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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

EXA-801 Power Controller

EXA-801 (A)	Power Controller	3L:0T:0P	3 credits	3Hrs/Week

Unit I Various Power Semiconductor Devices: (6 Hrs)

SCR, GTO, MOSFET, BJT, IGBT & MCT's & their protection, series-parallel operation, Heat sink calculations, Design of firing circuit for converters, choppers & inverters.

Unit II- Analysis & Design: (6 Hrs)
1-φ bridge converter, 3-φ bridge converter with and without freewheeling diode, effect of source impudence, power factor improvement techniques, and pulse width modulated converters, Dual converters, converter for HVDC application & DC drives.

Unit III-Analysis & Design: (10 Hrs)
voltage commutated, current commutated and load commutated choppers, multiquadrant choppers, chopper for traction application. Resonant choppers, SMPS.

Unit IV-VSI & CSI : (10 Hrs)
1-φ VSI, 3-φ VSI (180° mode, 150° mode & 120° mode of conduction), various inverter commutation circuits, harmonic reduction techniques, PWM inverters, Inverters for HVDC application & AC drives. Advantages & limitation of current source inverters over VSI, 1-phase and 3-phase CSI. Resonant inverters.

Unit V- Cycloconverter: (10Hrs)
1-φ to 1-φ, 3-φ to 3-φ cycloconverter circuits, circulating current scheme, non-circulating current operation, Mean output voltage, harmonics in supply current waveform & input-power factor. Concept of power quality

References:

1. Thyristorised Power Controllers - G.K.Dubey, Doradla, Joshi, Sinha
2. Power Electronics - C.W.Lander
3. Power Electronics - Rashid
4. Thyristorised power controlled converters & cycloconverters - B.R.Pelly
5. Power Electronics - N.Mohan
6. Power Electronics Application - Vithyathil.

EXA-801 Power Controller

EXA-801	Power Controller	0L:0T:1P	1 credits	2Hrs/Week

List of Experiments :(Extendable)

2: To study the characteristics of microcontroller based over current relay.

3: To perform symmetrical fault analysis in AC network analyser.

4: To perform symmetrical fault analysis in DC network analyser & perform the experiment for Unsymmetrical fault analysis on DC network.

5: To study the characteristics of the operation of Buchholz relay.

6: To study the characteristics of the microprocessor based DMT/IDMT over current

relay and determines the time current characteristics.

7: Testing of negative Sequence relay using the negative sequence kit against negative sequence current balanced and unbalanced load condition.

8: To study the characteristics of Electromechanical over current relay.

9: To study microcontroller base over/ under voltage relay.

10: To study characteristics of microcontroller based earth fault relay.

11: To study characteristics of electromechanical earth fault relay.

12: To find out the string efficiency across the string of insulators.

Experiment 13:To study various effects on transmission line simulator

a) Ferranti effect simulation for an unloaded line

b) Shunt Reactor Compensation for Unloaded Line

c) Loading of Transmission line

d) Shunt capacitive compensation of transmission line (to improve voltage profile)

e) Parallel operation of transmission line

f) Simulation of 3-Phase fault

g) Simulation of SLG, LLG and LL fault

h) Effect of Parallel line on Fault Current

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EXA-802 (A)	EHVAC & DC	3L:0T:0P	3 credits	3Hrs/Week

Unit- I Introduction: (6Hrs)
EHV A.C. and D.C. links, Kind of D.C. links, limitations and advantages of A.C. and D.C. transmission, principal application of A.C. and D.C. transmission, trends in EHV A.C. and D.C. transmission, power handling capacity, firing angle control, overlapping.

Unit- II FACTS Devices: (10Hrs)
Basic types of controller, series controller, static synchronous series compensator(SSSC), thyristor-controlled series capacitor(TCSC), thyristor controlled series reactor(TCSR), shunt controller (STATCOM), static VAR compensator(SVC), series series controller, combined series-shunt controller, unified power flow controller (UPFC), thyristor controlled p+
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hase shifting transformer(TCPST).

