वनस्थली विद्यापीठ

वनस्थली विद्यापीठ की **कार्य समिति** की एक बैठक **रविवार**, दिनांक **28 फरवरी, 2016** को **पूर्वाह्न 11:30 बजे** अतिथि निवास (गांधी घर) वनस्थली विद्यापीठ में सम्पन्न हुई। उपस्थिति नीचे लिखे अनुसार रही:

1.	प्रो. चित्रा पुरोहित	-	अध्यक्ष, वनस्थली विद्यापीठ
2.	प्रो. सिद्धार्थ शास्त्री	-	उपाध्यक्ष, वनस्थली विद्यापीठ
3.	प्रो. आदित्य शास्त्री	-	कुलपति, वनस्थली विद्यापीठ
4.	प्रो. सुधा शास्त्री	-	कोषाध्यक्ष, वनस्थली विद्यापीठ
5.	श्रीमती सुमित्रा सिंह	-	सदस्य
6.	प्रो. सुभाष शर्मा	-	सदस्य
7.	प्रो. संतोष कुमार	-	सदस्य
8.	प्रो. एल.के. माहेश्वरी	-	सदस्य
9.	प्रो. ईना शास्त्री	-	सदस्य
10.	प्रो. विनय शर्मा	-	सदस्य
11.	प्रो. शील शर्मा	-	सदस्य
12.	प्रो. वन्दना गोस्वामी	-	सदस्य
13.	श्रीमती लीना मुखर्जी	-	सदस्य
14.	डॉ. उमा रानी अग्रवाल	-	सदस्य
15.	प्रो. धर्मकिशोर	-	कार्यवाहक मंत्री, वनस्थली विद्यापीठ
16.	प्रो. हर्ष पुरोहित	-	विशेष आमंत्रित
17.	प्रो. रीता सोनावत	-	विशेष आमंत्रित
18.	श्रीमती विभा पारीक	-	विशेष आमंत्रित

नोटः- 1. श्रीमती कमला, डॉ. ज्योति पारीक एवं कमिश्नर कालेज शिक्षा किन्हीं अपरिहार्य कारणों से बैठक में उपस्थित नहीं हो सके।

2. बैठक की अध्यक्षता प्रो. चित्रा पुरोहित, अध्यक्ष, वनस्थली विद्यापीठ द्वारा की गई।

बैठक की कार्यवाही प्रारम्भ करने से पूर्व विद्यापीठ के कुलपति द्वारा बैठक में उपस्थित सभी सदस्यों, विशेष रूप से श्रीमती सुमित्रा सिंह, प्रो. एल.के. माहेश्वरी, प्रो. संतोष कुमार, प्रो. सुभाष शर्मा एवं प्रो. रीता सोनावत का स्वागत किया गया। उन्होंने संतोष व्यक्त किया कि बाह्य सदस्यों के उपस्थित होने से विद्यापीठ को समय-समय पर उचित मार्गदर्शन प्राप्त होता रहता है।

तत्पश्चात् कुलपति महोदय द्वारा कार्य समिति की बैठक की कार्यवाही प्रारम्भ की गयी।

11. विषय सूची की मद संख्या-11: विद्यापीठ की 29 नवम्बर, 2015 को हुई विगत बैठक की कार्य सूची के बिन्दु संख्या-48 में सत्र 2016-2017 से चुनिंदा नये पाठ्यक्रम को प्रारम्भ किये जाने संबंधी प्रस्ताव के सन्दर्भ में निम्न नये पाठ्यक्रम प्रारम्भ किये जाने पर विचार:

(i) M.Sc. Environmental Science
(ii) M.Sc. Geology
(iii) M.Phil. Geography
(iv) B.Tech. Mechatronics

कुलपति द्वारा समिति के सदस्यों को बताया गया कि समिति ने विगत बैठक दिनांक 29 नवम्बर, 2015 में विद्यापीठ में शैक्षिक सत्र 2016-2017 से चुनिंदा नये पाठ्यक्रम प्रारम्भ किये जाने संबंधी प्रस्ताव पर काफी विचार-विमर्श कर उक्त प्रस्ताव पर समुचित निर्णय लिये जाने हेतु कुलपति, वनस्थली विद्यापीठ को प्राधिकृत किया था। उन्होंने बताया कि छात्राओं की मांग को ध्यान में रखते हुए विद्यापीठ में शैक्षिक सत्र 2016-2017 से (i) M.Sc. Environmental Science (ii) M.Sc. Geology (iii) M.Phil. Geography (iv) B.Tech. Mechatronics नये पाठ्यक्रम आरम्भ किये जा रहे है। इन पाठ्यक्रमों का समावेश विद्यापीठ द्वारा शैक्षिक सत्र 2016-2017 के लिए मुद्रित विवरण पत्रिका में कर दिया गया है।

संकल्प संख्या- 11

विद्यापीठ की 29 नवम्बर, 2015 को हुई विगत बैठक की कार्य सूची के बिन्दु संख्या-48 में सत्र 2016-2017 से चुनिंदा नये पाठ्यक्रम को प्रारम्भ किये जाने संबंधी प्रस्ताव के सन्दर्भ में निम्न नये पाठ्यक्रम प्रारम्भ किये जाने के संबंध में विद्यापीठ द्वारा की गई कार्यवाही को अभिलिखित किया जाता है एवं इन नये पाठ्यक्रमों को आरम्भ किये जाने की भी स्वीकृति प्रदान की जाती है:

(i) M.Sc. Environmental Science
(ii) M.Sc. Geology
(iii) M.Phil. Geography
(iv) B.Tech. Mechatronics

BANASTHALI VIDYAPITH

Bachelor of Technology (CS/IT/ECE/EIE/EEE/MCTR)

Curriculum Structure

Fifth Semester Examination

Sixth Semester Examination

BANASTHALI VIDYAPITH
P.O. BANASTHALI VIDYAPITH
(Rajasthan)-304022

No. F. 9-6/81-U.3

Government of India
Ministry of Education and Culture
(Department of Education)

New Delhi, the 25th October, 1983

N O T I F I C A T I O N

In exercise of the powers conferred by Section 3 of the University Grants Commission Act, 1956 (3 of 1956) the Central Government, on the advice of the Commission, hereby declare that Banasthali Vidyapith, P. O. Banasthali Vidyapith, (Rajasthan) shall be deemed to be a University for the purpose of the aforesaid Act.

Sd/-
(M. R. Kolhatkar)
Joint Secretary of the Government of India

N O T I C E

Changes in Bye-laws/Syllabi and Books may from time to time be made by amendment or remaking, and a Candidate shall, except in so far as the Vidyapith determines otherwise, comply with any change that applies to years she has not completed at the time of change.

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Fifth Semester

Sixth Semester

Sixth Semester

Curriculum Structure

Bachelor of Technology (Computer Science and Engineering)

Semester - V (December, 2018)

Course No	Course Name	L	T	P	C	* CA	ESA	Total Marks
FC 5.1	Course Choice - 1	3	0	0	3	15	30	45
CS 5.1	Course Choice - 2	3	0	0	3	15	30	45
CS 5.2	Data Communications and Networks	4	0	0	4	20	40	60
CS 5.3	Java Programming	4	0	0	4	20	40	60
	Java Programming Lab	0	0	6	3	15	30	45
CS 5.4	Seminar	0	0	4	2	30	-	30
CS 5.5	Systems Programming	4	0	0	4	20	40	60
CS 5.6	Microprocessors and Microcontrollers	3	1	0	4	20	40	60
	Microprocessors and Microcontrollers Lab	0	0	2	1	5	10	15
CS 5.7	Introduction to Discrete Mathematics	4	0	0	4	20	40	60
	Semester Wise Total :	**25**	**1**	**12**	**32**	**180**	**300**	**480**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No	Course Name	L	T	P	C
Course Choice - 1					
FC 5.1	Parenthood and Family Relation	3	0	0	3
FC 5.1	Women in Indian Society	3	0	0	3
Course Choice - 2					
CS 5.1	Economics For Engineers	3	0	0	3
CS 5.1	Principles of Management	3	0	0	3

Semester - VI (April/May, 2019)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 6.1	Course Choice - 3	3	0	0	3	15	30	45
CS 6.1	Course Choice - 4	3	0	0	3	15	30	45
CS 6.2	Operating Systems	4	0	0	4	20	40	60
	Operating Systems Lab	0	0	2	1	5	10	15
CS 6.3	Project	0	0	8	4	10	20	30
CS 6.4	Software Engineering	4	0	0	4	20	40	60
CS 6.5	Theory of Computation	4	0	0	4	20	40	60
CS 6.6	Mathematics - IV	3	1	0	4	20	40	60
	Mathematics - IV Lab	0	0	4	2	10	20	30
CS 6.7	Optimization Techniques	3	1	0	4	20	40	60
	Semester Wise Total :	**22**	**2**	**14**	**33**	**155**	**310**	**465**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 3						
FC	6.1	Women in Indian Society	3	0	0	3
FC	6.1	Parenthood and Family Relation	3	0	0	3
Course Choice - 4						
CS	6.1	Principles of Management	3	0	0	3
CS	6.1	Economics For Engineers	3	0	0	3

Curriculum Structure

Bachelor of Technology (Information Technology)

Semester - V (December, 2018)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 5.1	Course Choice - 1	3	0	0	3	15	30	45
IT 5.1	Course Choice - 2	3	0	0	3	15	30	45
IT 5.2	Data Communications and Networks	4	0	0	4	20	40	60
IT 5.3	Java Programming	4	0	0	4	20	40	60
	Java Programming Lab	0	0	6	3	15	30	45
IT 5.4	Systems Programming	4	0	0	4	20	40	60
IT 5.5	Microprocessors and Microcontrollers	3	1	0	4	20	40	60
	Microprocessors and Microcontrollers Lab	0	0	2	1	5	10	15
IT 5.6	Information Systems and Securities	3	1	0	4	20	40	60
IT 5.7	Seminar	0	0	4	2	30	-	30
	Semester Wise Total :	**24**	**2**	**12**	**32**	**180**	**300**	**480**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 1						
FC	5.1	Parenthood and Family Relation	3	0	0	3
FC	5.1	Women in Indian Society	3	0	0	3
Course Choice - 2						
IT	5.1	Economics For Engineers	3	0	0	3
IT	5.1	Principles of Management	3	0	0	3

Semester - VI (April/May, 2019)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 6.1	Course Choice - 3	3	0	0	3	15	30	45
IT 6.1	Course Choice - 4	3	0	0	3	15	30	45
IT 6.2	Operating Systems	4	0	0	4	20	40	60
	Operating Systems Lab	0	0	2	1	5	10	15
IT 6.3	Project	0	0	8	4	10	20	30
IT 6.4	Software Engineering	4	0	0	4	20	40	60
IT 6.5	Theory of Computation	4	0	0	4	20	40	60
IT 6.6	Internet and Web Technology	4	0	0	4	20	40	60
	Internet and Web Technology Lab	0	0	4	2	10	20	30
IT 6..7	Optimization Techniques	3	1	0	4	20	40	60
	Semester Wise Total :25	**1**	**14**	**33**	**155**	**310**	**465**	

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 3						
FC	6.1	Women in Indian Society	3	0	0	3
FC	6.1	Parenthood and Family Relation	3	0	0	3
Course Choice - 4						
IT	6.1	Principles of Management	3	0	0	3
IT	6.1	Economics For Engineers	3	0	0	3

Curriculum Structure

Bachelor of Technology
(Electronics and Communication Engineering)

Semester - V (December, 2018)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
F C 5.1	Course Choice - 1	3	0	0	3	15	30	45
EC 5.1	Course Choice - 2	3	0	0	3	15	30	45
EC 5.2	Analog Communication	4	0	0	4	20	40	60
	Analog Communication Lab	0	0	2	1	5	10	15
EC 5.3	Communication Networks	4	0	0	4	20	40	60
EC 5.4	Analog Integrated Circuits	4	0	0	4	20	40	60
	Analog Integrated Circuits Lab	0	0	2	1	5	10	15
EC 5.5	Microprocessors and Microcontrollers	3	1	0	4	20	40	60
	Microprocessors and Microcontrollers Lab	0	0	2	1	5	10	15
EC 5.6	Microwave Electronics	4	0	0	4	20	40	60
	Microwave Electronics Lab	0	0	2	1	5	10	15
EC 5.7	Seminar	0	0	4	2	30	-	30
	Semester Wise Total :	**25**	**1**	**12**	**32**	**180**	**300**	**480**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 1						
FC	5.1	Parenthood and Family Relation	3	0	0	3
FC	5.1	Women in Indian Society	3	0	0	3
Course Choice - 2						
EC	5.1	Economics For Engineers	3	0	0	3
EC	5.1	Principles of Management	3	0	0	3

Semester - VI (April/May, 2019)

Course No	Course Name	L	T	P	C	* CA	ESA	Total Marks
FC 6.1	Course Choice - 3	3	0	0	3	15	30	45
EC 6.1	Course Choice - 4	3	0	0	3	15	30	45
EC 6.2	Digital Communication	4	0	0	4	20	40	60
	Digital Communication Lab	0	0	2	1	5	10	15
EC 6.3	Power Electronics	4	0	0	4	20	40	60
	Power Electronics Lab	0	0	2	1	5	10	15
EC 6.4	Control Systems	3	1	0	4	20	40	60
	Control Systems Lab	0	0	2	1	5	10	15
EC 6.5	Digital Signal Processing	4	0	0	4	20	40	60
	Digital Signal Processing Lab	0	0	2	1	5	10	15
EC 6.6	Project	0	0	8	4	20	40	60
EC 6.7	Mathematics - IV	3	1	0	4	20	40	60
	Semester Wise Total:	**24**	**2**	**16**	**34**	**170**	**340**	**510**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course Code		Course Name	L	T	P	C
Course Choice - 3						
FC	6.1	Women in Indian Society	3	0	0	3
FC	6.1	Parenthood and Family Relation	3	0	0	3
Course Choice - 4						
EC	6.1	Principles of Management	3	0	0	3
EC	6.1	Economics For Engineers	3	0	0	3

Curriculum Structure

Bachelor of Technology

(Electronics and Instrumentation Engineering)

