(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai-25) Venkateswara Nagar, Panjappur, Tiruchirappalli - 620 012, Tamil Nadu.









INDEX

CRITERION: 2.3.2

Teachers use ICT enabled tools for effective teaching-learning process

2021 - 2022

ICT TOOLS USAGE

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COURSE LOG Branch : ECE Subject: EC 8451 Electromagnetic Particulars of Portions Covered Day Order Period Teaching Methods Date Unit Topics PPT c-resources etc. 16/3 BB BB with 17/3 T charts. PPT+ 4.5 v White Barro BB Systems BB 2 BB BB BB BB 2 BB BB BB

Branch: ECE

Subject: ECS 691 - MPMC

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| 15.1.20 | D | 4 | 2 | 8086 Signals | BB |
| 01.10 | II | 6 | ಎ | Basic configurations- System Bus | BB |
| 0./.20 | N | 6 | 2: | Timing System design using 8086 | BB |
| 06.1.30 | N | 7 | 2 | Ilo Paugramming | BB |
| 21.1.20 | V | ۵ | ચ | Multiple gramming, system Bus | BB |
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| 5,1,20 | E | 6 | 2 | closely coupled and Loosely | BB |
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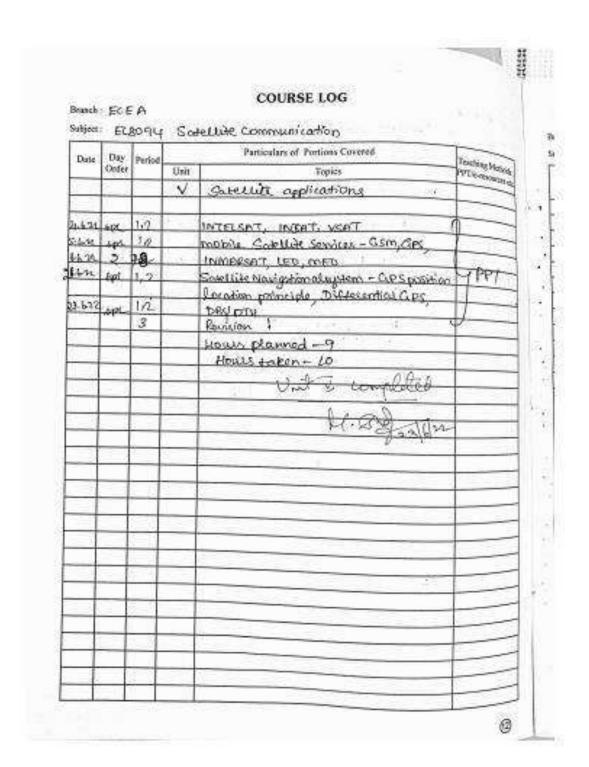
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| 810 | 5 | 3 | | | |
| | - | 4 | 1 | Multimedia compenents and application | BB |
| 1242 | 3 | 2 | 3 | Sampling and quantization of speech | |
| 444 | 4 | 1 | | PCM - Pulse code modulation | BB |
| S 1-32 | 5 | 3 | 1 | Adaptive differential PCH-ADPO | PP7 |
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COURSE LOG Subject 68094 Substitute Communication

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Venkateswara Nagar, Panjappur, Trichy - 620 012.

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PROJECTOR USAGE LOG

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Venkateswaru Nagar, Panjappur, Trichy - 620 012.

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PROJECTOR USAGE LOG

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Venkateswara Nagar, Panjappur, Trichy - 620 012.

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Venkateswara Nagar, Panjappur, Trichy - 620 012.

PROJECTOR USAGE LOG

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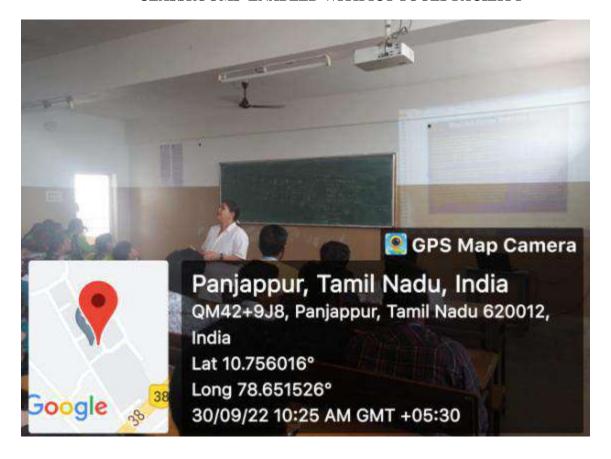
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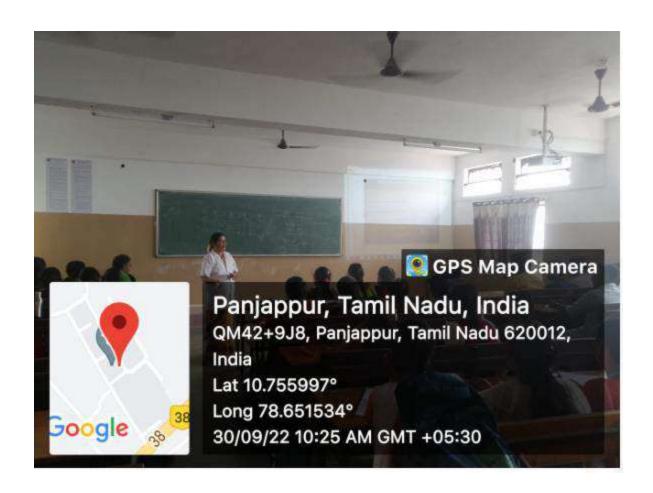
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PROJECTOR USAGE LOG