Unit- III Converters in EHV D.C: (10Hrs)
Components of EHV D.C. system, converter circuits, rectifier and inverter valves, reactive power requirements, harmonics generation, adverse effects, classification, remedial measures to suppress, filters, ground return, converter faults & protection ,commutation failure, multi terminal D.C. lines.

Unit- IV Controlling: (10Hrs)
Control of EHV D.C. system, control characteristics, constant current control, constant extinction angle control, ignition angle control, parallel operation of HVAC & DC system, problems & advantages.

Unit- V Transmission Systems: (6Hrs)
Travelling waves on transmission systems, attenuation, distortion, effect of junction and termination on propagation of traveling waves, over voltages in transmission system, lightning, switching and temporary over voltages, control of lighting and switching over voltages.

References:

1. S. Rao,- "EHV AC & DC Transmission" Khanna pub.
2. Kimbark,-" HVDC Transmission" john willy & sons pub.
3. Arrillaga,- "HVDC Transmission"2nd Edition ,IEE londan pub.
4. Padiyar, -"HVDC Transmission" 1st Edition ,New age international pub.
5. T.K. Nagsarkar,M.S. Sukhiza, -"Power System Analysis", Oxford University
6. Narain.G. Hingorani, l. Gyugyi-"Undustanding of FACTS concept and technology", john willy & sons pub.
7. 7.P.Kundur- "H.V.D.C. Transmission" McGraw Hill

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EXA-802 (B) Machine Learning

EXA-802 (B)	Machine Learning	3L:0T:0P	3 credits	3Hrs/Week

UNIT-I Introduction: (10Hrs)

Learning, Types of Machine Learning. Some Basic Statistics: Averages, Variance and Covariance, Gaussian distribution, Bayes theorem. Concept learning: Introduction, Version Spaces and the Candidate Elimination Algorithm. Learning with Trees: Constructing Decision Trees, CART, Classification Example

UNIT-II Time Series : (6Hrs)

AR, MA, ARMA, ARIMA , ARMAX for predictions using time dependent data. Linear Discriminants: Linear Separability, Linear Regression , Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis SUPPORT Vector Machines: Optimal Separation, Kernels The Bias-Variance Tradeoff.

UNIT-III Bayesian learning: (6Hrs)

Introduction, Bayes Optimal Classifier, Naive Bayes Classifier, Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm, Neural Networks : The Perceptron, Multilayer Perceptron (MLP): Going Forwards, Backwards, MLP in practices, Deriving back Propagation

UNIT-IV Clustering: (10Hrs)

 Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison Evolutionary Learning: Genetic Algorithms, Genetic Operators, Genetic Programming Ensemble learning: Boosting, Bagging

UNIT-V Case studies : (10Hrs)

Use of Data sets , Data Pre-processing and application of the suitable algorithms .

Suggested Reading:

1. Tom M. Mitchell, Machine Learning, Mc Graw Hill, 1997

2. Stephen Marsland, Machine Learning - An Algorithmic Perspective, CRC Press, 2009

3. Margaret H Dunham, Data Mining, Pearson Edition., 2003.

 4. Galit Shmueli, Nitin R Patel, Peter C Bruce, Data Mining for Business Intelligence, Wiley India Edition, 2007 5. Rajjan Shinghal, Pattern Recognition, Oxford University Press, 2006.

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EXA-802 (C) Modern Manufacturing Processes

EXA-802 (C)	Modern Manufacturing Processes	3L:0T:0P	3 credits	3Hrs/Week

Preambles:

To motivate and challenge students to understand and develop an appreciation of the processes in correlation with material properties which change the shape, size and form of the raw materials into the desirable product by conventional or unconventional manufacturing methods

Course Outcomes:

Upon completion of this course, students will be able to understand the different conventional and unconventional manufacturing methods employed for making different products

Unit 1 Conventional Manufacturing processes: (6Hrs)

Casting and moulding: Metal casting processes and equipment, Heat transfer and solidification, shrinkage, riser design, casting defects and residual stresses.