Semester - V (December, 2018)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 5.1	Course Choice - 1	3	0	0	3	15	30	45
EI 5.1	Course Choice - 2	3	0	0	3	15	30	45
EI 5.2	Communication Engineering	3	1	0	4	20	40	60
	Communication Engineering Lab	0	0	2	1	5	10	15
EI 5.3	Transducers	4	0	0	4	20	40	60
	Transducers Lab	0	0	2	1	5	10	15
EI 5.4	Analog Integrated Circuits	4	0	0	4	20	40	60
	Analog Integrated Circuits Lab	0	0	2	1	5	10	15
EI 5.5	Microprocessors and Microcontrollers	3	1	0	4	20	40	60
	Microprocessors and Microcontrollers Lab	0	0	2	1	5	10	15
EI 5.6	Seminar	0	0	4	2	30	-	30
EI 5.7	Digital Signal Processing	4	0	0	4	20	40	60
	Semester Wise Total :	**24**	**2**	**12**	**32**	**180**	**300**	**480**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 1						
FC	5.1	Parenthood and Family Relation	3	0	0	3
FC	5.1	Women in Indian Society	3	0	0	3
Course Choice - 2						
EI	5.1	Economics For Engineers	3	0	0	3
EI	5.1	Principles of Management	3	0	0	3

Semester - VI (April/May, 2019)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 6.1	Course Choice - 3	3	0	0	3	15	30	45
EI 6.1	Course Choice - 4	3	0	0	3	15	30	45
EI 6.2	Power Electronics	4	0	0	4	20	40	60
	Power Electronics Lab	0	0	2	1	5	10	15
E I 6.3	Biomedical Instrumentation	4	0	0	4	20	40	60
EI 6.4	Control Systems	3	1	0	4	20	40	60
	Control Systems Lab	0	0	2	1	5	10	15
EI 6.5	Fiber Optics and Laser Instrumentation	4	0	0	4	20	40	60
	Fiber Optics and Laser Instrumentation Lab	0	0	2	1	5	10	15
EI 6.6	Lab view Lab	0	0	2	1	5	10	15
EI 6.7	Virtual Instrumentation	4	0	0	4	20	40	60
EI 6.8	Project	0	0	8	4	20	40	60
	Semester Wise Total :	**25**	**1**	**16**	**34**	**170**	**340**	**510**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 3						
FC	6.1	Women in Indian Society	3	0	0	3
FC	6.1	Parenthood and Family Relation	3	0	0	3
Course Choice - 4						
EI	6.1	Principles of Management	3	0	0	3
EI	6.1	Economics For Engineers	3	0	0	3

Curriculum Structure

Bachelor of Technology

(Electrical and Electronics Engineering)

Semester - V (December, 2018)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 5.1	Course Choice - 1	3	0	0	3	15	30	45
EE 5.1	Course Choice - 2	3	0	0	3	15	30	45
EE 5.2	Electrical Machines - I	4	0	0	4	20	40	60
	Electrical Machines - I Lab	0	0	2	1	5	10	15
EE 5.3	Elements of Power Systems	4	0	0	4	20	40	60
	Elements of Power Systems Lab	0	0	2	1	5	10	15
EE 5.4	Network Analysis	4	0	0	4	20	40	60
	Network Analysis Lab	0	0	2	1	5	10	15
EE 5.5	Power Electronics	4	0	0	4	20	40	60
	Power Electronics Lab	0	0	2	1	5	10	15
EE 5.6	Analog Integrated Circuits	4	0	0	4	20	40	60
	Analog Integrated Circuits Lab	0	0	2	1	5	10	15
EE 5.7	Seminar	0	0	4	2	30	-	30
	Semester Wise Total :	**26**	**0**	**14**	**34**	**185**	**310**	**495**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 1						
FC	5.1	Parenthood and Family Relation	3	0	0	3
FC	5.1	Women in Indian Society	3	0	0	3
Course Choice - 2						
EE	5.1	Economics For Engineers	3	0	0	3
EE	5.1	Principles of Management	3	0	0	3

Semester - VI (April/May, 2019)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 6.1	Course Choice - 3	3	0	0	3	15	30	45
EE 6.1	Course Choice - 4	3	0	0	3	15	30	45
EE 6.2	Communication Engineering	3	1	0	4	20	40	60
EE 6.3	Electrical Machines - II	4	0	0	4	20	40	60
	Electrical Machines - II Lab	0	0	2	1	5	10	15
EE 6.4	Power System Analysis	4	0	0	4	20	40	60
	Power System Analysis Lab	0	0	2	1	5	10	15
EE 6.5	Control Systems	3	1	0	4	20	40	60
	Control Systems Lab	0	0	2	1	5	10	15
EE 6.6	Microprocessors and Microcontrollers	3	1	0	4	20	40	60
	Microprocessors and Microcontrollers Lab	0	0	2	1	5	10	15
EE 6.7	Project	0	0	8	4	10	20	30
	Semester Wise Total :	**23**	**3**	**16**	**34**	**160**	**320**	**480**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 3						
FC	5.1	Women in Indian Society	3	0	0	3
FC	5.1	Parenthood and Family Relation	3	0	0	3
Course Choice - 4						
EE	5.1	Principles of Management	3	0	0	3
EE	5.1	Economics For Engineers	3	0	0	3

Curriculum Structure

Bachelor of Technology (Mechatronics)

Semester-V (December, 2018)

Course No	Course Name	L	T	P	C *	CA	ESA	Total Marks
FC 5.1	Course Choice - 1	3	0	0	3	15	30	45
MT 5.1	Course Choice - 2	3	0	0	3	15	30	45
MT 5.1	Communication Engineering	3	1	0	4	20	40	60
MT 5.2	Electrical Machine II	4	0	0	4	20	40	60
	Electrical Machine II Lab	0	0	2	1	5	10	15
MT 5.3	Industrial Instrumentation	4	0	0	4	20	40	60
	Industrial Instrumentation Lab	0	0	2	1	5	10	15
MT 5.4	Analog Integrated Circuits	4	0	0	4	20	40	60
	Analog Integrated Circuits Lab	0	0	2	1	5	10	15
MT 5.5	Pneumatic Engineering	4	0	0	4	20	40	60
	Pneumatic Engineering Lab	0	0	2	1	5	10	15
	Semester Wise Total :	**25**	**1**	**8**	**30**	**150**	**300**	**450**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice -1						
FC	5.1	Parenthood and Family Relation	3	0	0	3
FC	5.1	Women in Indian Society	3	0	0	3
Course Choice - 2						
MT	5.1	Economics for Engineers	3	0	0	3
MT	5.1	Principles of Management	3	0	0	3

Semester-VI (April/May, 2019)

Course No	Course Name	L	T	P	C	* CA	ESA	Total Marks
FC 6.1	Course Choice - 3	3	0	0	3	15	30	45
MT 6.1	Course Choice - 4	3	0	0	3	15	30	45
MT 6.2	Industrial Automation	4	0	0	4	20	40	60
	Industrial Automation Lab	0	0	2	1	5	10	15
MT 6.3	Linear Control System	4	0	0	4	20	40	60
	Linear Control System Lab	0	0	2	1	5	10	15
MT 6.4	Process Control	4	0	0	4	20	40	60
	Process Control Lab	0	0	2	1	5	10	15
MT 6.5	Hydraulic Engineering	4	0	0	4	20	40	60
	Hydraulic Engineering Lab	0	0	2	1	5	10	15
MT 6.6	Project	0	0	4	2	10	20	30
MT 6.7	Robotics	3	1	0	4	20	40	60
	Robotics Lab	0	0	2	1	5	10	15
	Semester Wise Total :	**24**	**2**	**14**	**33**	**165**	**330**	**495**

*** L - Lecture hrs/week; T - Tutorial hrs/week; P - Project/Practical/Lab/All other non-classroom academic activities, etc. hrs/week; C - Credit Points of the Course**

Course No		Course Name	L	T	P	C
Course Choice - 3						
FC	6.1	Women in Indian Society	3	0	0	3
FC	6.1	Parenthood and Family Relation	3	0	0	3
Course Choice - 4						
MT	6.1	Principles of Management	3	0	0	3
MT	6.1	Economics fo Engineers	3	0	0	3

Five Fold Activities

Fine Arts	Physical Education and Sports
Classical Dance (Bharatnatyam)	Aerobics
Classical Dance (Kathak)	Archery
Classical Dance (Manipuri)	Athletics
Creative Art	Badminton
Folk Dance	Basketball
Music-Instrumental (Guitar)	Cricket
Music-Instrumental (Orchestra)	Equestrian
Music-Instrumental (Sarod)	Flying - Flight Radio Telephone Operator's Licence (Restricted)
Music-Instrumental (Sitar)	Flying - Student Pilot's Licence
Music-Instrumental (Tabla)	Football
Music-Instrumental (Violin)	Gymnastics
Music-Vocal	Handball
Theatre	Hockey
	Judo
Social Service and Extension Activities	Kabaddi
Banasthali Sewa Dal	Karate - Do
Extension Programs for Women Empowerment	Kho-Kho
FM Radio	Net Ball
Informal Education	Rope Mallakhamb
National Service Scheme	Shooting
	Soft Ball
	Swimming
	Table Tennis
	Tennis
	Throwball
	Volleyball
	Weight Training
	Yoga

Evaluation Scheme for Theory Courses

Continuous Assessment (CA) (Max. Marks)					End-Semester Assessment (ESA) (Max.	Grand Total (Max. Marks)
Assignment		Periodical Test		Total (CA)		
I	II	I	II			
10	10	10	10	40	60	100

For laboratory and all non classroom activities (project, dissertation, seminar, etc.), the Continuous and End-semester assessment will also be of 40 and 60 marks respectively. Wherever desired, the detailed breakup of continuous assessment marks (40), for project, practical, dissertation, seminar, etc shall be announced by respective departments in respective student handouts.

Based on the cumulative performance in the continuous and end-semester assessments, the grade obtained by the student in each course shall be awarded. The classification of grades is as under:

Letter Grade	Grade Point	Narration
O	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
B	6	Above Average
C+	5	Average
C	4	Below Average
D	3	Marginal
E	2	Exposed
NC	0	Not Cleared

Based on the obtained grades, the Semester Grade Point Average shall be computed as under:

$$SGPA = \frac{CC_1 * GP_1 + CC_2 * GP_2 + CC_3 * GP_3 + ---- + CC_n * GP_n}{CC_1 + CC_2 + CC_3 + ---- + CC_n} = \frac{\sum_{i=1}^{n} CC_i * GP_i}{\sum_{i=1}^{n} CC_i}$$

Where n is the number of courses (with letter grading) registered in the semester, CC_i are the course credits attached to the i^{th} course with letter grading and GP_i is the letter grade point obtained in the i^{th} course. The courses which are given Non-Letter Grades are not considered in the calculation of SGPA.

The Cumulative Grade Point Average (CGPA) at the end of each semester shall be computed as under:

$$CGPA = \frac{CC_1 * GP_1 + CC_2 * GP_2 + CC_3 * GP_3 + ---- + CC_n * GP_n}{CC_1 + CC_2 + CC_3 + ---- + CC_n} = \frac{\sum_{i=1}^{n} CC_i * GP_i}{\sum_{i=1}^{n} CC_i}$$

Where n is the number of all the courses (with letter grading) that a student has taken up to the previous semester.

Student shall be required to maintain a minimum of 4.00 CGPA at the end of each semester. If a student's CGPA remains below 4.00 in two consecutive semesters, then the student will be placed under probation and the case will be referred to Academic Performance Review Committee (APRC) which will decide the course load of the student for successive semester till the student comes out of the probationary clause.

To clear a course of a degree program, a student should obtain letter grade C and above. However, D/E grade in two/one of the courses throughout the UG/PG degree program respectively shall be deemed to have cleared the respective course(s). The excess of two/one D/E course(s) in UG/PG degree program shall become the backlog course(s) and the student will be required to repeat and clear them in successive semester(s) by obtaining grade C or above.

Course Choice - 1 & 3

Parenthood and Family Relation

FC 5.1/FC 6.1 **L T P C**

3 0 0 3

Max. Marks : 45

(CA : 15 + ESA : 30)

Objectives :

1. To develop awareness of important aspects of parenthood.
2. To provide knowledge about the family in the context of changing socio-economic scenario in the country and to familiarize about interpersonal relationship and burning issues during adolescence.

Note : The paper will contain seven questions in all. Candidates are required to attempt any four.

- Meaning and definition of parenthood, Human reproductive system and conception.
- Symptoms of pregnancy, common discomforts during pregnancy, Care during pregnancy.
- Child Care - Feeding, weaning, toilet training, rest & sleep, personal grooming common ailments in children.
- Techniques of child rearing and impact on child's personality. Role of parents as facilitators of growth and development.
- Family Life Education Meaning and significance of family Interpersonal relationship within the family. Role conflicts and its resolution.
- Brief introduction to different aspects of development - (Physical, Motor, Social, Emotional, Cognitive, Language and Moral.)
- Introduction to reproductive health with brief discussion on STD/AIDS and sexual misbehaviour.
- Sex education importance and methods
- Contemporary Issue, Mental health and hygiene, Drug Addition, Marriage and family counseling.

Learning Experiences :

1. Observing children at different age levels in different situations.
2. Recording observations, including Anecdotal records on Individual differences in difference aspects of behaviour.
3. Preparing age related teaching aid
4. Viewing educational films followed by group discussion.
5. Case Studies.
6. Evaluating printed materials - (Magazines, news papers, articles from the books)
7. Collecting, composing and modifying age related songs and stories.

8. Introspecting one's own past childhood experiences, with parents, siblings, friends neighbours etc.
9. Planning and organizing play activities and games for children of different age groups.
10. Group discussions/Buzz sessions.
11. Role playing.
12. Planning for celebrating festivals, parties, get together.

References :

1. Hurlock E. B. (1978) : Child Development (6th ed.) McGraw Hill, New Delhi.
2. Hurlock. E. B. (1980) : Developmental Psychology, a Life Span Approach (5th ed.) McGraw Hill, New Delhi.
3. Panada, K. C. (1990) : Elements of Child Development, Kalyani Publishers, New Delhi.
4. Bourne G. (1984) : Pregnance, PAN Books, London.
5. Augustine I. S. (Ed.) (1982) : Indian Family in transition, Vikas Publishing House, New Delhi.
6. Mehra P. (1977) : Indian Youth, Emerging, Problems and issue, Saumaya Publications, Bombay.
7. Sharma N. (1999) : Understanding Adolescence, National Book Trust, New Delhi.
8. Kulkarni S. and Kulkarni S. (1995) : Responsible parenthood and Harmonious families.

Women in Indian Society

FC 5.1/FC 6.1

L T P C
3 0 0 3
Max. Marks : 45
(CA : 15 + ESA : 30)

Note : There will be 7 questions in all the students are required to attempt 4 questions.

Concept of Sex, Gender and Identity Formation of Women.

Concept of Justice and Equality: Constitutional Provisions, their Implication with reference to Customary and Discriminatory Practices.

Women in Pre-independence India: Social Reform Movements with reference to Prohibition of 'Child Marriage' and 'Sati'; Women's Participation in Indian Freedom Struggle.

Status of in Post Independence India with reference to Social, Educational, Health, Political and Economics status.

Rights and laws for the Empowerment of Women. Personnel Laws and debate on Uniform Civil Code, Property Rights of Women among Hindus, Muslims and Christians.