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CLASSROOMS ENABLED WITH ICT TOOLS FACILITY

















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| STATE | Dr. M. St | anmugavalli PROFESSOR | IC | E | |
| SE OBJECT | | | | | |
| educate o | on the basic co | ncepts of data networks | | | |
| - stroduce | the basics of | internetworking and serial communicati | ons | | |
| To educate o | on MODRIES | T and Field buses PROFIBUS and other communication p | | | |
| a introduce | industrial Eth | ernet and wireless communication | rotocal | | |
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| | | NDAMENTALS | | | 9 |
| | ierarchy and s | | PPT | 1 1 | 1.5 |
| Open Syste | m Interconnec | tion model of ISO | PPT | 2 | 3 |
| Data link co | ontrol protocol | | PPT | 2 | 5 |
| Media acce | ss protocol | | PPT | 2 | 7 |
| Command / | response | | PPT | 2 | 9 |
| Token passi CSMA/CD, | TCD/ID | | PPT | 2 | 11 |
| - CHANGE OF | TCP/IP | | PPT | 1. | 12 |
| INTERNE | F WORKING | and RS 232, RS485 | | | 9 |
| Bridges | | | PPT | | |
| Routers | | | PPT | | 13 |
| Gateways: | | | PPT | 2 | 15 |
| Standard ET | HERNET con | figuration special requirement for | DDT | | 16 17 |
| THE NET CO | onfiguration sp | secial requirement for networks used for | PPT | | 18 |
| SS 232 conf | iguration | | PPT | 2 | 20 |
| RS 485 conf | iguration | | PPT | 1 | 21 |
| Devicenet | tsor (AS) - int | erface | PPT | 2 | 23 |
| Alexanti | | 14 | PPT | 2 | 25 |
| HARTAND | FIELD BUS | | | | 9 |
| Introduction | Evolution of | signal standard | PPT | 2 | 27 |
| | nunication pro | | PPT | - | 28 |
| HART netwo | orks - HART c | ommands - HART applications | PPT | 2 | |
| Fieldbus - In | troduction | 41 | PPT | | 30 |
| General Field | fbus architectu | те | PPT | | 31 |
| Basic require | ments of Field | bus standard | PPT | 1 | 32 |
| | | crability Interchangeability | PPT | 7 | 33 |
| Introduction (| to OLE for pro | cess control (OPC), | PPT | 1 | 34 |
| | | US PA/DP/FMS AND FF | | | 35 |
| | otocol structur | | | | 9 |
| | s – troublesho | | PPT | 2 | 37 |
| Profibus, Into | | owne | PPT | 2 | 39 |
| Profibus prote | | | bbL | 2 | 41 |
| hint. | Section Statute | | PPT | 1 | 42 |

| Profibus communication model | 1000 | | - 4 |
|--|----------|----|-----|
| mication objects - system operation | PPT | 2 | 45 |
| muhleshooting | PPT | 14 | 46 |
| Reas of foundation fieldbus - Data Highway | PPT | 1 | 25 |
| INDUSTRIAL ETHERNET AND WIRELESS COMMU | NICATION | | 9 |
| Industrial Ethernet, Introduction | PPT | | 47 |
| Mbps Ethernet | PPT | 2 | 49 |
| 300 Mbps Ethernet | PPT | 2 | 51 |
| Radio and wireless communication | bbl | 1 | 52 |
| Introduction, components of radio link | PPT | 2 | 54 |
| made spectrum and frequency allocation | PPT | 2 | 56 |
| radio MODEMs | PPT | 2 | 58 |
| Impoduction to wireless HART and ISA100 | PPT | 1 | 59 |
| Board, PPT- Power point presentation | | | |

Sieve Mackay, Edwin Wrijut, Deon Reynders, John Park, Practical Industrial Data Networks Design, Installation and To ble hooting' Newnes Publication, Elsevier First Edition, 2004

William Buchanan, Computer Buses, CRC Press, 2000.

Behrouz Forouzan, Data Communications & Networking, 3rd edition, Tata McGraw hill, 2006.

- Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, Prentice Hall of India Pvt. Ltd., 5th Edition, 2011.
- Theodore S Rappaport, Wireless Communication: Principles and Practice, Prentice Hall of India 2nd Edition, 2001.
- William Stallings, Wireless Communication & Networks, Prentice Hall of India, 2nd Edition, 2005.

RSE OUTCOMES:

will have the

- Ability to define basic concepts of data communication and its importance.
- Ability to explain the various internetworking devices involved in industrial networks
- Ability to explain the various serial communication used in process industries.
- Ability to illustrate, compare & explain the working of HART and Field bus used in process digital communication.
- Ability to summarize the operation of MODBUS, PROFIBUS protocol & its applications.
- Ability to explain and adopt the different Industrial Ethernet protocol and usage of wireless communication in process applications.

LESSON PLAN ODD SEM (2021-22)

TITLE OF THE

E18091 INSTRUMENTATION IN PRTROCHEMICAL INDUSTRIES SUBJECT:

SEMESTER: VII

BRANCH: ICE

REGULATION: R-2017 AUC

NAME OF

ASSISTANT

STAFF:

Mr.R.SEETHARAMAN

PROFESSOR

ICE

COURSE OBJECTIVES:

1. To introduce the students the method of oil recovery and the steps involved in oil gas production process

2. To make the students understand the process behavior of some of the important unit operations in petrochemical industry through mathematical model

3. To familiarize the students to apply knowledge to select the appropriate control strategy for the selective process

4. To provide information about the most important derivatives obtained from petroleum products

5. To help the students in understanding selection and maintenance of instruments in petrochemical industry

| UNIT NO | TOPICS | TEACHING METHOD | NO. OF PERIO DS | CUMULA TIVE PERIODS |
|------------|--|--------------------|-----------------------|---------------------------|
| | OIL EXTRACTION AND OIL O | GAS PRODUCTI | ON | |
| 1 | Introduction to Oil and Gas Industries | PPT | 2 | 2 |
| | Techniques used for oil discovery | PPT | 2 | 4 |
| | Oil recovery methods | PPT | 1 | 5 |
| | Overview of oil gas production | PPT | 1 | 6 |
| | oil gas separation | PPT | 2 | 8 |
| | Gas treatment and compression | PPT | 2 | 10 |
| | Control and safety systems | PPT | 1 | 11 |
| | IMPORTANT UNIT OPERATI | ONS IN REFINE | RY | |
| 11 | Distillation Column | PPT | 1 | 12 |
| | Thermal cracking | PPT | 2 | 145 |
| | Catalytic Cracking & reforming | PPT | 2 | 16 |
| | Mathematical Modeling and control strategy | PPT | 2 | 18 |

| | Alkylation | PPT | 2 | 20 |
|----|--|-------------|---------|----|
| | Isomerization | PPT. | 2 | 22 |
| | DERIVATIVES FROM PE | ETROLEUM | | |
| | Methane and its derivatives | PPT | 2 | 24 |
| | Methanol Production | PPT | 1 | 25 |
| ш | Acetylene production | PPT | 1 | 26 |
| | Derivatives from acetylene | PPT | 2 | 28 |
| | Derivatives from ethylene | PPT | 2 | 30 |
| | Derivatives from propylene | PPT | 2 | 32 |
| | IMPORTANT PETROLEUM PRODUC | TS & MEASUR | REMENTS | |
| | BTX Processing | PPT | 2 | 34 |
| | Production of Styrene | PPT | 2 | 36 |
| | Production of Ethylene Glycol and Ethylene Oxide | PPT | 2 | 38 |
| IV | Production of Polyethylene & Polypropylene | PPT | 2 | 40 |
| | Study of parameters in petrochemical industry | PPT | 1 | 41 |
| | Selection of measuring instruments | PPT | 1 | 42 |
| | Maintenance of measuring instruments | PPT | 1 | 43 |
| | SAFETY IN INSTRUMENTAT | TION SYSTEM | S | |
| | Classification of Hazardous zone | PPT | 1 | 44 |
| | Electrical and Intrinsic safety | PPT | 1 | 45 |
| | Explosion suppression and Deluge Systems | PPT | 2 | 47 |
| | Flame, fire and smoke detectors | PPT | 1 | 48 |
| V | leak detectors | PPT | 1. | 49 |
| à | Guidelines and standards of safety instruments | PPT | 1 | 50 |
| | SIS Design Configurations | bbL | 1 | 51 |
| | Hazard and Risk Assessment | PPT | 2 | 53 |
| | Failure modes | PPT | 1 | 54 |
| | Operation and Maintenance | PPT | 1 | 55 |
| | | | | |

PPT-Power point presentation

COURSE OUTCOMES:

- Gain knowledge on oil gas production process and important unit operations in a refinery
- Having gained the process knowledge, ability to develop and analyze mathematical model of selective processes
- Able to develop, analyze and select appropriate control strategy for selective unit operations in a refinery
- Gain knowledge on the most important chemical derivatives obtained from petroleum products
- 5. Understand safety instrumentation followed in process industries