Unit 2 Introduction to bulk and sheet metal forming, (10Hrs)

plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk forming(forging, rolling, extrusion, drawing) and sheet forming (shearing, deep drawing, bending) principles of powder metallurgy.

Unit 3 Metal cutting: (10Hrs)

Single and multi-point cutting; Orthogonal cutting, various force components: Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, Cutting tool materials, Cutting fluids, Coating; Turning, Drilling, Milling and finishing processes, Introduction to CNC machining.

Unit 4 Additive manufacturing: (6Hrs)

Rapid prototyping and rapid tooling Joining/fastening processes: Physics of welding, brazing and soldering;design considerations in welding,Solid and liquid state joining processes;Adhesive bonding.

Unit 5 Unconventional Machining Processes: (10Hrs)

Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, principles and process parameters

Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear, dielectric, power and control circuits, wire EDM; Electro-chemical machining (ECM), etchant &maskant, process parameters, MRR and surface finish. Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining

Text Books:
1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India, 2014
2. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems
3. Degarmo, Black &Kohser, Materials and Processes in Manufacturing

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EXA-803(A) Economic Policies in India

EXA 803(A)	Economic Policies in India	3L:0T:0P	3 credits	3Hrs/Week

Unit –I Basic features and problems of Indian Economy: -(6 Hrs)
Nature of Indian Economy, demographic features and Human Resource Development (HDI), Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

Unit-II Sectoral composition of Indian Economy (6 Hrs)
- Issues in Agriculture sector in India ,land reforms Green Revolution and agriculture policies of India , Industrial development , small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

Unit-III Economic Policies :- (6 Hrs)
Economic Planning in India , Planning commission v/s NITI Aayog, monetary policy in India, Fiscal Policy in India,

Unit IV Centre state Finance Relations, (6 Hrs)
Finance commission in India. LPG policy in India.

Unit-V External sector in India: -(6 Hrs)
India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.

Suggested Readings:

1. Dutt Rudder and K.P.M Sunderam (2001): Indian Economy, S Chand & Co. Ltd. New Delhi.

2. Mishra S.K & V.K Puri (2001) "Indian Economy and –Its development experience", Himalaya Publishing House.

3. KapilaUma: Indian Economy: Policies and Performances, Academic Foundation

4. Bardhan, P.K. (9th Edition) (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.

5. Jalan, B. (1996), India's Economic Policy- Preparing for the Twenty First Century, Viking, New Delhi.

SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

EXA-803 (B) Cyber Law and Ethics

EXA 803(B)	Cyber Law and Ethics	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

Understanding the Real Approach, Cyber Ethics, Cyber Jurisdiction, Cyber Laws of other rules.

Course Outcomes:

Students identify and analyze statutory, regulatory, constitutional, and organizational *laws* that affect the information technology professional. Students locate and apply case *law* and common *law* to current *legal* dilemmas in the technology field.

UNIT I History of Information Systems and its Importance, (10 Hrs)

basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles.

UNIT II Security Threats to E Commerce, (10 Hrs)

Virtual Organization, Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards. Physical Security- Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls, Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges

UNIT III Model of Cryptographic Systems, (6 Hrs)

Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies Network

Unit IV Security (6 Hrs)

Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

UNIT V Security metrics (10 Hrs)

Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mining Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes

References:

1. Godbole,― Information Systems Security‖, Wille
 2. Merkov, Breithaupt, ― Information Security‖, Pearson Education
3. Yadav, ―Foundations of Information Technology‖, New Age, Delhi 4. Schou, Shoemaker, ― Information Assurance for the Enterprise‖, Tata McGraw Hill
5. Sood,―Cyber Laws Simplified‖, Mc Graw Hill
 6. Furnell, ―Computer Insecurity‖, Springer 7. IT Act 2000

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EXA-803(C) Internet of Things

EXA 803(C)	Internet of Things	3L:0T:0P	3 credits	3Hrs/Week

Course Preambles:

1. To assess the vision and introduction of IoT.
2. To Understand IoT Market perspective.
3. To Implement Data and Knowledge Management and use of Devices in IoT Technology.
4. To Understand State of the Art - IoT Architecture.
5. To classify Real World IoT Design Constraints, Industrial Automation in IoT.