Domestic Violence Act, 2005
Sexual Harasment at Work Place. **(Vishakha Case)**
Women's Movements in India and Challenges Ahead

Reading Material :

1. Altekar, A. S. - Position of Women in Hindu Civilization.
2. Desai, Neera - Women in Modern India.
3. Desai, Neera & Maitreyi-'Women and Society' (1986), Ajanta Publications.
4. Gangarde - 'Social Legislation in India'.
5. Ghadially, Rehana - 'Women in Indian Society', Pareek Indira and Garg - Role and Identity of the Indian Women.
6. Yogendra, Singh - The Image of Man.
7. Report of the Committee on Status of Women.

Economics For Engineers

CS / IT / EC / EI / EE 5.1/6.1 **L T P C**

3 0 0 3

Max. Marks : 45

(CA : 15 + ESA : 30)

Objectives : To introduce the fundamental concepts of economics/finance and to explain how these will contribute to decision making in engineering operations.

Section A

What Economics is all about? Micro and Macro Economics. Origin and meaning of Engineering Economics, Role of Economics in Engineering, Scope of Engineering Economics.

Theory of Demand: Law of Demand, Demand Function and Determinants of Demand, Types of Demand.

Elasticity of Demand: Concept, Types and Measurement.

Section B

Production function and Laws of Production. Optimal Input combination. Cost concepts and cost output relationship.

Types of market structures; Determination of equilibrium price and output under perfect competition.

Section C

Timevalue of Money and Project Evaluation: Interest Formulas; Cash Flow Diagram; Principles of Economic Equivalance, Evaluation of Engineering Projects using methods of Present Value and Internal Rate of Return.

Capital Budgeting: Concept and significance of capital budgeting.

Depreciation Analysis: Meaning and causes of depreciation; methods of calculating depreciation – straightline and declining balance methods.

Books Recommended:

1. Gerald J. Thuesen and W.J. Fabrycky: **Engineering Economy, Ninth Edition:** PHI Learining Private Limited, New Delhi.
2. S. ParkChan: **Contemporary Engineering Economics:** 3rd Edition, Prentice Hall.
3. M. Parkin: **Economics:** 5th Edition, Addison Wesley.
4. Mahendra P. Agasty: **Engineering Economics and Costing, Second Edition:** Scitech Publications (India) Pvt. Ltd.
5. R. Panneerselvam: **Engineering Economics, Tenth Printing:** PHI Learning Private Limited, New Delhi.

Course Choice - 2 & 4

Principles of Management

CS / IT / EC / EI / EE 5.1/6.1 **L T P C**

3 0 0 3

Max. Marks : 45

(CA : 15 + ESA : 30)

Section A

What is management? Scientific approach-Taylor's contribution, administrative approach-Henry Fayol's contribution, human relation approach-Elton Mayo's contribution, system approach.

Planning: Need and process, types of plans-goals, objectives, policies and strategies; decision making-situations and process.

Section B

Organizing: Organization structure, departmentation, centralization v/s decentralization, span of management, delegation and power of authority.

Motivation-importance, theories of motivation-Maslow, McClleland Herzberg, theories.

Section C

Theories and styles of leadership-Trait, behavioral.

Communication: Process and principles, types of communication, barriers to communication.

Control: Process of evaluation & control, method of control.

References:

1. Agarwal R.D.: **Organization and Management**. Tata Mcgraw Hill, New Delhi.
2. Koontz O. Donnel: **Principles of Management.** Tata Mcgraw Hill, New Delhi.
3. Gupta C.B.: **Management: Theory and Practice**.

4. Tripathi P.C. & Reddy P.N.: **Principles of Management.** Tata Mcgraw Hill, New Delhi.
5. Robbins & D.Cenzo: **Fundamentals of Management**. Pearson Education.

Bachelor of Technology

(Computer Science and Engineering)

Fifth Semester

Data Communications and Networks

CS 5.2 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Data Communication Model, tasks of a communication system, networking, analog and digital transmission, different transmission media.Data encoding: digital data digital signals, digital data analog signals (ASK, PSK, FSK), analog data digital signals (PCM, Delta modulation), analog data analog signals (AM, FM, PM), modems, interfacing [RS-232C], multiplexing (TDM, FDM).

Section B

Principles and Purpose of layered approach, OSI model, ARPANET model, protocol architecture (OSI, TCP/IP) Data link control: Frame Synchronization asynchronous and synchronous; flow control- stop and wait, sliding window, go-back-N protocols; error detection- CRC, error control - ARQ schemes. Network switching - circuit switching, packet switching; routing and congestion control; introduction to frame relay and ATM.

Section C

High speed LANs; network management; Internetworking, the Internet Protocol, DNS and URL; transport protocols: TCP, UDP; remote procedure call; network security - encryption, RSA algorithm and data compression, applications - (Telnet, FTP, SMTP, HTTP); introduction to ISDN and broadband ISDN.

Text Books:

[1] A.S. Tannanbaum: **Computer Networks**: PHI
[2] W. Stailings: **Data and Computer Communications**: Pearson Education
[3] Prakash C. Gupta: **Data Communication & Computer Networks**: PHI

Reference Books:

[1] Korose & Ross: **Computer Networking:** Pearson Education

[2] Behrouz A. Fou Rouzan: **Data Communication & Networking:** Tata McGraw Hill

Java Programming

CS 5.3

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Java Introduction: Evolution, features, concepts of Java Virtual Machine (JVM) and its task, Java and Internet, Environment (JRE, JDK, JSDK, APIs), Application & Applet.

Java Programming: Structure of program, Data Types, Variables, Operators, Expressions, Control statements (sequencing, alteration, looping), Object oriented Concepts, Objects, Classes, Constructors, Method Overloading, Arrays, String handling, Wrapper classes, packages, Access Specifier, Inheritance, Method Overloading, Interfaces, Inner & Anonymous classes.

Section B

Exception handling, Streams and I/O programming, Serialization, Multithreading, Collection framework (Set, Map, List, Vector), Generic, Iterators, Utility Classes, Networking, Socket and Datagram programming, JDBC, ODBC-JDBC drivers Database Connectivity, JDBC statements, Resultset, Metadata.

Section C

GUI in Java using graphics classes , Features of AWT and Swing, Layout Managers, Event handling, Adapter classes, Applet, Frames, all components of AWT (button, textbox, checkbox, fonts etc).

Java Server Pages (JSP), Servlet, Introduction to J2EE & EJB, Deployment of applications.

Text Books :

[1] Herbert Schildt, **Java: The Complete Reference J2SE**, 5th Edition, Tata Mcgraw Hill

[2] Suresh Rajgopalan, **Java Server Programming Bible,** Wiley Publication

Reference Books :

[1] E. Balagurusamy, **Programming with Java**, tata McGraw-Hill Publications

[2] Madhushree Ganguli, **JSP: A Beginner's Guide**, Delhi, Wiley Publication

[3] H.M. Deitel, P.J.Deitel **Java: How to program**, Third edition, Prentice Hall Publication

[4] Cay S., Horstmann and Gary Cornell, **Core Java 2,** Volume I & II, Delhi, Pearson publisher
[5] Ivan Bayross, **Web Enabled Commercial application development using., HTML, DHTML, Javascrip**t
[6] **Perl CGI**, New Delhi, BPB Publication
[7] Bernard Van, Haccke, **JDBC: Java Database Connectivity**, New Delhi, IDG Books

Java Programming Lab

L T P C
Contact Hours: 90 **0 0 6 3**
Max. Marks : 45
(CA : 15 + ESA : 30)

(45 Labs each of 2 hours)

Lab Number	Problems
L1 – L2	Simple Programs
L3 – L4	Programs based on Control Statements
L5 – L8	Programs based on Classes & Inheritance
L9 – L10	Programs based on Arrays
L11 – L12	Programs based on Packages & Interfaces
L13 – L14	Programs based on Wrapper Classes
L15 – L16	Programs based on Exception Handling
L17 – L18	Programs based on I/ O Classes
L19 – L20	Programs based on Strings
L21 – L23	Programs based on Threads
L24 – L26	Programs based on Applets
L27 – L28	Programs based on Graphics
L29 – L32	Programs based on Event Handling
L33 – L35	Programs based on Swings & GUI Components
L36 – L37	Programs based on Serialization
L38 – L39	Programs based on Networking
L40 – L41	Programs based on JDBC
L42 – L45	Programs based on JSP & Servlets

Systems Programming

CS 5.5 **L T P C**
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Components of System Software, evolution of system Software. General Machine structure (Memory, Register, Data Instructions). Assemblers, Design of Two Pass Assembler. Macros and Macro Processors. Translators: Interpreters, Brief description of different phases of compiler.

Section B

Loaders: A Two Pass Loader Scheme, Relocating loader, subroutine linkage, Direct linking loader. Binders, Overlays. Types and basic functions of operating systems. Software Tools: Text Editors, Program Generator,Debug Monitors.

Section C

Access to system services: ROM BIOS, DOS , Mouse and EMS (Expanded memory specifications) Functions, Keyboard and Screen Management. Introduction to Terminal Emulator. DOS Device Drivers : Types , Structure and Processing. Interrupt Types, Organization, Interrupt Hardware , Program status register(PSR) , Interrupt Processing.

Text Books :

[1] Roy Donovan J.J., **Ellzay S. & Staff Bigger: Systems programming:** Mc-Graw Hill, 1972

[2] Sanjay K. Bose: **Hardware and Software of Personal Computers:** Wiley Eastern Publications

Reference Books:

[1] Dhamdhere D.M.: **Introduction to system software:** Tata Mc-Graw Hill, 1986.

[2] Peter D. L: **An Introduction Real-Time Microcomputer System Design**: Mc-Graw Hill International Co

[3] Bigger Staf Ted J.: **System Software Tools:** Prentice Hall

[4] Ray Dunkan: **Advance MS-DOS programming:** BPB Publication

[5] Dhamdhere D. M.: **System Programming and Operating Systems:** Mc-Graw Hill

[6] Daniel A. Norton: **Writing DOS Device Drivers:** Addison Wisley

Microprocessors and Microcontrollers

CS 5.6

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Objective :

The objective of the Microprocessor and Microcontrollers is to do the students familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules. The student can also understand of 8051 Microcontroller concepts, architecture,

programming and application of Microcontrollers. Student able to do any type of industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

Section A

8086/8088 Microprocessor: Pin Assignment, Architecture, Functional Diagram, Register Organization, Memory address space & data organization, Segment registers & Memory segmentation, Dedicated & general use of memory, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams, Interrupts, Bus timings, Demultiplexing. Assembly Language Programming of 8086: Instruction Format, Instruction Set, Data Transfer instructions, Arithmetic instructions, Logical instruction, Shift instructions, Rotate instructions, Flag control instructions, Compare instructions, Jump instructions, Subroutine & the subroutine handling instructions, Loop & loop handling instructions, String instructions.

Section B

Peripheral Devices and Their Interfacing: Introduction, memory and I/O interfacing with 8086, data transfer schemes, programmable peripheral interface (8255), programmable DMA controller (8257), programmable interrupt controller (8259), programmable communication interface (8251), programmable counter/interval timer (8253 and 8254), special purpose interfacing devices, elements and circuits for interfacing. Communication Interface: Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tolls, MDS.

Section C

Introduction to Microcontrollers: Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming. 8051 Interrupts Communication: Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming. Interfacing & Industrial Applications: Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

TEXT BOOKS:

1. Kenneth J Ayala, **"The 8051 Micro Controller Architecture, Programming and Applications",** Thomson Publishers, 2nd Edition.

2. D.V.Hall, **"Micro Processor and Interfacing"**, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Ajay V. Deshmukh, "Microcontrollers - theory applications", Tata McGraw-Hill Companies-2005.
2. Ray and Bhurchandi. "Advanced Micro Processors", Tata McGraw Hill.
3. Kenneth J. Ayala, "The 8086 Micro Processors Architecture, Programming and Applications", Thomson Publishers, 2005.
4. Microcomputer Systems: The 8086/8086 Family: Architecture, Programming and Design, 2nd ed., Liu & Gibson.

Microprocessors and Microconntrollers Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. Write a program to calculate the addition of 16-bit No.
2. Write a program to calculate the addition of 32-bit No.
3. To transfer the content of one memory location to other memory location.
4. To exchange the content of one memory location to other memory location.
5. To find out the maximum of N given nos.
6. To generate the fibonacci series.
7. To find location of given nos.
8. To find out the multiplication of two 16 –bit nos.
9. To find out the minimum of N given

Introduction to Discrete Mathematics

CS 5.7

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Permutations, Combinations, selection with & without replacement, Sets and multisets, permutation and combinations of multisets, enumeration of permutation and combination of sets & multisets, placing distinguishable (indistinguishable) objects into distinguishable (indistinguishable) boxes. Discrete probability, The rules of sum & product, generation of permutation and combinations, Relations and functions, properties of binary relations, equivalence relations, partial order relations, chains and antichains, lattices and boolean algebra.

Section B

Basic concepts of graph theory: vertices, edges, degree, paths, circuits, cycles, complete graphs and trees, Multi-graphs, weighted graphs and directed graphs, Adjacency matrix of a graph, Connected and disconnected graphs, K-connected and K-edge connected graphs, Shortest path in weighted graphs, Eulerian path and circuits, Hamiltonian path and circuits, Planar graphs, chromatic number, edge colouring of graphs, Vizing's theorem, Trees and cut sets: Trees, spanning tree and cut set, minimum spanning tree.

Section C

Pigeon hole Principle: Inclusion-Exclusion principle, Generating functions and Discrete numeric functions, manipulation of numeric functions, Asymptotic behavior of numeric function, Recurrence relations, Linear recurrence relation with constant coefficients and their solutions, Homogeneous solution, particular solution & total solutions, Solution by the method of generating functions.

Text Books:

1. Liu C.L.: **Elements of Discrete Mathematics:** Mc Graw Hill International editions, 1985
2. Kolman Bernard & Busby Robert C.: **Discrete Mathematical Structures for Computer Science**: Prentice Hall of India, 1988

Reference Books:

1. Tremblay J.P & Manohar R.: **Discrete Mathematical Structures With Applications To Computer Science**: Tata Mc Graw Hill Book Co. 1988
2. Baugh Richard Johnson: **Discrete Mathematics**: Macmillan Publishing Co. 1989
3. Doerr Alan: **Applied Discrete Structures for Computer Science**: Galgotia Publications, 1987.
4. Deo Narsingh: **Graph Theory**: Prentice Hall of India, 1986
5. Joshi K.D. : Foundations of Discrete Mathematics : Wiely Eastern Ltd. 1989.