TEXT BOOKS:

- 1. Waddams, A.L., "Chemicals from Petroleum", Wiley, 1973. (Digitized in 2007)
- Balchen, J.G., and Mumme K.I., "Process Control Structures and Applications", Von Nostrand Reinhold Company, New York, 1988

REFERENCES:

- Liptak, B.G., "Instrumentation in Process Industries", Chilton Book Company, 2005. (Digitized in 2008.)
- 2. Austin, G.T. and Shreeves, A.G.T., "Chemical Process industries", McGraw-Hill, 2012
- HavardDevold, "Oil and Gas Production Handbook", ABB, 2006
- Paul Gruhn and Harry Cheddie, "Safety Instrumented Systems: Design, Analysis, and Justification", 2nd Edition, ISA Press, 2006

2 6/08/2021 SIGNATURE OF STAFF

SIGNATURE OF HEAD OF THE DEPARTMENT

| | | L | ESSON PLA | .N | | |
|---------------------------|-------------|---------|-------------|------------------|-------|--|
| AND A STANLAND CONTRACTOR | | EVE | N SEM (2021 | -2022) | | Annual Control of the |
| TITLE OF THE SUBJECT: | GE8076 | | PROFES: | SIONAL ETHICS II | N ENC | GINEERING |
| SEMESTER: | VIII | BRANCH: | ICE | REGULATI | ON: | R-2017 AUC |
| NAME OF STAFF: | DR.P.ARAVIN | D | ASSISTA | NT PROFESSOR | ICE | |

COURSE OBJECTIVES:

 To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

| UNIT NO | TOPICS | TEACHING METHOD | NO. OF PERIOD S | CUMULATIVE PERIODS | | | | | | |
|------------|---|--------------------|-----------------------|-----------------------|--|--|--|--|--|--|
| | HUMAN VALUES | | | 16 | | | | | | |
| 1 | Morals, values and Ethics | BB | 1 | 01 | | | | | | |
| | Integrity - Work ethic - Service learning | BB | 1 | 02 | | | | | | |
| | Respect for others - Living peacefully | BB | 1 | 03 | | | | | | |
| | Caring - Sharing - Honesty - Courage - Valuing time | BB | -2 | 0.5 | | | | | | |
| | - Cooperation - Commitment - Empathy | BB | 1 | 06 | | | | | | |
| | Self-confidence - Character - Spirituality | BB | 3 | 09 | | | | | | |
| | Introduction to Yoga | BB | 1 | 10 | | | | | | |
| | meditation for professional excellence and stress management | BB | 1 | 11 | | | | | | |
| | Revision | BB | 2 | 13 | | | | | | |
| | ENGINEERING ETHICS | | | | | | | | | |
| | Senses of 'Engineering Ethics' - Variety of moral issues | BB | 3 | 16 | | | | | | |
| | Types of inquiry - Moral dilemmas - Moral Autonomy | BB | 3 | 19 | | | | | | |
| | Kohlberg's theory - Gilligan's theory - Consensus & Controversy | BB | 1 | 20 | | | | | | |
| | Professions and Professionalism | BB | 1 | 21 | | | | | | |
| | Professional Ideals and Virtues - Uses of Ethical Theories | BB | 2 | 23 | | | | | | |
| | ENGINEERING AS SOCIAL EXPERIMENTATION | | | | | | | | | |
| _ | Engineering as Experimentation | BB | 3 | 26 | | | | | | |
| | Engineers as responsible Experimenters | BB | 3 | 29 | | | | | | |
| | Codes of Ethics | BB | 3 | 32 | | | | | | |
| Ш | A Balanced Outlook on Law | BB | 2 | 34 | | | | | | |
| | Revision | BB | 2 | 36 | | | | | | |
| | SAFETY, RESPONSIBILITIES AND RIGHTS | | | 9 | | | | | | |
| IV | Safety and Risk - Assessment of Safety and Risk | BB | 1 | 37 | | | | | | |
| | Risk Benefit Analysis and Reducing Risk | BB | 2 | 39 | | | | | | |
| | Respect for Authority - Collective Bargaining | BB | 2 | 41 | | | | | | |
| | Confidentiality | BB | 1 | 42 | | | | | | |
| | Conflicts of Interest - Occupational Crime - | BB | 3 | 45 | | | | | | |

| | Lo. 6. Cont. Bloker, Repolation Rights | BB | 3 | 48 |
|---|--|-------|-----|----|
| | Professional Rights - Employee Rights | BB | 2 | 50 |
| | Intellectual Property Rights (IPR) | BB | 1 | 51 |
| | Discrimination | 1000 | | |
| | Global Issues | | | |
| V | Multinational Corporations – Environmental Ethics – Computer Ethics | ВВ | 4 | 55 |
| | Weapons Development- Engineers as Managers | BB | 3 | 58 |
| | | BB | 5 | 63 |
| | Consulting Engineers - Engineers as Expert Witnesses and Advisors | 18284 | 157 | |
| | Moral Leadership - Sample Code of Conduct | BB | 2 | 65 |

BB -Black board teaching, PPT- Power point presentation

TEXT BOOKS:

- Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
- Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

- Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
- 2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics Concepts and Cases", Cengage Learning, 2009.
- 3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
- 4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
- 5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi, 2013.
- World Community Service Centre, 'Value Education', Vethathiri publications, Erode, 2011.