Course Outcomes

On successful completion of the course, the student will: • Understand the concepts of Internet of Things • Analyze basic protocols in wireless sensor network • Design IoT applications in different domain and be able to analyze their performance • Implement basic IoT applications on embedded platform

Unit 1 Introduction to IoT - **(10 Hrs)**

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT,Functional blocks of IoT, Communication models & APIs

Unit 2 IoT & M2M **- (10 Hrs)**

Machine to Machine, Difference between IoT and M2M, Software define Network

Unit 3 Network & Communication **(10 Hrs)**

Network & Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

Challenges in IoT Design challenges, Development challenges, Security challenges, Other challenges

Unit 4 Domain specific applications **(6 Hrs)**

Domain specific applications of IoT Home automation, Industry applications, Surveillance applications,

Unit 5 Other IoT applications **(6 Hrs)**

Developing IoTs Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python

Reference Books:

1. Vijay Madisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"

2. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

EXA-804 Projects –II (Major)

EXA 804	Projects –II (Major)	0L:0T:6P	6 credits	12Hrs/Week

Preambles:

The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone orjointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under EEP1;

2. Review and finalization of the Approach to the Problem relating to the assigned topic;

3. Preparing an Action Plan for conducting the investigation, including team work;

4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;

5. Final development of product/process, testing, results, conclusions and future directions;

6. Preparing a paper for Conference presentation/Publication in Journals, if possible;

7. Preparing a Dissertation in the standard format for being evaluated by the Department.

8. Final Seminar Presentation before a Departmental Committee

SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

MANDATORY COURSES

Sr. No.	Course Code	Course Title	Credits	Preferred Semesters
1	MC	[Environmental Sciences, Induction Program, NSS/NCC] Constitution of India	Nil	I, III, IV,
		Total		0

Induction Program

MC	Induction Program	0L:0T:0P	Nil	2Hrs/Week

Induction program (mandatory)	3 weeks duration (Please refer Appendix-A for guidelines & also details available in the curriculum of Mandatory courses)
Induction program for students to be offered right at the start of the first year.	- Physical activity - Creative Arts - Universal Human Values - Literary - Proficiency Modules - Lectures by Eminent People - Visits to local Areas - Familiarization to Dept./Branch & Innovations

A student has to undergo this induction program after joining the institute and before the commencement of classes. Normal classes of the engineering program shall begin after the students have undergone a three-weeks induction program. The Induction program for students comprises of Physical activities; Learning an art form; Literature & Cinema; Social Awareness; Lectures & Visits; Universal Human Values; Familiarization to Department/ Branch, College & Innovations.

SCHOOL OF ENGINEERING
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

EXA-308-NSS/NCC

EXA-308	NSS/NCC	0L:0T:0P	Nil	2Hrs/Week

Course Preamble

- To develop qualities of Character, Courage, Comradeship, Discipline, Leadership, Secular Outlook, Spirit of Adventure and the ideals of Selfless Service amongst the Youth of the Country.
- To Create a Human Resource of Organized, Trained and Motivated Youth, to Provide Leadership in all Walks of life and be always available for the Service of the Nation
- To Provide a Suitable Environment to Motivate the Youth to Take Up a Career in the Armed Forces.

Course Outcomes:

- ➢ To develop student's personality through community services
- ➢ Instilling discipline in the souls of the cadets,
- ➢ Imparting leadership, discipline, integration, adventure, military, physical and community development training

Course Content :
The National Cadet Corps (India)) was formed under NCC Act of 1948 and is open to school and college students on voluntary basis. The Cadets are given basic military training in small arms and parades. The motto of NCC is "Unity and Discipline". One week long NSS camp is organized every year where students undertake various social welfare activities like Blood Donation Camp, Tree Plantation and awareness programs on drug de-addiction, AIDS, Swine-flu and campaign for saving water and cleanliness.