Bachelor of Technology (Computer Science and Engineering)

Sixth Semester

Operating Systems

CS 6.2

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

History of the operating systems, Operating system functions, OS classification: single user, multi user, simple monitor, batch processing, time sharing, real time OS. Information Management: management file supports, access methods, allocation methods, contiguous,linked and indexed allocation, directory system Memory Management : partition, paging and segmentation. Virtual memory and demand paging. Device Management: Disk and Drum scheduling algorithms. Protection of resources. I/O Processor Management: I/O traffic controller, I/O scheduler, I/O device handlers.

Section B

Process Management: Process states, level of schedulers and scheduling algorithms. Interposes Communication: Process synchronization, critical section problem and its software, hardware and semaphore solutions. Deadlock: Presentation, avoidance, detection and recovery. Parallel Processing: Difference between distributed and parallel processing, OS for parallel processors.

Section C

Case Study: Unix: Unix-history, design principles, programmer interface user interface, file system, process management, memory management, I/O system, Interposes commands, Vi Editor Unix Shell. Communication management in Netware, Netware features. Windowing technology, Relationship between operating system and windows, Graphical user interface components.

Text Books:

[1] Achyut S. Godbole: **Operating system with case studies in Unix , Netware, Windows NT:** Tata McGraw Hill Publications

[2] Silberschatz , Galvin: **Operating System Concepts:** Addision Wisley Publications

Reference Books:

[1] Andrew S. Tananbeum: **Modern Operating Systems**: Printice Hall Publications

[2] Russell A. Stultz : **Illustrated MS-DOS 6.22 :** BPB Publications

[3] Deitel: **Introduction to Operating System:** Addition Wesley Publication

Operating Systems Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

Unix Shell Programming Assignment

1. Shell script to Perform various arithmetic operation.
2. Shell script to find the factorial of a number.
3. Shell script to reverse a no. and check for the no. to be palindrome or not.
4. Shell script to find whether no. is prime or not.
5. Shell script to generate fibonacci series.
6. Shell script to generate table of a given no.
7. Shell script to generate star pattern..05

8. Shell script to search a particular login entered by you. This program should continuously run on background to let you know about when that user has logged in.
9. Shell program for sorting a set of nos. The set of no. are to be entered through file.
10. Shell script to Generation and summation of natural numbers (and their various forms) e.g. 12 + 32 + 52 + ...
11. A shell script for binary to decimal conversion.
12. Shell program to generate and sum all prime numbers between any two given numbers.
13. Shell program for equivalent effect of the DOS command TYPE.
14. Shell script to protect a file through password. Password should be displayed in encrypted form.

Software Engineering

CS 6.4 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Software engineering concepts, software evolution, software process models, software project planning: identifying software scope, resources, risk management, project scheduling, tracking, cost estimation: project metrics, cost factors, cost estimation techniques (decomposition,

empirical, automated estimation, Delphi). Analysis concepts, structured vs object oriented analysis, object oriented analysis modelling.

Section B

System Design: design concepts and principles (modularization, abstraction, refinement, cohesion, and coupling), object oriented concepts: class and object definitions, encapsulation, polymorphism, inheritance, association, multiplicity, composition and aggregation, generalization, specialization. Object Oriented Modelling using Unified Modelling Language (UML): class diagrams, use case diagrams, sequence diagrams, activity, and state diagrams. Implementation: language classes, coding style, efficiency.

Section C

Software Quality Assurance: quality factors and criteria, SQA metrics, SQA techniques. Verification and Validation: software testing methods (WBT, BBT), software testing strategy (unit testing, integration testing, system, testing), Maintenance : types of maintenance, software maintenance process, maintainability, software reuse, re-engineering, reverse engineering, CASE.

Text Books:

[1] Roger S. Pressman: **Software Engineering: A Practitioner's Approach:** 6th Edition McGraw Hill , 1992

[2] Pankaj Jalote: **An Integrated Approach To Software Engineering**, 2nd Edition: Narosa Publications

Reference Books:

[1] Nira S. Godbole: **Software Quality Assurance Principles & Practices:** Narosa Publications

[2] H. Sommervill Ian: **Software Engineering:** Addition Wesley Pub. Co

[3] Fairley Richard: **Software Engineering:** McGraw Hill, 1985

[4] Paul Ammann & Jeff offutt : **Introduction to Software Testing:** Cambridge University Press.

Theory of Computation

CS 6.5 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Mathematical Preliminaries, Alphabets, Strings, Languages, States, Transitions, Finite Automata and Regular Expressions, Applications e.g. Lexical Analyzers and Text Editors, Pumping Lemma, Closure Properties of Regular Sets, Decision Algorithms for Regular Sets.

Section B

Context Free Grammars, Chomsky Normal Forms And Greibach Normal Forms, Ambiguity, Pushdown Automata and the Equivalence of Contex Free Languages to Sets Accepted by Non-Deterministic PDA, Pumping Lemma for CFL's, Closure Properties of CFL's and Decision Algorithms for CFL's.

Section C

Turing Machines: Introduction, Turing Computability, Non-deterministic, Multitape and other versions of Turing Machine, Church's Hypothesis, Primitive Recursive Function, Gödelization, Recursively Enumerable Languages, Undecideability: Universal Turing Machines and Unsolvability of the Halting Problem, Post's Correspondence Problem.

Text Books:

[1] Hopcroft J.E. and Ullman J.D.: **Introduction to Automata Theory, Languages and Computation:** Narosa Publishing House, 1988

Reference Books:

[1] Derick wood: **Theory of Computation:** Harper & Row Publishers, New York, 1987.

[2] Lewis H.R. & Papadimitriou C.H.: **Elements of the Theory of Computation:**

[3] Martin, John C.: **Theory of Computation:** Pearson

[4] Nasir S. F.B., P.K. Srimani : **Automata Theory:** Cambridge University Press.

Mathematics - IV

CS 6.6

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Complex Functions, Continuity, Differentiability, Analytic Function, Cauchy-Riemann Equations in Cartesian & Polar Coordinates, Conformal Mapping, Conformal mapping by Elementary Functions, Transformations , Bilinear Transformation.

Section B

Line Integral in Complex Plane, Cauchy's Integral Theorem, Cauchy's Integral Formula, Derivative of Analytic Functions, Power Series, Taylor's Series, Laurent Series, Singularities, Residue, Residue Theorem and Evaluation of Real Integrals.

Section C

Finite Differences, Relation between Difference and Derivatives, Differences of Polynomials, Interpolation, Newton's Formula for Forward and Backward Interpolation, Divided Differences, Newton's General Interpolation Formula, Lagrange's Interpolation Formula, Error in Interpolation, Numerical Differentiation, Numerical Integration Newton's Cotes Quadrature Formula, Simpson's, Weddle's and Trapezoidal rules, Gauss Quadrature Formula, Root finding for Nonlinear Equations (Transcendental & Algebraic Equations), Iterative method, Bisection method, Regula-Falsi Method, Newton Raphson's Method, Order of Convergence, Numerical solution of first and second order
Differential Equations, Euler's Method, Picard's Method, Runge-Kutta's Method.

Text Books:

[1] Grewal B.S: **Higher Engineering Mathematics**, Khanna Publishers, 40th edition.

[2] Ramana B.V.: **Higher Engineering Mathematics**, TMH Publications, New Delhi.

Reference Books:

[1] E. Kreyszig: **Advanced Engineering Mathematics**: 9th ed., Wiley Eastern, 2011.

Mathematics IV Lab

L T P C
0 0 4 2
Max. Marks : 30
(CA : 10 + ESA : 20)

L1	Perform floating point operations using normalization (addition, subtraction, multiplication, division)
L2-L3	Find the roots of equation (bisection method, Regula-Falsi method, Newton Raphson method, successive approximation method)
L4-L5	Find solution of n linear equation (Gauss elimination method (with & without pivoting), Gauss Seidel method, Gauss Jordan method)
L6-L7	Interpolate value of f(x) at given x (Lagrange's interpolation method, Newton forward interpolation method, Newton's backward interpolation method)
L8	Fitting of different curves (straight line fit (x on y), straight line fit (y on x), parabola, exponential curve)
L9	Find derivative of a given tabulated function at given value (Newton's forward method, Newton's backward method)
L10-L11	Find Integrated value (when tabulated function given-Trapezoidal rule (simple & modified)), Simpson's 1/3 (simple & modified), Simpson's 3/8 (simple & modified))
L12-L13	Find Integrated value (when algebraic expression given-Trapezoidal rule (simple & modified), Simpson's 1/3 (simple & modified), Simpson's 3/8 (simple & modified))
L14-L15	Solve differential equation (Euler's method, Runge-kutta 4th order method, Modified Euler's method, Predictor-corrector method)

Optimization Techniques

CS 6.7

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Classical Optimization Techniques: Single variable, Multi variable, Optimization of multivariable with equality and inequality constraints, Linear Programming: Graphical Analysis, Principles of Simplex methods, Simplex method in tabular form, Big-M, Degeneracy & Cycling, Duality and Dual Simplex method, Transportation problems and Assignment problems.

Section B

Nonlinear programming- Single variable optimization: Unimodal, Elimination method, Interpolation method, Unconstraint optimization: Direct search method, Random search method, Grid search method, Newton's method, Constrained optimization: Characteristics of constrained problem, Random search method, Augmented Lagrange multiplier method, Kuhn-Tucker conditions. Quadratic programming: Beale's & Wolfe's method, Separable programming.

Section C

Network Analysis: Introduction of Network analysis, Shortest path problem PERT & CPM, Updating of PERT charts, project planning and scheduling with CPM & PERT, Time-cost optimization, Queueing Theory: Probability description of arrivals and service times, objectives and different characteristics of a queueing system, Steady-state behaviour of Markovian and Erlangian Models (M/M/1, M/M/C).

Text Books:

1. Ronald, L. Rardin: **Optimizaion in Operations Research**. Prentice Hall, 1998
2. F.S. Hiller and G.J. Lieberman: **Operations Research**: Pearson Education, 8th edition.

Bachelor of Technology (Mechatronics)

Fifth Semester

Industrial Instrumentation

MT 5.3

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Role of transducers in instrumentation- Classification of transducer and its characteristics. Signal Conditioning of Strain Gauge circuits, temperature compensation for Strain gauge, Piezoelectric Transducers and its Frequency response. Optical Transducers: Photo emissive cell, Photo voltaic cell, Photo Conductive cell.

Pressure Measurement: Manometers, Elastic pressure elements, Electromechanical Pressure Transducers, Vacuum Measurement: Knudsen gauge, Pirani Gauge, Ionization gauge, Mcleod Gauge.

Noise: Electrical noise, Static noise, Magnetic noise, Crosstalk and its remedies.

Section B

Temperature Measurement: Thermometers: Liquid in glass and Bimetallic type, Radiation Pyrometers and Optical Pyrometers.

Level Measurement: Sight Glass, Hydrostatic, Purge type level sensor, differential pressure method for level measurement, Buoyancy methods, Nucleonic level gauge, Ultrasonic level meter, Capacitive type level sensor.

Flow measurement: Venturimeter, Orifice plate, Pitot tubes, Rotameter, Turbine Flowmeter, Electromagnetic Flowmeter, Hot wire anemometer, Ultrasonic Flowmeter, Laser doppler anemometer.

Section C

Measurement of Velocity: DC and AC Tacho-generators, Seismic Transducer for vibration measurement, Accelerometers.

Miscellaneous Measurement: pH Sensor, hygrometer, measurement of thermal conductivity and thickness, Hydrometer.

Virtual Instrumentation: Architecture of a virtual Instrumentation, graphical system design, Data-flow techniques, graphical programming in data flow and comparison with conventional programming.

Text Books:

1. A.K.Sawhney, Puneet Sawhney," Mechanical Measurements and Instrumentation",Dhanpat Rai.
2. R.K. Jain"Mechanical and Industrial Measurements", Khanna Publishers.
3. S.K.Singh," Industrial Instrumentation and Control", Tata Mcgraw Hill.

Reference Books:

1. D.S. Kumar, "Mechanical Measurements and Control", Metropolitan Book Co. Pvt. Ltd.
2. Ernest O.Doebelin," Measurement Systems", Tata Mcgraw Hill.
3. B C Nakra, K K Chaudhry, "Instrumentation Measurement and Analysis", Tata Mcgraw Hill.
4. Rangan Sharma Mani" Instrumentation: Devices and systems",Tata Mcgraw Hill.
5. DVS Murthy,"Transducers and Instrumentation", Eastern Economy Edition.
6. S.K.Singh,"Computer Aided Process Control",PHI,2005.

Industrial Instrumentation Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 15)

1. Create a VI to find the sum of 'n' natural number and factorial of a given number using feedback node and Shift Register.
2. Create a sub VI for slope of a line.
3. Create a VI to plot the characteristics of RTD and Thermistor.
4. Create a VI to plot the step response of a second order system for different values of ? and wn using block diagram and Math script.
5. Implementation of Clipper and potential divider circuit using ELVIS.

Pneumatic Engineering

MT 5.5 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Introduction to Pneumatic energy, Gas laws (Boyle's law, Charles' law, Gay-Lussac's law), Generalized gas equation, Preparation of compressed air, Compressor and its type (Piston, Screw, Reciprocating, Rotary and Axial), Air Storage System, Dryers, Maintenance and troubleshooting of Pneumatic system.

Section B

Elements of pneumatic system: Filter, Regulator and Lubricator (FRL) unit, Direction Control Valves (DCV), Flow Control Valves (FCV), Pressure Control Valves (PCV), Time delay, Quick Exhaust, Twin pressure and Shuttle valves, Non-Return Valves (NRV), Pilot-operated check valves.

Pneumatic Actuator: Linear, Rotary and Limited angle actuators

Classification and types of Cylinders, Cushioning, Seals, ISO symbols

Section C

Electro-pneumatic circuits: solenoid valves, switches (push button, detent and limit), relays, reed & proximity switches, Switch Mode Power Supply (SMPS).

Direct and Indirect actuation, Development of single and multi actuator circuits, speed control of cylinders, supply air throttling and Exhaust air throttling.

Signal Processing Elements: Use of logic gates (OR and AND) in pneumatic applications. Introduction to Vacuum Technology & its application.

Suggested Books:

1. Jagadeesha T, "Pneumatics: Concepts, Design and Applications," Universities Press (India) private Limited, 2015
2. K. Shanmuga Sundaram, "Hydraulic and Pneumatic Controls: Understanding made Easy," S. Chand Limited, 2006. (Reprint 2009)

3. S R Majumdar, "Pneumatic Systems: Principle and Maintenance," Tata McGraw-Hill Education, 1996.

Pneumatic Engineering Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1) Direct control of single and double acting cylinders.
2) Controlling double acting cylinder with impulse valve.
3) Logical (AND & OR) control with shuttle & twin pressure valve.
4) Operation of single and double acting cylinder using pilot operated directional control valve.
5) Operation of double acting cylinder using relay and solenoid valve.
6) Apply AND, OR logic using solenoid valve and two manual controls for forward stroke of a double acting cylinder.
7) Continuous operation of a double acting cylinder sing double solenoid valve.
8) Simulation for condition monitoring of double acting cylinder.
9) Simulation of PID Controller in Feed Forward mode.
10) Operation of Double Acting Cylinder using PLC.
11) Study of vacuum technology.

