measure the readings at different engine loadings. The fuel injection system was a traditional system consisting of a single hole pintle nozzle which inject the fuel at 200-205 bar.

Engine performance study includes brake power, indicated power, frictional Power, BMEP, IMEP, brake thermal efficiency, indicated thermal efficiency, Mechanical efficiency, volumetric efficiency, specific fuel consumption, Air fuel ratio, heat balance and combustion analysis. Lab view based Engine Performance Analysis software Package e soft is provided for on line performance evaluation.

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performance, Combustion & Emissions characteristics of Single cylinder CI engine fuelled with the blends Performance, CSOME with diesel.

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6.2 Combustion analysis

6.2.1 Cylinder Pressure

Y

The variation of cylinder pressure with crank angle at different loads for different fuels is as shown in the fig6.5. In a CI engine, the cylinder pressure characterizes the ability of fuel to mix well with air and burn. It is clear that the combustion starts earlier for B20 due to shorter ignition delay. It is observed that B20 as higher peak pressure than diesel & other blends. It may be due to more fuel is accumulated in the combustion chamber which leads to higher peak pressure at the time of premixed combustion stage. The higher peak pressure for B20 as compared to diesel may also be due dynamic injection advance, which results in initiation of combustion before TDC at the pressure rises quickly. The peak pressure for B20 is 68.6 bar, while in the case of diesel, it is 67 bar at full load.

Cylinder Pressure Graph



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2017-18

6.3.2 Carbon dioxide (CO₂) emissions:

Fig 6.8 shows the variation of CO₂ emission with load for diesel and biodiesel blends. CO₂ emissions of biodiesel are higher than that of diesel fuel. Presence of oxygen in biodiesel and relatively lower content of carbon in biodiesel for the same volume of fuel consumed are the reasons for higher emission of CO_2 .

However, some researcher reported lower CO₂ emissions for biodiesel than diesel. The explanation given is that the high viscosity of biodiesel reduces cone angle which leads to reduction of amount of a entrainment in the spray resulting in hindrance in complete combustion.



Fig 6.8: Variation of CO2 emission for different fuels.



Performance, Combustion & Emissions characteristics of Single cylinder CI engine fuelled with the blends of NOME & CSOME with diesel.

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CHAPTER 7

CONCLUSION

The present study was about technical feasibility of blends of biodiesels of neem and cotton sced with diesel fuel in the compression ignition engine without any modification. The engine performance, combustion and various emission characteristics were analyzed. The characteristics were briefly discussed in the previous chapter through which we can make following conclusions.

The brake thermal efficiency for B20 at full load was found to be higher than that of diesel and other blends. The brake power for diesel is more than that of B10 & B30 blends of biodiesel of neem and cotton seed with diesel at full load. This is due to the fact that biodiesel has lower heating value compared to diesel, so more biodiesel is needed to maintain constant power output. The BP for B20 at full load is almost equal to that of diesel. The BSFC obtained at full load for the blends B10 and B20 is same as that of diesel. It is observed that as the load increases the BSFC for diesel and other blends of biodiesel decreases and is almost same for all the fuels.

The peak cylinder pressure for B20 is closer to diesel fuel and it is slightly higher than B30 at full load. It is observed that the heat release rate is higher for diesel than other blends at full loads. This may be due higher volatility and better mixing of diesel with air. Another reason may be, as a consequence of the longer ignition delay, the intensity of premixed combustion phase for diesel is more.

It is observed that the CO emissions for B20 & B30 are comparatively less than the diesel fuel. This is due to the fact that the biodiesel is an oxygenated fuel, it led to better combustion of fuel, resulting in the decrease in CO emission. Reduction in CO emission is a strong advantage in favour of blends of biodiesel of neem and cotton seed with diesel. CO₂ emissions of blends of biodiesel are higher than that of diesel fuel. Presence of oxygen in biodiesel and relatively lower content of carbon in biodiesel for the same volume of fuel consumed are the reasons for higher emission of CO₂. The values of the the terms of biodiesel in the fuel blends. The time terms of biodiesel in the fuel blends.

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