Web sources:

www.onlineethics.org, www.nspe.org, www.globalethics.org, www.ethics.org

COURSE OUTCOMES: Understanding the human values and ethics in the human excellence and behaviour in the organisation helps to understand the characteristics of morals and engineer's conduct of behaviour and practice in the workplace

Engineering as an experimental process to understand the various ethical implications

responsibility of engineers to ensure the safety, health and welfare of the public

the importance of ethics in dealing with the global issues, computer ethics and weapons development

SIGNATURE OF STAFF

SIGNATURE OF HEAD OF THE DEPARTMENT

LESSON PLAN EVEN SEM (2021 -2022)

TITLE OF THESUBJECT: | E18092 | THERMAL POWER PLANT INSTRUMENTATION

SEMESTER VI BRANCH ICE REGULATION R-2017 AUC

NAME OF STAFF: Dr. P.Thirumurugan

Assistant Professor /ICE

COURSE OBJECTIVES:

- > To make the students familiarize about various power generation methods.
- > To identify various parameters in thermal power plant
- To impart knowledge about the different types of controls and control loops.
- To familiarize the student with the methods of monitoring different parameters like speed, vibration of turbines and their control.

| Unit No | Topics | Teaching Method | No. of Periods | Cumulative Periods |
|------------|---|--------------------|-------------------|-----------------------|
| All III | UNIT I - POWER GENERATION | METHODS | | |
| | Brief Survey of methods of power generation | BB | 1 | 1 |
| | Hydro, thermal power plant | BB | 2 | 3 |
| I | Nuclear, solar and wind Power plant | BB | 2 | 5 |
| | Importance of instrumentation in power generation | BB/PPT | 1 | 6 |
| | Thermal power plant | BB | 1 | 7 |
| | Building blocks | BB/PPT | 1 | 8 |
| | Details of boiler | BB | 1 | 9 |
| | Boiler processes P&I Diagram | BB | 1 | 10 |
| | Cogeneration | BB | 1 | 11 |
| | UNIT II - MEASUREMENTS IN PO | WER PLANTS | | |
| | Electrical measurements: current, voltage, power | BB | 1 | 12 |
| | frequency, Power Factor | BB | 2 | 14 |
| | non electrical parameters: flow of feed water | BB | 1 | 15 |
| -13 | fuel, air, steam pressure | BB/PPT | 2 | - 17 |
| П | steam temperature and smoke density measurement | BB | 2 | 19 |
| | Flue gas oxygen analyzer | BB | 1 | 20 |
| | pollution monitoring instruments | BB | 1 | 21 |
| | UNITHI - FURNACE CONT | ROL-I | | |
| | Coal handling: Pulverizers | BB/PPT | 1 | 22 |
| | Furnace Draught: natural draught | BB/PPT | 1 | 23 |
| | forced draught | BB | 1 | 24 |

| Ш | induced draught, power requirements for draught systems, Combustion control: Fuel/Air ratio, combustion efficiency, | BB | 4 | 28 |
|---------|---|--------|-----|--------|
| | excess air, parallel and cross limited combustion control | BB | 2 | 30 |
| | soot-blowing operation. | BB | 2 | 32 |
| 111 3/1 | UNIT IV - BOILER CONTRO | OL | 100 | SHOULD |
| | Boiler metal temperature measurement, pressure | BB | 2 | 34 |
| | Boiler feed water processing and control | BB | 1 | 35 |
| IV | drum level measurement methods | BB | 1 | 36 |
| 2.5 | steam temperature control; main steam and reheat steam | BB/PPT | 3 | 39 |
| 4 | distributed control system in power plants | BB | 2 | 41 |
| | interlocks in boiler operation | BB | 2 | 43 |
| | UNIT V - TURBINE CONTROL | | | |
| | Speed measurement, rotor and casing movement | BB | 3 | 46 |
| V | Vibration measurement | BB | 2 | 48 |
| | shell temperature monitoring and control | BB/PPT | 2 2 | 50 |
| | steam pressure control, lubricant oil temperature | BB/PPT | 2 | 52 |
| | cooling system | BB | 2 | 54 |

BB -Black board teaching, PPT- Power point presentation

COURSE OUTCOME

1. Understanding various power generation process.

2. Identify important parameter to be monitored and controlled in thermal power plant.

3. Knowledge about various building blocks and instruments involved in thermal power plant and its controlling process.

TEXT BOOKS:

Sam Dukelow, Control of Boilers, Instrument Society of America, 1991.