Sixth Semester

Industrial Automation

MT 6.2

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Introduction to Automation and its Components: Relays- electro mechanical relays, reed relays, hermetically sealed relay, solid state relay. Contactors, Switches- toggle switch, DIP switch, Rotary switch, Selector switch, Pushbutton, Limit Switch, Temperature switch, Pressure switch, Level switch, Flow switch, Sensors, Actuators, Solenoids.

Section B

Programmable Logic Controller (PLC) : Introduction, Architecture, Selection criteria, I/O modules, Introduction to various programming techniques, Ladder diagram programming, Bit Instructions, Timers, Counters, Sequencers, mathematical and logical instructions, types of memory, real time applications.

Section C

Supervisory Control and Data Acquisition (SCADA): Introduction, Elements of SCADA, Features of SCADA, Applications of SCADA system.

Distributed Control System (DCS): Centralized and Distributed Control Concept, Specifications of DCS, System Architecture, Elements of DCS, DCS Displays (User defined displays, Graphic Display, Trend Display, Alarm summary, Instrument faceplate, tuning display).Advantages and Applications of DCS.

Data Communication Links and Protocols: HART Protocol, Field Bus, GPIB, Comparison of MODBUS, PROFIBUS, FIPBUS, Industrial Ethernet.

Text Books:

1. Modern Control Technology, Components and Systems, Christopher T. Kilian Cengage Learning (2006).
2. Lukcas M.P. ,"Distributed Control Systems", Van Nostrand Reinhold Co. New York (1986)
3. John W.Webb, Ronald A Reis," Programmable Logic Controller-Principles and Applications"/ 4th edition, PHI, New Jersey.

Reference Books:

1. Frank D. Petruzella," Programmable logic controller" 2nd edition, McGraw Hill, New York.
2. Curtis D. Johnson,"Process Control Instrumentation Technology",7th Edition,PHI, New Delhi,2002
3. Surekha Bhanot." Process Control: Principles and Applications", Oxford.

Industrial Automation Lab

L T P C
0 0 2 1
Max. Marks : 60
(CA : 20 + ESA : 40)

1. To study of Siemens PLC Trainer kit (S7-1200).
2. PLC based Ladder logic programming for logic gates.
3. PLC based Ladder logic programming using NO/NC Switches.
4. PLC based Ladder logic programming using timers.
5. PLC based Ladder logic programming using counters.
6. PLC based Ladder logic programming using arithmetic operations.
7. PLC based Ladder logic programming using logical operations.
8. To write a program for control of traffic light using ladder logic.
9. To design a 24 hour clock using ladder logic programming.
10. To write a program for blinker

.

Linear Control System

MT 6.3 **L T P C**

3 1 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Introduction to control system, differential equation and LTI transfer function, Mathematical Modeling, Block diagram reduction techniques, signal flow graph, servomechanism: synchros, AC and DC servomotors.

Time Domain Analysis: Standard test signals, Time Response Analysis of First Order and Second Order System, Transient response analysis, steady state errors and error constants.

Section B

Introduction to controllers: P, PI, PD and PID controllers, effect of feedback, Stability concept, relative stability, Routh stability criterion.

Root Loci Technique: Concept of root locus, construction of root locus and closed loop stability.

Frequency Domain Analysis: Correlation between time & frequency response, Polar plots, Stability in frequency domain (GM & PM), Nyquist plots and Nyquist stability criterion, Constant M and N circles.

Section C

Performance specifications in frequency-domain and Bode plot.

Compensation: cascade and feedback compensation, time & frequency domain design using lag, lead and lag-lead compensation.

State Space Analysis: Concepts of state, state variable, state model, state models for linear continuous time functions, diagonalization of transfer function, solution of state equations, concept of controllability & observability.

Suggested Books:

1. K. Ogata, Modern Control Engineering, 3rd ed., Prentice Hall, USA. 1997
2. B.C. Kuo, and F. Golnaraghi, Automatic control system. John Wiley and Sons (Asia) Pte Ltd, Eighth Edition, 2003.
3. M. Gopal, Control System: Principles and Design, TMH, Second Edition, 2002.

Linear Control System Lab

L T P C

0 0 2 1

Max. Marks : 15

(CA : 5 + ESA : 10)

1. To obtain transfer function and complex transfer function using pole-zero method using MATLAB.
2. To obtain transfer function in various series and parallel combinations using MATLAB.
3. To obtain closed loop transfer function from the given block diagram and also plot its pole-zero plot using MATLAB.
4. To obtain step and impulse response of first order control system using MATLAB.
5. To obtain step and impulse response of second order control system using MATLAB.
6. To plot root locus for the given transfer function using MATLAB.
7. To pot bode plot for the given transfer function using MATLAB.
8. To plot Nyquist plot for the given transfer function using MATLAB.
9. To obtain the response of field controlled motor using MATLAB.
10. To obtain the response of armature controlled motor using MATLAB.

Process Control

MT 6.4 **L T P C**

3 1 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Introduction to Process Control: Objective of Process Control, Benefits, Difficulties and Requirements of Process control Implementation, Process dynamics-Elements of process control, process variables, Process lag and Control lag, Types of Dynamic Processes: Integral process, First order process, Second order process, Dead time, Single /multicapacity, self-Regulating /non self regulating, Linear/non linear, Degree of freedom, Piping and Instrumentation Diagram.

Mathematical Modelling of Processes: Modeling of liquid-level process, gas process, thermal process. Concentration response of a stirred tank, Temperature response of a stirred tank, Interacting and Noninteracting two tank level system

Section B

Control Action and Controller tuning: Basic control action-characteristics of on -off, Proportional control, Design of Integral and Derivative Controller, Composite controller models-PD,PI and PID controllers and comparison of these controller actions. Electronic controllers. Response of controllers for different types of test inputs-selection of control mode for different process with control scheme. Optimum controller settings-Tuning of

controllers by Process reaction curve method, Continuous cycling method, damped oscillation method.

Section C

Final Control elements: Pneumatic control valve, construction details and types, valve sizing, selection of control valves, inherent and installed characteristics of valve,actuators and positioners.

Complex Control Techniques: Feed forward control, Ratio control, Override control, Cascade control, Split range control, Inferential control, Model predictive control, Adaptive control, Boiler level control, Distillation column control, Furnace control.

Safety in Instrumentation control systems: Area and material classification as per IEC and NEC standard, techniques used to reduce explosion hazards, intrisinic safety and installation of intrinsically safe systems.

Text Books:

1. C.D.Johnson," Process Control and Instruments Technology, PHI Education (2002).
2. D.Patranabis, "Principles of Process Control", second edition, TMH.
3. Lisa K. wells & Jeffrey Travis, Lab VIEW for everyone, Prentice Hall, New Jersey, 1997.
4. Jovitha Jerome, Virtual Instrumentation using LabVIEW, PHI Learning Pvt. Ltd. Delhi 2010.

Reference Books:

1. R.P.Vyas "Process Control and Instrumentation", Central Techno Publications.
2. R.K.Jain,"Mechanical and Industrial Measurements", Khanna Publishers.
3. S.K.Singh, "Computer Aided Process Control",PHI,2005. Bela G Liptak,"Instrument engineers Handbook-Process Control", Chilton book company-3rd edition.
4. Industrial Electronics, Petruzella, Mcgraw Hill.
5. Liptak B.," Process Measurement and Analysis", Chilton book company-3rd edition.
6. Tatamanglam R."Industrial Instrumentation Principle and Design", Springer Verlag, 2000 ISBN 1852332085.
7. M.Chidambaram, Computer Control of Processes, 2002.
8. Thomas Hughes," Programmable Logic Controller", ISA Publication.
9. Stuart Boyer, "SCADA Supervisory Control and Data Acquisition",ISA Publication.
10. Gruhn and Cheddie ,"Safety Shutdown systems", ISA Publication, 1998.

Process Control Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study and draw a ladder logic diagram for tank filling device simulator.
2. To study and draw a ladder logic diagram for pump control.
3. To study and draw a ladder logic diagram for star-delta start-up.
4. To study and draw a ladder logic diagram for pole changing switch.
5. To study and draw a ladder logic diagram for furnace door control.
6. To study and draw a ladder logic diagram for road work traffic light.
7. To study and draw a ladder logic diagram for Automatic tablet filler.
8. To study and draw a ladder logic diagram for selective belt switch.
9. To study and draw a ladder logic diagram for level control.
10. To study and draw a ladder logic diagram for mixing of two fluids.

Hydraulics Engineering

MT 6.5

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Introduction to Hydraulics, Fluid classifications, Properties of fluid, Shear stresses in a fluid. Pressures & Measurement of Pressure: Absolute, Gauge &Vacuum Pressure, Pascal's law, Hydrostatic law, Hydrostatic Static Forces on Submerged Bodies: Flat surface & Curved Surface, Buoyancy and Floatation: Archimedes's Principle, Metacenter. Fluid Kinematics: Types of Fluid Flow, Flow rate & Continuity Equation, Fluid Dynamics: Euler's Equation, Bernoulli's theorem, Application of Bernoulli's theorem: Venturimeter, Orifice Meter, Pitot Tube, Notches & Weirs, Flow in Pipes & Losses: Major losses & Minor losses.

Section B

Valves: Directional control valves, Pressure control valves, Proportional control valves, Flow control valves), Hydraulic Cylinders: Single acting, Double Acting, Special Cylinders: Special, Rod less, Telescopic. Fluid power Actuators: Linear & Rotary Actuators. Hydraulic Pumps: Centrifugal Pump, Reciprocating Pump, Rotary Displacement Pump. Compressors: Piston, Screw, Reciprocating, Rotary and Axial. ISO symbols and its Applications. Hydraulic System-Hydraulic Press, Hydraulic lift, Hydraulic Accumulator.

Section C

Hydraulic Oils: Types, Properties and applications. Classification: Mineral based Fire resistant & Biodegradable Oils. Filters, Contaminations and Location of Filter.

Hydraulic Motors: Gear Motors, LSHT Motors, Multi stroke axial piston motors, Multi stroke radial piston motors, Variable Displacement Radial piston motors.

Design of hydraulic circuits: Basic and Industrial hydraulic circuits, Advantages, Application and Design of Electro-hydraulic system, Electro hydraulic Control.

Hydroulic Engineering Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study Hydraulic System and Pump.
2. To study Hydraulic differential cylinder and Hydraulic motor.
3. Actuation of single- acting cylinder: Direct and indirect solenoid valve actuation.
4. Actuation of single- acting cylinder: Basic Boolean logic functions.
5. Actuation of double- acting cylinder.
6. To design Hydraulic Speed Control circuits: meter-in, meter-out and bleed off.
7. To design Hydraulic Regenerative circuit.
8. To design Hydraulic Circulation circuit.

Robotics

MT 6.7

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

BASIC CONCEPTS- Automation and Robotics - An over view of Robotics - present and future applications, Pose of rigid body, classification by coordinate system, Rotation matrix, Transformation matrix, Homogeneous transformation matrix, Composition of matrix, D-H parameters, Euler Angles (ZYZ, RPY angles)

KINEMATICS- Forward Kinematic, Kinematics of typical manipulators (3 link, Spherical arm, Anthropomorphic arm, Stanford, puma-560) and Inverse Kinematic Problems, Solutions of Inverse Kinematic problems, Multiple Solution,

Section B

DIFFERENTIAL TRANSFORMATION: Velocities (Linear and Rotation), Velocity propagation link to link, Jacobian, Work Envelop, Singularity

DYNAMICS: Lagrange formations (Computation of Kinetic Energy and Potential Energy) Torque equation generation- Derivation, Euler and Newton method

Section C

PATH PLANNING- Path and trajectory, joint space trajectories, (PTP, motion through a sequence points) Operational space trajectories

CONTROL - Feedback and closed loop control, Trajectory Follow Control, Control law partioning, Disturbance Rejection

CASE STUDY- Introduction of ROS (Robot Operating system)

TEXT BOOKS:

1. Introduction to Robotics / John J Craig / Pearson Edu.
2. Robotics / Fu K S/ McGraw Hill.

REFERENCES:

1. Robotics, CSP Rao and V.V. Reddy, Pearson Publications (In press)
2. Robotics and Control / Mittal R K &Nagrath I J / TMH.
3. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
4. Robotic Engineering / Richard D. Klafter, Prentice Hall
5. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science
6. Robot Dynamics and Control by Mark W. Spong and M. Vidyasagar, John Wiley & Sons.

Robotics Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

E.1 Introduction of ROBO ANALYSER and KUKA SIM Simulators
E.2 Workspace generation and Orientation of Manipulators
E.3 Manipulations with KuKA robot (KR-16)
E.4 Introduction of Robotino view Software and experiments:
1. Sensors fusion
2. Path tracking
3. Camera fusion
4. Path planning
5. Lidar fusion
6. Navigation

E.5 Introduction of ROS AND RVIZ Simulator and Simulations

Bachelor of Technology (Information Technology)

Fifth Semester

Data Communications and Networks

IT 5.2 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Data Communication Model, tasks of a communication system, networking, analog and digital transmission, different transmission media.Data encoding: digital data digital signals, digital data analog signals (ASK, PSK, FSK), analog data digital signals (PCM, Delta modulation), analog data analog signals (AM, FM, PM), modems, interfacing [RS-232C], multiplexing (TDM, FDM).

Section B

Principles and Purpose of layered approach, OSI model, ARPANET model, protocol architecture (OSI, TCP/IP) Data link control: Frame Synchronization asynchronous and synchronous; flow control- stop and wait, sliding window, go-back-N protocols; error detection- CRC, error control - ARQ schemes. Network switching - circuit switching, packet switching; routing and congestion control; introduction to frame relay and ATM.

Section C

High speed LANs; network management; Internetworking, the Internet Protocol, DNS and URL; transport protocols: TCP, UDP; remote procedure call; network security - encryption, RSA algorithm and data compression, applications - (Telnet, FTP, SMTP, HTTP); introduction to ISDN and broadband ISDN.

Text Books:

[1] A.S. Tannanbaum: **Computer Networks**: PHI

[2] W. Stailings: **Data and Computer Communications**: Pearson Education

[3] Prakash C. Gupta: **Data Communication & Computer Networks**: PHI

Reference Books:

[1] Korose & Ross: **Computer Networking:** Pearson Education

[2] Behrouz A. Fou Rouzan: **Data Communication & Networking:** Tata McGraw Hill

Java Programming

IT 5.3 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Java Introduction: Evolution, features, concepts of Java Virtual Machine (JVM) and its task, Java and Internet, Environment (JRE, JDK, JSDK, APIs), Application & Applet.