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SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Constitution of India

MC	Constitution of India	0L:0T:0P	Nil	2Hrs/Week

Unit 1. Introduction

Concept of liberty; Concept of positive and negative obligations

Unit 2 The Premises of Social Revolution:

Intellectual and historical origins of the concept of Social Economic Justice in India.

Unit 3 Sixty years of civil rights movement in India:

Moderate nationalism and the emergence of the politics of socio-economic justice; Annie Besant, the Theosophical Society and the Home Rule League Movement,

Unit 4 Impact of Socialism on the Writing of the Indian Constitution [I], [1914-31]:

From the First World War to the Karachi Resolution: [a] Jawaharlal Nehru's arrival in national politics and his initiation in municipal politics; [b] The Bolshevik Revolution [1917] and its impact on growth of Indian socialism; [c] Growth and influence of Fabian socialists on Indian nationalism; [d] Commonwealth of India Bill [1925]; [e] National Demand or the Motilal Nehru Report [1927-8] and the Calcutta Congress [1928]; [f] Karachi Resolution of the Indian National Congress [1931]

Unit 5 Impact of Socialism on the Writing of the Indian Constitution [II], [1932-52]:

From the Demand for Adult Suffrage to Passing of the Constitution of India: [a] Growth of the Congress Socialist Party and the demand for the adoption of adult suffrage; [b] Panchayati Raj and empowerment in the Indian Constitution; [c] The National Plan [1938], the Bombay Plan [1944] and proposals for large-scale industrialisation in India; [d] The August Offer [1940], Cripps Mission [1942] and the Cabinet Mission proposals [1946]; [e] The establishment of Indian Constituent Assembly [1946], the Indian Independence Act [1947], the working of the Constituent Assembly and the Assembly debates and the role of the Oligarchy comprising of Jawahaharlal Nehru, Vallabhbhai Patel, Maulana Abul Kalam Azad and Rajendra Prasad in it; [f] Social reforms and State Security v. 'Due Process of Law'; [g] The introduction, passage and development of the Hindu Code Bill, 1956

References:

1. Bagehot, Walter, An Introduction to English Legal History, [London, 1990]
2. Berlin, Isaiah, Henry Hardy and Ian Harris, Liberty: Incorporating Four Essays on Liberty, [Oxford, 2002]

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3. Austin, Granville, The Indian Constitution: Cornerstone of a Nation, [Oxford, 1966] –, Working of a Democratic Constitution: A History of the Indian Experience, [New Delhi, 2003]

4. Bagchi, Amiya Kumar, Private Investment in India, 1900-1939, [London, 1972]

5. Bakshi, P.M., The Constitution of India: With Comments and Subject Index, [Delhi, 1991]

6. Basu, Durgadas, Introduction to the Constitution of India, [New Delhi, 1995] –, Shorter Constitution of India, [Calcutta, 1959]

7. Chandra, Bipan, [et al.], India's Struggle for Independence, [New Delhi, 1991]

8. Coupland, Reginald, The Indian Problem, Three Volumes, [London, 1944]

9. Dutta, Nilanjan, 'From Subject to Citizen: Towards a History of Indian Civil Rights Movement', in Michael Anderson and Sumit Guha, Changing Concepts of Rights and Justice in South Asia, [New Delhi, 2000]

10. Dhavan, Rajeev and Thomas Paul, Nehru and the Constitution, [Bombay, 1992]

11. Forbes, Geraldine, Women in India, [Cambridge, 1996] Gauba, O.P., Constitutionalism in a Changing Perspective, [New Delhi, 1996]

12. Mohanty, Manoranjan, 'Does India Need a New Constitution? [A Democratic Right Perspective on Constitutional Discourse]', in Surya Narayan Misra, Subhas Chandra Hazary and Amareshwar Misra, [ed.], Constitution and Constitutionalism in India, [New Delhi, 1999]