 Modern Power Station Practice, Vol.6, Instrumentation, Controls and Testing, Pergamon Press, Oxford, 1971.

REFERENCES:

- Krishnaswamy KM, Bala P, Bala MP, "Power Plant Instrumentation," Prentice Hall, 2013
- Elonka.S.M.and Kohal A.L., Standard Boiler Operations, McGraw-Hill, New Delhi, 1994.
- 3. Jain R.K., Mechanical and industrial Measurements, Khanna Publishers, New Delhi, 2008

Course Teacher

(Dr.P. Thirumurugan)

HoD/ICE

(Dr. S. M. Girirajkumar)

SARANATHAN COLLEGE OF ENGINEERING

Venkateswara Nagar, Panjappur, Trichy - 620 012.

PROJECTOR USAGE LOG

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| SI. No. | Date | Dept | Subject | Faculty Name | Projector ON time | Projector OFF time | Usage Hours | Faculty Signature | |
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SARANATHAN COLLEGE OF ENGINEERING

Venkateswara Nagar, Panjappur, Trichy - 620 012.

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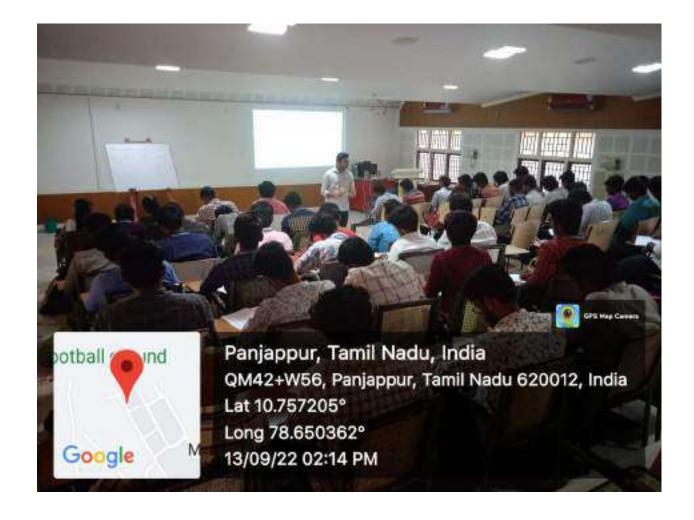
PROJECTOR USAGE LOG

| SI. No. | Date | Dept | Subject | Faculty Name | Projector ON time | Projector OFF time | Projector Usage Hours | Faculty Signature |
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M.E Seminar hall usage



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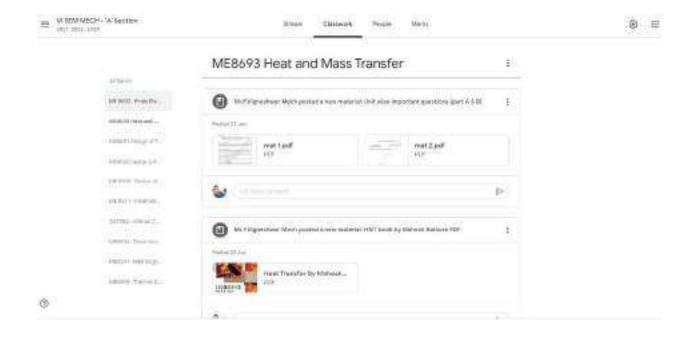
CAD LAB



Google Classroom







Branch: CSE

Subject: CS8491- COMPUTER ARCHITECTURE

| Date | Day | Period | | Particulars of Portions Covered | Teaching Methods |
|---------|------------|--------|------|--|--|
| Date | Order | | Unit | Topics | PPT/e-resources e |
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| 83.20 | చి | v | E | Basic Operational Concepts | £.B |
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Branch:

Subject: @58491 - Comporder Architecture

| Day | Period | | Particulars of Portions Covered | Teaching Methods |
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| Order | 1 | Unit | Topics | PPT/e-resources etc |
| 5 | 6 | 11 | Intersection to Asitmetic apartice | 48B |
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Branch: CSE

Subject: C38491 - Compder Acclitedure

| Date | Day | Period | | Particulars of Portions Covered | Teaching Methods |
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| | Order | | Unit | Topics | PPT/e-resources etc |
| 16.5 | 1 | .5 | 3 | Building a Doda Tati | BB |
| 18.5 | .5 | , | 3 | Control implementation of home | BB |
| 18.5 | .3 | ٥ | .3 | ALI Centles Signals | EPF. |
| 20:5 | 5 | 6 | ے | Control implementation of chance | F-0957 |
| 28.5 | 1 | .5 | 3 | exercises of Pipelining | BB |
| 25.5 | 3 | 1 | 3 | Harasas | FFT |
| 24.5 | -5 | 4 | _3_ | Data Hatmas | , AB |
| 27.5 | 5 | 6 | 3 | Control & Structural Hotrack | PPT |
| 28.5 | 1 | 3 | .3 | Data Hatanes is sprawing | PPT |
| 28.5 | 1 | .55 | .3 | Parallelism | |
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Branch: CSE

Subject: COSA) - Computer Acchilecture

| Date | Day | Period | | Particulars of Portions Covered | Teaching Mathed |
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| | Order | | Unit | Topics | Teaching Methods PPT/e-resources etc |
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SYLLABUS

CS8491

COMPUTER ARCHITECTURE

OBJECTIVES:

To learn the basic structure and operations of a computer.

- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To learn the basics of pipelined execution.

To understand parallelism and multi-core processors.

- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the different ways of communication with I/O devices.

UNIT I BASIC STRUCTURE OF A COMPUTER SYSTEM

Functional Units - Basic Operational Concepts - Performance - Instructions: Language of the Computer - Operations, Operands - Instruction representation - Logical operations decision making - MIPS Addressing.

UNIT II ARITHMETIC FOR COMPUTERS

Addition and Subtraction - Multiplication - Division - Floating Point Representation -Floating Point Operations - Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT

A Basic MIPS implementation - Building a Datapath - Control Implementation Scheme -Pipelining - Pipelined datapath and control - Handling Data Hazards & Control Hazards -Exceptions.

UNIT IV PARALLELISIM

Parallel processing challenges - Flynn's classification - SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading - Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

MEMORY & I/O SYSTEMS

Memory Hierarchy - memory technologies - cache memory - measuring and improving cache performance - virtual memory, TLB's - Accessing I/O Devices - Interrupts - Direct Memory Access - Bus structure - Bus operation - Arbitration - Interface circuits - USB.

OUTCOMES:

TOTAL: 45 **PERIODS**

On Completion of the course, the students should be able to:

- · Understand the basics structure of computers, operations and instructions.
- Design arithmetic and logic unit.
- Understand pipelined execution and design control unit.
- Understand parallel processing architectures.
- Understand the various memory systems and I/O communication.

TEXT BOOKS:

David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.

Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.



Unit-1

| Sno | Topic Name | Reference | Page Numbers | Teaching | No of Periods | Cumulative Periods | Teaching Outline for the Students | |
|-----|---|-----------|-----------------|----------|------------------|-----------------------|--|--|
| 1 | Introduction | | | вв | 1 | 1 | Scope, importance and application- Lecture &Discussion | |
| 2 | Functional Units | T2 | 3-6 | ВВ | 1 | 2 | Introduction to functional units of Computers | |
| 3 | Basic Operation Concepts | T2 | 7-19 | ВВ | 1 | 3 | Discussion on basic operati concepts | |
| 4 | Performance | T2 | 1.13 | ВВ | 1 | 4 | Lecture on Performance of computer System | |
| 5 | Instructions: Language of the Computer-Operations, Operands | Ti | 60-72 | вв | 1 | 5 | Introduction to instruction set | |
| 6 | Instruction representation | T1 | 80-87 | ВВ | 1 | 6 | Discussion on instruction representations | |
| 7 | Logical operations | Tì | 87-90 | PP T | 1 | 7 | Lecture on instructions used for performing logical operations | |
| 8 | Decision making | Tl | 90-96 | PP T | 1 | 8 | Lecture on decision making instructions Students willsolve problems | |
| 9 | MIPS Addressing | T1 | 111- 121 | PP T | 2 | 10 | Introduction of MIPS addressing system used in computers. Students will solve problems | |

LEARNING OUTCOME At the end of unit, Students should be able to

- · Discuss trends in Components of a digital computer system.
- · Demonstrate an understanding of the Instructions in modern computer process.
- Understand about Logical operations, control operations in digital computer system.

Unit-2



| Sno | Topic Name | Reference | Page Numbers | Teaching aid | No of Periods | Cumulative Periods | Teaching Outline for the Students |
|-----|--|-----------|-----------------|-----------------|------------------|-----------------------|---|
| 10 | Addition and Subtraction | TI | 178-182 | вв | 2 | 12 | Solve problems on Addition and Subtraction arithmetic operations |
| 11 | Multiplication | Ti | 183-189 | ВВ | 2 | 14 | Solve problems on Multiplication arithmetic procedure |
| 12 | Division | TI | 189-184 | ВВ | 2 | 16 | Solve problems on Division operation procedure |
| 13 | Floating Point Representation | T1 | 196-202 | PPT | 1 | 17 | Discussion on representation of real numbers |
| 14 | Floating Point Operations Sub- word Parallelism | TT | 203-222 | PPT | 2 | 19 | Lecture on the procedures used to perform various floating point operations in Computer systems |

LEARNING OUTCOME At the end of unit, Students should be able to

- To learn and apply the operations of Addition, subtraction, Multiplication, and Division in modern computer.
- 2. To learn about floating points operations (add, sub, mul, Div)