Java Programming: Structure of program, Data Types, Variables, Operators, Expressions, Control statements (sequencing, alteration, looping), Object oriented Concepts, Objects, Classes, Constructors, Method Overloading, Arrays, String handling, Wrapper classes, packages, Access Specifier, Inheritance, Method Overloading, Interfaces, Inner & Anonymous classes.

Section B

Exception handling, Streams and I/O programming, Serialization, Multithreading, Collection framework (Set, Map, List, Vector), Generic, Iterators, Utility Classes, Networking, Socket and Datagram programming, JDBC, ODBC-JDBC drivers Database Connectivity, JDBC statements, Resultset, Metadata.

Section C

GUI in Java using graphics classes , Features of AWT and Swing, Layout Managers, Event handling, Adapter classes, Applet, Frames, all components of AWT (button, textbox, checkbox, fonts etc).

Java Server Pages (JSP), Servlet, Introduction to J2EE & EJB, Deployment of applications.

Text Books :

[1] Herbert Schildt, **Java: The Complete Reference J2SE**, 5th Edition, Tata Mcgraw Hill

[2] Suresh Rajgopalan, **Java Server Programming Bible,** Wiley Publication

Reference Books :

[1] E. Balagurusamy, **Programming with Java**, tata McGraw-Hill Publications

[2] Madhushree Ganguli, **JSP: A Beginner's Guide**, Delhi, Wiley Publication

[3] H.M. Deitel, P.J.Deitel **Java: How to program**, Third edition, Prentice Hall Publication

[4] Cay S., Horstmann and Gary Cornell, **Core Java 2,** Volume I & II, Delhi, Pearson publisher
[5] Ivan Bayross, **Web Enabled Commercial application development using., HTML, DHTML, Javascrip**t
[6] **Perl CGI**, New Delhi, BPB Publication
[7] Bernard Van, Haccke, **JDBC: Java Database Connectivity**, New Delhi, IDG Books

Java Programming Lab

L T P C
Contact Hours: 90 **0 0 6 3**
Max. Marks : 45
(CA : 15 + ESA : 30)

(45 Labs each of 2 hours)

Lab Number	Problems
L1 – L2	Simple Programs
L3 – L4	Programs based on Control Statements
L5 – L8	Programs based on Classes & Inheritance
L9 – L10	Programs based on Arrays
L11 – L12	Programs based on Packages & Interfaces
L13 – L14	Programs based on Wrapper Classes
L15 – L16	Programs based on Exception Handling
L17 – L18	Programs based on I/ O Classes
L19 – L20	Programs based on Strings
L21 – L23	Programs based on Threads
L24 – L26	Programs based on Applets
L27 – L28	Programs based on Graphics
L29 – L32	Programs based on Event Handling
L33 – L35	Programs based on Swings & GUI Components
L36 – L37	Programs based on Serialization
L38 – L39	Programs based on Networking
L40 – L41	Programs based on JDBC
L42 – L45	Programs based on JSP & Servlets

Systems Programming

IT 5.4 **L T P C**
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Components of System Software, evolution of system Software. General Machine structure (Memory, Register, Data Instructions). Assemblers, Design of Two Pass Assembler. Macros and Macro Processors. Translators: Interpreters, Brief description of different phases of compiler.

Section B

Loaders: A Two Pass Loader Scheme, Relocating loader, subroutine linkage, Direct linking loader. Binders, Overlays. Types and basic functions of operating systems. Software Tools: Text Editors, Program Generator,Debug Monitors.

Section C

Access to system services: ROM BIOS, DOS , Mouse and EMS (Expanded memory specifications) Functions, Keyboard and Screen Management. Introduction to Terminal Emulator. DOS Device Drivers : Types , Structure and Processing. Interrupt Types, Organization, Interrupt Hardware , Program status register(PSR) , Interrupt Processing.

Text Books :

[1] Roy Donovan J.J., **Ellzay S. & Staff Bigger: Systems programming:** Mc-Graw Hill, 1972

[2] Sanjay K. Bose: **Hardware and Software of Personal Computers:** Wiley Eastern Publications

Reference Books:

[1] Dhamdhere D.M.: **Introduction to system software:** Tata Mc-Graw Hill, 1986.

[2] Peter D. L: **An Introduction Real-Time Microcomputer System Design**: Mc-Graw Hill International Co

[3] Bigger Staf Ted J.: **System Software Tools:** Prentice Hall

[4] Ray Dunkan: **Advance MS-DOS programming:** BPB Publication

[5] Dhamdhere D. M.: **System Programming and Operating Systems:** Mc-Graw Hill

[6] Daniel A. Norton: **Writing DOS Device Drivers:** Addison Wisley

Microprocessors and Microcontrollers

IT 5.5

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Objective :

The objective of the Microprocessor and Microcontrollers is to do the students familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules. The student can also understand of 8051 Microcontroller concepts, architecture,

programming and application of Microcontrollers. Student able to do any type of industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

Section A

8086/8088 Microprocessor: Pin Assignment, Architecture, Functional Diagram, Register Organization, Memory address space & data organization, Segment registers & Memory segmentation, Dedicated & general use of memory, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams, Interrupts, Bus timings, Demultiplexing. Assembly Language Programming of 8086: Instruction Format, Instruction Set, Data Transfer instructions, Arithmetic instructions, Logical instruction, Shift instructions, Rotate instructions, Flag control instructions, Compare instructions, Jump instructions, Subroutine & the subroutine handling instructions, Loop & loop handling instructions, String instructions.

Section B

Peripheral Devices and Their Interfacing: Introduction, memory and I/O interfacing with 8086, data transfer schemes, programmable peripheral interface (8255), programmable DMA controller (8257), programmable interrupt controller (8259), programmable communication interface (8251), programmable counter/interval timer (8253 and 8254), special purpose interfacing devices, elements and circuits for interfacing. Communication Interface: Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tolls, MDS.

Section C

Introduction to Microcontrollers: Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming. 8051 Interrupts Communication: Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming. Interfacing & Industrial Applications: Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

TEXT BOOKS:

1. Kenneth J Ayala, **"The 8051 Micro Controller Architecture, Programming and Applications",** Thomson Publishers, 2nd Edition.
2. D.V.Hall, **"Micro Processor and Interfacing"**, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Ajay V. Deshmukh, "Microcontrollers - theory applications", Tata McGraw-Hill Companies-2005.
2. Ray and Bhurchandi. "Advanced Micro Processors", Tata McGraw Hill.
3. Kenneth J. Ayala, "The 8086 Micro Processors Architecture, Programming and Applications", Thomson Publishers, 2005.
4. Microcomputer Systems: The 8086/8086 Family: Architecture, Programming and Design, 2nd ed., Liu & Gibson.

Microprocessors and Microconntrollers Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

Write a program to calculate the addition of 16-bit No.
Write a program to calculate the addition of 32-bit No.
To transfer the content of one memory location to other memory location.
To exchange the content of one memory location to other memory location.
To find out the maximum of N given nos.
To generate the fibonacci series.
To find location of given nos.
To find out the multiplication of two 16 –bit nos.
To find out the minimum of N given

Information Systems and Securities

IT 5.6

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Foundations of Cryptography and Security, Ciphers and Secret Messages, Security Attacks and Services, Mathematical Tools for Cryptography, Substitutions and Permutations, Modular Arithmetic, Euclid's Algorithm, Conventional Symmetric Encryption Algorithms, Theory of Block Cipher Design, DES and Triple DES, Modes of Operation (ECB, CBC, OFB, CFB), Strength of DES, Modern Symmetric Encryption Algorithms, RC5 Stream Ciphers, One Time Pad, Cryptanalysis.

Section B

Public Key Cryptography, Prime Numbers and Primality testing, Factoring Large Numbers, RSA, attacks on RSA, Diffie-Hellman, Algorithm, Public-Key Cryptography Standards, Hashes and Message Digests, Message Authentication, MD5, SHA, Digital Signatures, Certificates, Digital Signature Standard (DSS and DSA),

Section C

Authentication of Systems, Kerberos (V4 and V5) and VeriSign, Electronic Mail Security (Pretty Good Privacy, S/MIME), IPSec and Web Security, Intrusion detection systems, Secure Sockets and Transport Layer (SSL and TLS), Electronic Commerce Security, Secure Electronic Transaction (SET), E-Cash (DigiCash), Digital Watermarking and Steganography.

Text Books:

1. Stallings, W.: **Cryptography and Network Security: Principles and Practice**, 4th Ed

Reference Books:

1. Schneier, Bruce: **Applied Cryptography**
2. Schneier, Bruce: **Secrets and Lies: Digital Security in a Networked World**

Bachelor of Technology (Information Technology)

Sixth Semester

Operating Systems

IT 6.2 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

History of the operating systems, Operating system functions, OS classification: single user, multi user, simple monitor, batch processing, time sharing, real time OS. Information Management: management file supports, access methods, allocation methods, contiguous,linked and indexed allocation, directory system Memory Management : partition, paging and segmentation. Virtual memory and demand paging. Device Management: Disk and Drum scheduling algorithms. Protection of resources. I/O Processor Management: I/O traffic controller, I/O scheduler, I/O device handlers.

Section B

Process Management: Process states, level of schedulers and scheduling algorithms. Interposes Communication: Process synchronization, critical section problem and its software, hardware and semaphore solutions. Deadlock: Presentation, avoidance, detection and recovery. Parallel

Processing: Difference between distributed and parallel processing, OS for parallel processors.

Section C

Case Study: Unix: Unix-history, design principles, programmer interface user interface, file system, process management, memory management, I/O system, Interposes commands, Vi Editor Unix Shell. Communication management in Netware, Netware features. Windowing technology, Relationship between operating system and windows, Graphical user interface components.

Text Books:

[1] Achyut S. Godbole: **Operating system with case studies in Unix , Netware, Windows NT:** Tata McGraw Hill Publications

[2] Silberschatz , Galvin: **Operating System Concepts:** Addision Wisley Publications

Reference Books:

[1] Andrew S. Tananbeum: **Modern Operating Systems**: Printice Hall Publications

[2] Russell A. Stultz : **Illustrated MS-DOS 6.22 :** BPB Publications

[3] Deitel: **Introduction to Operating System:** Addition Wesley Publication

Operating Systems Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

Unix Shell Programming Assignment

1. Shell script to Perform various arithmetic operation.
2. Shell script to find the factorial of a number.
3. Shell script to reverse a no. and check for the no. to be palindrome or not.
4. Shell script to find whether no. is prime or not.
5. Shell script to generate fibonacci series.
6. Shell script to generate table of a given no.
7. Shell script to generate star pattern..05

8. Shell script to search a particular login entered by you. This program should continuously run on background to let you know about when that user has logged in.
9. Shell program for sorting a set of nos. The set of no. are to be entered through file.
10. Shell script to Generation and summation of natural numbers (and their various forms) e.g. 12 + 32 + 52 + ...
11. A shell script for binary to decimal conversion.
12. Shell program to generate and sum all prime numbers between any two given numbers.
13. Shell program for equivalent effect of the DOS command TYPE.
14. Shell script to protect a file through password. Password should be displayed in encrypted form.

Software Engineering

IT 6.4 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Software engineering concepts, software evolution, software process models, software project planning: identifying software scope, resources, risk management, project scheduling, tracking, cost estimation: project metrics, cost factors, cost estimation techniques (decomposition, empirical, automated estimation, Delphi). Analysis concepts, structured vs object oriented analysis, object oriented analysis modelling.

Section B

System Design: design concepts and principles (modularization, abstraction, refinement, cohesion, and coupling), object oriented concepts: class and object definitions, encapsulation, polymorphism, inheritance, association, multiplicity, composition and aggregation, generalization, specialization. Object Oriented Modelling using Unified Modelling Language (UML): class diagrams, use case diagrams, sequence diagrams, activity, and state diagrams. Implementation: language classes, coding style, efficiency.

Section C

Software Quality Assurance: quality factors and criteria, SQA metrics, SQA techniques. Verification and Validation: software testing methods (WBT, BBT), software testing strategy (unit testing, integration testing, system, testing), Maintenance : types of maintenance, software maintenance

process, maintainability, software reuse, re-engineering, reverse engineering, CASE.

Text Books:

[1] Roger S. Pressman: **Software Engineering: A Practitioner's Approach:** 6th Edition McGraw Hill , 1992

[2] Pankaj Jalote: **An Integrated Approach To Software Engineering**, 2nd Edition: Narosa Publications

Reference Books:

[1] Nira S. Godbole: **Software Quality Assurance Principles & Practices:** Narosa Publications

[2] H. Sommervill Ian: **Software Engineering:** Addition Wesley Pub. Co

[3] Fairley Richard: **Software Engineering:** McGraw Hill, 1985

[4] Paul Ammann & Jeff offutt : **Introduction to Software Testing:** Cambridge University Press.

Theory of Computation

IT 6.5 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Mathematical Preliminaries, Alphabets, Strings, Languages, States, Transitions, Finite Automata and Regular Expressions, Applications e.g. Lexical Analyzers and Text Editors, Pumping Lemma, Closure Properties of Regular Sets, Decision Algorithms for Regular Sets.

Section B

Context Free Grammars, Chomsky Normal Forms And Greibach Normal Forms, Ambiguity, Pushdown Automata and the Equivalence of Contex Free Languages to Sets Accepted by Non-Deterministic PDA, Pumping Lemma for CFL's, Closure Properties of CFL's and Decision Algorithms for CFL's.

Section C

Turing Machines: Introduction, Turing Computability, Non-deterministic, Multitape and other versions of Turing Machine, Church's Hypothesis, Primitive Recursive Function, Gödelization, Recursively Enumerable Languages, Undecideability: Universal Turing Machines and Unsolvability of the Halting Problem, Post's Correspondence Problem.

Text Books:

[1] Hopcroft J.E. and Ullman J.D.: **Introduction to Automata Theory, Languages and Computation:** Narosa Publishing House, 1988

Reference Books:

[1] Derick wood: **Theory of Computation:** Harper & Row Publishers, New York, 1987.

[2] Lewis H.R. & Papadimitriou C.H.: **Elements of the Theory of Computation:**

[3] Martin, John C.: **Theory of Computation:** Pearson

[4] Nasir S. F.B., P.K. Srimani : **Automata Theory:** Cambridge University Press.

Internet and Web Technology

IT 6.6

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Internet Protocol model, Internet Addresses (IPV6), IP routing concepts, Table Driven and next hop routing, other routing related protocols, Internet Access through PPP, SLIP, Web servers, Routing Secruity, Switch based routing, Switch based routing, Routing in unicast environment, multicasting, Mobile routing, Mail protocols (MIME).

Section B

Web Server Technology: Web's Robot global access to information, HTML, HTTP, Cascading, Style Sheets: Syntax, Class Selector, ID Selector, DOM (Document Object Model) Accessing a web server, publishing on web server, secure HTTP, Secure Sockets Layer, Proxies, IIS.

Browsing Systems: Searching and web casting Technique, Basic features bookmarks, cookies, progress indicators, Browsing tricks, Next generation web browsing, search engines, architecture of search engines, search tools, web crawlers, types of crawlers.

Section C

Website Development : XML, Structuring data, namespaces, XML Schema Documents, Generating XML Data, Writing XML File, API for XML, XSL, Creating Document type definition, Java Script Object Model, ASP: ASP Basic, Procedure, Functions, ASP Object: Response, Request, Session and Application, Database Connectivity in ASP, Basic Syntax Rule of V.B. Script.

Text Reference/Books : Suggested

1. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp-2001, TMH.
2. Internet & World Wide Programming, Deitel, Deitel & Nieto, 2000 Pearson Education.
3. Ivan Bayross: HTML, DTHML, Java Script, Perl, CGI: BPB Publication.

4. Complete reference guide to java script, Aron Weiss, QUIE, 1997.
5. Active Server Page 3.0 in 21 Days, SAMS Techmedia.
6. Deborah S.Roy, Eric J. Roy, Mastering HTML 4.0
7. VB Script Interactive Course, Techmedia.
8. Mastering XML by Ann Navarro, BPB Publication
9. Internet & Internet Engg. By Minoli
10. Internet & Web Technology by Rajkamal.

Internet and Web Technology Lab

L T P C
0 0 4 2
Max. Marks : 60
(CA : 20 + ESA : 40)

Practical Syllabus

Lab No.	Topic
Lab 1	Introduction to HTML and Web Browsers
Lab 2	Formatting Web Pages
Lab 5	
Lab 6	Anchor tag, Image tag, List and Table formation
Lab 10	
Lab 11	Color Schemes and Other Miscellaneous Tags
Lab 13	
Lab 14	CSS (cascade style scheets), dynamically changing text and style
Lab 18	
Lab 19	Dynamically Chaging Content of using Placement, Filyters and Transitions
Lab 25	
Lab 26	Introduction to Scripting, Implications of suing Script Tags in Various HTML Tags
Lab 30	
Lab 31	Variable Declaration, Operators, Condition and Control Statements
Lab 35	
Lab 36	Basic input/output functions of Java Script
Lab 40	
Lab 41	Object Model, Simple Animation Creation using Java Script and DHTML
Lab 44	Creation of XML File
Lab 45	DTD in XML

Optimization Techniques

IT 6.7 **L T P C**

3 1 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Classical Optimization Techniques: Single variable, Multi variable, Optimization of multivariable with equality and inequality constraints, Linear Programming: Graphical Analysis, Principles of Simplex methods, Simplex method in tabular form, Big-M, Degeneracy & Cycling, Duality and Dual Simplex method, Transportation problems and Assignment problems.

Section B

Nonlinear programming- Single variable optimization: Unimodal, Elimination method, Interpolation method, Unconstraint optimization: Direct search method, Random search method, Grid search method, Newton's method, Constrained optimization: Characteristics of constrained problem, Random search method, Augmented Lagrange multiplier method, Kuhn-Tucker conditions. Quadratic programming: Beale's & Wolfe's method, Separable programming.

Section C

Network Analysis: Introduction of Network analysis, Shortest path problem PERT & CPM, Updating of PERT charts, project planning and scheduling with CPM & PERT, Time-cost optimization, Queueing Theory: Probability description of arrivals and service times, objectives and different characteristics of a queueing system, Steady-state behaviour of Markovian and Erlangian Models (M/M/1, M/M/C).

Text Books:

1. Ronald, L. Rardin: **Optimizaion in Operations Research**. Prentice Hall, 1998
2. F.S. Hiller and G.J. Lieberman: **Operations Research**: Pearson Education, 8th edition.

Bachelor of Technology
(Electronics and Communication Engineering)

Fifth Semester

Analog Communication

EC 5.2 **L T P C**
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Introduction – Communication process, source of information, channels- Noise, System noise source, Noise & feed back, Noise figure – Electromagnetic Spectra. Base band and pass band signals, Modulation process – need, band width, requirements- frequency spectra of non-sinusoidal signals. Analogue vs Digital communication, Continuous and discrete spectra, band pass system.

Section B

Modulation:- amplitude modulation : basic principles, Mathematical relationships, frequency modulation and phase modulation – basic principles, mathematical relationships, comparison between amplitude modulation and angle modulation spectral analysis of different modulation. Modulators: Amplitude modulator, suppressed carrier DSB modulator, balanced modulator, SSB modulator: Filter method, phase shift method & Third method-ISB modulators, Vestigial side band modulator, Frequency modulator: Direct & Indirect method, narrow band FM. Phase modulator Spectral analysis of these modulators, Transmitters – AM transmitter, low level and high level SSB transmitter-, pilot carrier – FM transmitter – narrow band and wide band, FM stereo transmitter.

Section C

Receiver: -Sensitivity, selectivity, signal to noise ratio, Demodulators – diode detector, FM detectors, phase detector- ratio detector – Foster – Seelay discriminator-, AM receiver – (Block level treatment) – TRF receiver, super heterodyne receiver, Double super heterodyne receiver – SSB receiver, communication receiver, AGC circuitry, FM receiver – FM stereo receiver (block level) Carrier shareholding. Capture effect.

Text Books:

1. George Kennedy: **Electronic Communications Systems:** Mc Graw Hill.
2. Taub and Schilling: **Principles of communication systems:** Mc Graw Hill.
3. Martin S Roden: **Analog and digital Communication systems.**
4. Sol Lapatine: **Electronic communication.**

5. Dennis Roody and Jhon Coolen: **Electronic communication** Prentice Hall.
6. J Dunlop & D G Smith: **Elecommunication Engineering.**

Analog Communication Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

To Study the Amplitude Modulation and measure modulation Index.
To Study the Amplitude Demodulation.
To Study the Frequency modulation.
To Study the Frequency Demodulation.
To Study the Balanced Modulator.
To Study the extraction of Single side band from double side bandwidth phase shifter method.
To study the extraction Single side band from double side bandwidth Weaver's method.
To study the Principle of Ratio Detector.
To study the Principle of Foster-Seeley discriminator.

Communication Networks

EC 5.3

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Introduction to communication systems and data communications. Introduction of network, requirement of Internet. Data Networking, Network history, Local area network topologies, WAN, MAN,VPN, (Virtual Private Network). Bandwidth, Bandwidth data rate. Multiplexing-TDM, FDM, CDMA, data encoding. Network model-layer structure of network model. OSI Model, OSI layers. TCP/IP Model layers. Arpanet, Peer to Peer communication. Communication Media and cable-structure-through wire-copper cable-STP, UTP, co-axial cable, optical fiber. Wireless media-wireless LAN, organization and standards. Wireless devices and topologies. Wireless communication, wireless security.

Section B

Network layer devices-Modem, NIC, hub, bridge, switch, router, firewall, gateway. Switching Networks-circuit switching, Packet Switching. Networks-Circuit Switching, Packet Switching. Networks addressing

schemes-MAC Address, Subneting, Superneting. Routing Concept, Routing protocol (RIP), Routed protocols. Introduction to IPV6 Principles of Internetworking. Ethernet (CSMA/CD) Token Ring and FDDI, Fast Ethernet.

Section C

Layer protocol Structure. Data link control – Flow Control, Error Detection, Error Control. HDLC. Network layer-ARP, RARP, ICMP. Effect of Congestion and Congestion Control in Network-(Back pressure, choke packet, Implicit Congestion Signaling, Explicit Congestion Signaling. Traffic Management-Transport layer Protocols-connection oriented and connectionless services, TCP, TCP Congestion Control and Flow Control. UDP. Application Layer Protocols – HTTP, FTP, SMTP, SNMP, Telnet. Introduction to ISDN. Narrow Band and Broad Band. Introduction to WAN Technologies. ATM and Frame relay.

Text Books:

1. E.C. Jordan: **Electromagnetic wave & Radiating System:** PHI, II edition 1986.
2. A.S. Tannanbaum: **Computer Networks:** Pearson Education 2003.
3. W.Stailling: **Data & Computer Communication**: PHI New Delhi, 5th edition 1997.
4. J.Martin: **Computer Networks and Distributed Processing**: PHI, 1998.

Analog Integrated Circuits

EC 5.4 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Feedback Amplifiers : classifications of amplifiers, general feedback structure, properties of negative feedback, feedback topologies, Transfer gain with feedback, General Characteristics of negative feedback amplifiers, input resistance, output resistance. Method of analysis, voltage series and current series feedback, current shunt and voltage shunt feedback.

Power amplifiers : classification, operation, analysis and design of Class A, Class B, Class-AB, Class C, power dissipation and efficiency calculations, amplifier distortion.

Section B

High Frequency Amplifiers : Hybrid-pi CE transistor model, Hybrid-pi Conductance, Hybrid-pi Capacitances, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, gain-

bandwidth product, **Multistage Amplifiers :** frequency response, Effect of Cascading on bandwidth, RC Coupled amplifier, Low frequency response of an RC coupled stage, Effect of emitter bypass capacitor, High frequency response of two cascaded CE transistor stages, Multistage CE amplifier cascaded at high frequencies.

Section C

Operational amplifier & its Applications : BJT Differential Amplifier : DC and AC analysis, transfer characteristics, differential and common modes gain. ideal op-amp, inverting and non-inverting amplifier, offset voltage, offset currnent, bias current, slew rate, CMMR, design of Integrator and differentiator, summing amplifiers, differential and instrumentation amplifiers, Active filters, OP-AMP RC Oscillator circuits : Wien-Bridge, Phase-Shift, Precision rectifier, comparator, Schmitt trigger, 555 IC timer.

Text Books:

1. Millman and Halkias : Integrated electronics, TMH, 1991.
2. Boylestad, Nashelshy, **Electronic Devices and Circuit Theory,** Pearson publication, Tenth Edition, 2009.
3. Gayakwad Ramakant A., "OP-AMP & Linear Integrated circuits", New Delhi (Prentice Hall) fourth Edition 2010.

Reference Book :

1. Adel Sedra & Kenneth Smith, **MICROELECTRONIC CIRCUITS Theory and applications" FIFTH edition International version :** Oxford University Press, 2009.

Analog Integrated Circuit Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To design the Astable Multivibrator using 555
2. To design the Monostable Multivibrator using 555
3. To design summer using 741 IC
4. To design Intergrator using 741 IC
5. To design Schmitt Trigger using 741/555 IC
6. To design Differentiator using 741 IC
7. To design peak detector using 741 IC
8. To design scalar using 741 IC
9. To study active filters : LPF, HPF, BPF.
10. To design Voltage to frequency converter.
11. To study phase locked loop.
12. To study frequency shift keying using PLL 565.

Microprocessors and Microcontrollers

EC 5.5 **L T P C**

3 1 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Objective :

The objective of the Microprocessor and Microcontrollers is to do the students familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules. The student can also understand of 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers. Student able to do any type of industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

Section A

8086/8088 Microprocessor: Pin Assignment, Architecture, Functional Diagram, Register Organization, Memory address space & data organization, Segment registers & Memory segmentation, Dedicated & general use of memory, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams, Interrupts, Bus timings, Demultiplexing. Assembly Language Programming of 8086: Instruction Format, Instruction Set, Data Transfer instructions, Arithmetic instructions, Logical instruction, Shift instructions, Rotate instructions, Flag control instructions, Compare instructions, Jump instructions, Subroutine & the subroutine handling instructions, Loop & loop handling instructions, String instructions.

Section B

Peripheral Devices and Their Interfacing: Introduction, memory and I/O interfacing with 8086, data transfer schemes, programmable peripheral interface (8255), programmable DMA controller (8257), programmable interrupt controller (8259), programmable communication interface (8251), programmable counter/interval timer (8253 and 8254), special purpose interfacing devices, elements and circuits for interfacing. Communication Interface: Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tolls, MDS.

Section C

Introduction to Microcontrollers: Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly

language programming. 8051 Interrupts Communication: Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming. Interfacing & Industrial Applications: Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

Test Books :

1. Kenneth J Ayala, **"The 8051 Micro Controller Architecture, Programming and Applications",** Thomson Publishers, 2nd Edition.
2. D.V.Hall, **"Micro Processor and Interfacing"**, Tata McGraw-Hill.

Reference Book :

1. Ajay V. Deshmukh, "Microcontrollers - theory applications", Tata McGraw-Hill Companies-2005.
2. Ray and Bhurchandi. "Advanced Micro Processors", Tata McGraw Hill.
3. Kenneth J. Ayala, "The 8086 Micro Processors Architecture, Programming and Applications", Thomson Publishers, 2005.
4. Microcomputer Systems: The 8086/8086 Family: Architecture, Programming and Design, 2nd ed., Liu & Gibson.

Microprocessors and Microcontrollers Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. Write a program to calculate the addition of 16-bit No.
2. Write a program to calculate the addition of 32-bit No.
3. To transfer the content of one memory location to other memory location.
4. To exchange the content of one memory location to other memory location.
5. To find out the maximum of N given nos.
6. To generate the fibonacci series.
7. To find location of given nos.
8. To find out the multiplication of two 16 –bit nos.
9. To find out the minimum of given.

Microwave Electronics

EC 5.6

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Introduction to Microwaves & its application. Transmission Lines: General equation, input independence characteristic independence, reflection & reflection coefficient, standing wave ratio, resonant and anti resonant line impedance matching, smith chart & its applications, coaxial, twin, strip & micro strip lines & baluns.

Section B

Wave Guides: Wave propagation in rectangular & circular wave-guides, wave-guide modes, Q of wave-guides, wave-guide coupling. Microwave Passive Components: s-parameter representation and analysis of microwave component such as tees, two hole direction coupler, attenuators, phase shifter, Rectangular cavity resonator, circulator & isolator.

Section C

Microwave Tube Devices: Conventional Vacuum tubes at microwave, O type device - Klystron (two cavity & reflex). M type device magnetron, Introduction to TWT (Traveling Wave Tubes). Microwave Semiconductor Devices IMPATT, TRAPATT & Gunn Devices.

Text Books:

1. Sisodia-Raghuvanshi: **Microwave Circuits & Passive Devices:** (Wiley-eastern).1st edition.1987
2. S.Y. Liao: **Microwave Devices & Circuits**, (Prentice Hall).1st Edition 1995,
3. Collins: **Foundation Of Microwave Engineering**, (Mc Graw Hill) 2nd Edition 1992
4. P.A. Rizzi: **Microwave:** (Prentice Hall). 1st Edition 1998

Microwave Electronics Lab

L T P C
0 0 4 2
Max. Marks : 15
(CA : 5 + ESA : 10)

1. Determine the operating frequency of reflex klystron.
2. Draw the VI characteristics of Reflex klystron.
3. Draw the characteristics of attenuator.