Unit -3

| Sno | Topic Name | Reference | Page Numbers | Teaching | No of Periods | Cumulative Periods | Teaching Outline for the Students | |
|-----|----------------------------------|-----------|-----------------|----------|------------------|-----------------------|---|--|
| 15 | A Basic MIPS implementation | TI | 244-248 | ВВ | 1 | 20 | Video on MIPS Processor implementation | |
| 16 | Building a Data path | T1 | 251-259 | BB | -1 | 21 | Demonstration on building a data path | |
| 17 | Control Implementation Scheme | TI | 259-272 | PPT | 2 | 23 | Discussion on control implementation scheme | |
| 18 | Pipelining | TI | 272-286 | PPT | 1 | 24 | Introduction to pipelining concepts | |
| 19 | Pipelined data path and control | TI | 286-303 | BB | 2 | 26 | Lecture on Pipelined data path &control | |
| 20 | Handling Data Hazards | TI | 303-325 | ВВ | 1 | 27 | Discussion on data hazards | |
| 21 | Control Hazards | TI | 325-332 | BB | 1 | 28 | Discussion on Control Hazards | |
| 22 | Exceptions | TI | 332-333 | ВВ | 1 | 29 | Discussion on Exceptions | |

LEARNING OUTCOME At the end of unit, Students should be able to

- To learn and apply the operations of MIPS Implementation and control schema implementation.
- To learn about pipeline Hazards and Graphics Processing Units.

Unit - 4

| Sno | Topic Name | Reference | Page Numbers | Teaching aid | No of Periods | Cumulative Periods | Teaching Outline for the Students | |
|-----|---|-----------|-----------------|-----------------|------------------|-----------------------|--|--|
| 23 | Parallel processing challenges | | 502-504 | вв | 1 | 30 | Discussion on the various challenges in parallel processing | |
| 24 | Flynn's classification SISD, MIMD, SIMD, SPMD, and Vector Architectures | T1 | 504-515 | PPT | 2 | 32 | Introduction to Flynn's classification and various parallel processor architectures. | |
| 25 | Hardware multithreading | TI | 516-519 | PPT | 1 | 33 | Discussion on Hardware multithreading | |
| 26 | Multi-core processors and other Shared Memory Multiprocessors | Tı | 519-523 | вв | 1 | 34 | Lecture on multi-core processors | |
| 27 | Introduction to Graphics Processing Units | TI | 523-531 | вв | 2 | 36 | Introduction to graphics processing units | |

| 28 | Clusters, Warehouse Scale Computers | TI | 531-536 | PPT | 1 | 37 | Lecture on clusters Scale Computers |
|----|--|----|---------|-----|---|----|---|
| 29 | Message-Passing Multiprocessors | TI | 531-536 | PPT | 1 | 38 | Lecture on message-passing Microprocessors |

LEARNING OUTCOME At the end of unit, Students should be able to

- · Able to understand Concept of Speculation, Static Multiple Issues.
- · Students are able to understand the Hardware multithreading concepts

Unit - 5

| Sno | Topic Name | Reference | Page Numbers | Teaching ald | No of Periods | Cumulative Periods | Teaching Outline for the Students | | |
|-----|--|-----------|-----------------|-----------------|------------------|-----------------------|---|--|--|
| 30 | Memory Hierarchy & Memory Technologies | T2 | 288-289 | вв | 1 | 39 | Lecture on Memory hierarchy and Discussion on various memory technologies | | |
| 31 | Cache memory | T2 | 289-300 | ВВ | 1 | 40 | Introduction to the concepts of Cache Memory | | |
| 32 | Measuring and improving cache performance | T2 | 300-305 | вв | 1 | 41 | Solve problems on measures for improving cache performance | | |
| 33 | Virtual memory, TLBs | T2 | 305-310 | PPT | 1 | 42 | Discussion on virtual memory and TLB | | |
| 34 | AccessingI/O Devices | T2 | 96-103 | вв | 1 | 43 | Discussion on accessing methods of I/O Devices | | |
| 35 | Interrupts | T2 | 103-119 | ВВ | 1 | 44 | Lecture on interrupts | | |
| 36 | Direct Memory Access | T2 | 285-287 | ВВ | 1 | 45 | Lecture on DMA | | |
| 37 | Bus structure-Bus operation | T2 | 228-237 | PPT | 1 | 46 | Discussion on Bus structure | | |
| 38 | Arbitration -Interface circuits | T2 | 237-238 | ВВ | 1 | 47 | Lecture on Arbitration & Interface Circuits | | |
| 39 | USB | T2 | 238-239 | PPT | 1 | 48 | Lecture on USB | | |
| | | (| Content Be | yond t | he Syll | abus | VII | | |
| 40 | Instruction level parallelism | | | ВВ | 1 | 49 | Lecture on Instruction level parallelism | | |

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| 3 | 71 - 100% |



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SARANATHAN COLLEGE OF ENGINEERING

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