4. To verify the wave-guide law.
5. To study the directivity and coupling coefficient of Directional Coupler.
6. To study the properties of magic Tea and also determine isolation and coupling coefficient.
7. To Measure the VSWR of (i) Short circuit (ii) Open circuit (iii) Matched Load (iv) Unmatched Load.
8. To study the properties of E-plane and H-plane Tea. Determine isolation and coupling coefficient.

Bachelor of Technology
(Electronics and Communication Engineering)
Sixth Semester
Digital Communication

EC 6.2 **L T P C**
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Random variables: Review of probability theory, communications examples, random variable, probability distribution function, probability density function, joint cumulative distribution and probability density, average value and variance of a random variable, error function, Gaussian probability density, Raleigh probability density, central limit theorem. Information Theory: discrete massages, concept of amount of information, Entropy, information rate, coding to increase average information per bit – Huffman coding, Lampel Ziv coding, Shannon's theorem, Channel capacity, capacity of a Gaussian channel, Bandwidth – S/N trade off. Error control coding: Rationale of coding and types of codes, discrete memory less charnel, some algebraic concepts, code efficiency and Hamming bound, linear block codes, Cyclic codes, Convolution codes, maximum likelihood decoding of convolution codes.

Section B

Pulse Modulation Systems: Sampling theorem, Generation and demodulation of PAM, PWM, PPM, quantization of Signals, quantization error, PCM, Companding and Multiplexing of PCM Signals, Delta and adaptive delta modulation, Bit, Word and Frame Synchronization, Matched filter detection.

Section C

Digital Modulation Techniques: Phase shift, amplitude shift and frequency shift keying, Minimum shift keying, calculation of error probability for PSK, ASK, FSK techniques. Modulation, Power spectra, Bandwidth efficiency and application of digital modulation techniques.

Text Books:

1. Simon Haykin: **Digital Communication**: John Wiley and sons
2. Taub and Schilling: **Princiles Of Communication System:** Tata McGraw Hill, Second edition.
3. Jhon Proakis: **Digital Communications:** McGraw Hill.
4. Bernad Shlar: **Digital Communication:** Pearson Education.
5. K Sam Shanmugam: **Digital and Analog Communication Systems:** Jhon Wiley and Sons.
6. Lathi B.P.: **Modern Digital And Analog Communications Systems:** PRISM Indian *Edition.*

Digital Communication Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

To study the Principle of Pulse amplitude modulation and demodulation system.

- To study the Principle of Pulse width modulation system.
- To study the Principle of Pulse width demodulation system.
- To study the Principle of Pulse code modulation system.
- To study the Principle of Pulse code demodulation system.
- To study the Principle of Pulse position modulation system.
- To study the Principle of Pulse position demodulation system.
- To study the Principle of Amplitude Shift Keying.
- To study the Principle of Frequency Shift Keying.
- To study the Principle of Phase Shift Keying

Power Electronics

EC 6.3

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Need of power electronics, Introduction to power electronics devices (static and dynamic characteristics) power diodes, power transistor, power MOSFETS, IGBT, MCT, GTOs, Triac. Thyristor SCR: Operational characteristics, Turn ON methods, switching characteristics, thyristor protection, over voltage protection, over current protection, gate protection, snubber circuit Firing circuits for Thyristors, heating, series and parallel combination of Thyristors.

Section B

Commutation Techniques: Load commutation, resonant- pulse commutation, complementary commutation, impulse commutation, line commutation, Phase controlled rectifier: Principal of phase control, single and three phase converters. Effect of source impedance on the performance of converters, dual converter (ideal and practical) DC choppers: Principle, control strategies, step-up and step-down choppers.

Section C

Inverters: Single-phase voltage source inverters 180 and 120 mode operation; Fourier analysis of single-phase inverter output voltage. Pulse width modulated inverters, Reduction of harmonics in the inverter output, single-phase current source inverters with ideal switch. Cyclo-converters: Step-up and step-down cyclo-converter, Single phase to single-phase cyclo-converters three-phase half wave cyclo-converters.

Text Books:

1. Rashid Muhammad H.: **Power Electronics Circuits, Devices And Applications:** PHI publication, 14th reprint Edition.
2. Bimbhra P.S.: **Power Electronics:** Khanna Publication, 3rd Edition.

Reference:

1. Rama Moorthy: **An Introduction To Thyristors And Their Application:** 2nd Edition, ISBN-81-85336-67-9.

Power Electronics Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study the V-I characteristics of a DIAC.
2. To study the V-I characteristics of a TRIAC.
3. To study the V-I characteristics of a SCR.
4. Micro controller based Problem Assignment.

Control Systems

EC 6.4

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Open loop and closed loop systems, servomechanism, mathematical model of systems, differential equations and transfer functions, Block diagram algebra, signal flow graphs; +ve and -ve feedback effects of feedback, servo- components, DC and AC servomotors, Techogenerators, synchors, stepper motor, op-amp, potentiometer as an error detector; comparison of AC and DC servomechanism.

Section B

Standard test signals, time response of first and second order systems, steady state errors and error constants, Design specifications of second order systems, effects of derivative and integral error compensation, PID controller, Design considerations for higher order systems in brief, performance indices.

Concept of stability, necessary conditions for stability, Routh Hurwitz stability criterion, relative stability criterion, relative stability in terms of Routh Hurwitz criterion; Root-locus technique.

Section C

Correlation between time and frequency response specifications; Frequency domain plots, polar plots, Bode plot, log magnitude versus phase plots; Gain-margin, Phase-margin, Nyquist stability criterion; Constant-M and constant-N circles; closed loop frequency response from these.

Preliminary considerations of classical design, cascade and feedback compensation, time-domain design using lag, lead and lag lead compensation, frequency domain design using lag.

Text/ReferenceBooks:

1. I.J. Nagrath and M. Gopal: **Control System & Engineering 2nd Ed.:** Wiley Eastern Ltd.,1985.
2. Katsushiko Ogata: **Modern Control Engineering 3rd Ed.**: Printice Hall of India Pvt. Ltd., 2001

Control Systems Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study and controlling action using PID controller and calculate the first overshoot temperature and plot the graph.
2. To study the DC position controller and find out the tachometer gain.

Digital Signal Processing

EC 6.5 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Introduction of Signals, Systems and Signal Processing, Classification of Signals and Systems, Advantages of digital over analog Signal processing, Signal Models - Continuous Time versus Discrete time signals, Periodic and aperiodic Signals, Phasor Signals and Spectra, Energy and Power Signals, System Modeling Concepts, The superposition integral for Fixed and Linear Systems, Impulse Response of a Fixed and Linear System - Fourier Series - Trigonometric Series- Exponential Fourier Series-Symmetry Properties of the Fourier Coefficients. Fourier Integral, Energy Spectral Density, FourierTransforms in the Limit, Fourier Transform Theorems and Pairs, System Analysis with Fourier Transform, Lap lace Transform Theorems, Network Analysis using the Lap lace Transform.

Section B

Discrete Time Signals and Systems - Review of Sampled Data Systems, Time Domain Representations of Discrete Time Signals, Frequency Domain Representation of Discrete Time Signals, Discrete Time Signals obtained by sampling, Discrete Fourier Transform. Z-Transform - Definition and Examples, Inverse Z-Transform, Properties of the Z-Transform, Introduction to Realization of Digital Systems - Block Diagrams and Signal Flow Graphs. Introduction to Realization of an IIR and FIR systems, Discrete Fourier Transforms (DFT) and Fast Fourier Transform (FFT).

Section C

Design of Digital Filters: Introduction to Filters, A comparison of IIR and FIR Digital Filters. Design of IIR Digital Filters –Impulse Invariant Transformation, Bilinear Transformation, Design of Digital Butter worth and Chebyshev Filters. Design of FIR Digital Filters - Windowing and Rectangular Window, Filter Designs using Windows, Frequency Sampling Technique. DSP tools and DSP techniques in various applications.

Text Books:

1. Johnson Johnny R.: **Introduction to Signal Processin:** Prentice-Hall of India, 1998.

2. Oppenheim V. Alan: **Signal & Systems:** Prentice-Hall of India, 1995.
3. Proakis G.John: **Digital Signal Processing:** Prentice-Hall of India, 3rd edition, 2002.

Digital Signal Processing Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

List of Experiments:

1. Write a program in MATLAB to generate the following functions: Unit Impulse, Unit Step, Unit Ramp, Sinusoidal, Exponential, Random signal.
2. Write a program in MATLAB to study the basic operations on the discrete time signals: Amplitude Scaling, Time Shifting, Time Scaling, Folding, addition and multiplication of two signals.
3. Write a program in MATLAB to check for linearity, causality and stability of discrete time system.
4. Write a program in MATLAB to perform Linear Convolution.
5. Write a program in MATLAB to perform Circular Convolution.
6. Write a program in MATLAB to perform the Discrete Fourier transform for the given sequences.
7. Write a program in MATLAB to perform Inverse Discrete Fourier transform for the given sequences.
8. Write a program in MATLAB to design analog Butterworth filter for the given specifications.
9. Write a program in MATLAB to design analog Chebyshev filter for the given specifications.
10. Write a program in MATLAB to find frequency domain response (magnitude and phase response) for the given IIR and FIR systems

Bachelor of Technology

(Electronics and Instrumentation Engineering)

Fifth Semester

Communication Engineering

EI 5.2

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Amplitude Modulation: Amplitude modulation and detection, Generation and detection of DSB-SC, SSB and vestigial side band modulation, carrier acquisition AM transmitters and receivers, super hetrodyne receiver, IF amplifiers, AGC circuits Frequency Division multiplexing

Angle Modulation: Basic definitions Narrow band and wideband frequency modulation, transmission bandwidth of FM Signals, Generation and detection of frequency modulation

Section B

sampling process. Analog Pulse Modulation Systems-Pulse Amplitude Modulation, Quantization process, quantization noise, Pulse code Modulation, Differential Pulse code Modulation, Delta Modulation, Types of digital modulation, waveforms for amplitude, frequency and phase shift keying, methods of generation of coherent and noncoherent, ASK,FSK and PSK, comparison of above digital techniques.

Section C

Time Division Multiplexing: Fundamentals, Electronic Commulator, Bit/byte interleaving, Tl carrier system, synchronization and signaling of Tl, TDM and PCM hierarchy, synchronization techniques

Introduction to Information Theory: Measure of information, Entropy & Information rate, channel capacity, Hartley Shannan law, Huffman coding, shannan Fano coding.

Text Books:

1. Simon Haykin, **"Communication Systems"** John Wiley & Son?; 4th Edition
2. G.Kennedy and B. Davis, **"Electronic Communication Systems"** 4th Edition, Tata McGraw Hill
3. Simon Haykin, **"Digital Communications"** John Wiley & Sons

Reference Books:

1. B.P. Lthi, **"Modern Analog & Digital Communication Systems"** Oxford University Press.
2. Taub & Schilling, **"Communication System: Analog and Digital"** Tata Me Graw Hill
3. R.P.Singh & S.D. Sapre, **"Communication Systems Analog and Digital"** Tata McGraw Hill.

Communication Engineering Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

Experiments List

1. To study and perform Amplitude Modulation & Demodulation (AM).
2. To study and perform Double Sideband Suppressed Carrier Modulation & Demodulation (DSB-SC).
3. To study and perform Frequency Modulation & Demodulation (FM).
4. To study and perform Pulse Amplitude Modulation & Demodulation (PAM).
5. To study and perform Pulse Width Modulation & Demodulation (PWM).
6. To study and perform Pulse Position Modulation & Demodulation (PPM).
7. To study and perform Pulse Code Modulation & Demodulation (PCM).
8. To study Super Heterodyne Receiver.
9. To study Tuned Radio Receiver.

Transducers

EI 5.3 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Role of transducers in Instrumentation - Transducer construction, classification and characteristics, strain gauge sensitivity, Temperature compensation and cancellation Techniques, strain gauge calibration, **Measurement of Pressure-** Pirani gauge, Monometers, Bourdon gauges, Diaphragm, Bellows, Pressure measurement using Electrical type transducers, vacuum gauges, McLeod gauge, Knudsen gauge, Thermocouple gauge, ionization gauge, Differential pressure transmitter-Pneumatic and Electrical types-Calibration of pressure gauges.

Measurement of temperature: Bimetallic thermometer, resistance thermometers, 3-lead and 4-lead arrangement

Section B

Measurement of Thickness, Measurement of Flow- Variable head flow meters orifice plate, Venturi tube, dall tube, flow nozzle, pitot tube, Rota meter, mass flow meter, positive displacement meter, turbine flow meter, electromagnetic flow meter, ultrasonic flow meter, open channel flow measurements, solid flow measurement, flow meters calibration.

Section C

Level measurement: - Gauge glass technique coupled with photo electric readout system – Float type level indication – Different schemes–Level switches - Level measurement using displacer and torque tube–Bubbler

system. Boiler drum level measurement– Differential pressure method – Hydra step systems– Electrical types of level gauges using resistance, capacitance, nuclear radiation and ultrasonic sensors – Level measurement of corrosive fluids.

Electronic Display: principle of LED matrix and alpha numeric displays, gas discharged plasma panels, flat panel CRT, LCD, electro-luminescent and electrophoretic displays.

Text Books:

1. Principles of Industrial Instrumentation, D. Patranabis, Tata McGraw Hill Publishing Co., 2000.
2. Measurement systems: Application and Design, E. O. Doeblin, TMH Publishing Co., 2004
3. Instrument Engineers handbook, edited by B. G. Liptak., Chilton Book Co., 1974.
4. R.K.Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi 1999.
5. Ernest O. Doebelin, Measurement systems application and design international student Edition, Tata McGraw Hill Publishing Co., New Delhi, 1999.
6. A.K.Sawhney, A course in Electrical and Electronic Measurement and Instrumentation – Dhanpat Rai and Sons, New Delhi, 1999.

Transducer Lab

L T P C
0 0 2 1
Max. Marks : 60
(CA : 20 + ESA : 40)

1. Introduction of LabVIEW
2. Application of Arithmetic, Logical and Boolean Operations in LabVIEW.
3. Create a VI for conversion of temperature from Celsius to Fahrenheit.
4. Create a VI to salve an equation using Formula Node.
5. Application of 'For' and 'While' loop.
6. Sum of n natural number using LabVIEW.
7. Create a VI to display any information using case structure.
8. Introduction of array and cluster.
9. Elvis based Experiments
   (a) Component testing
   (b) Potential Divider
   (c) Clipping Circuit

Microprocessors and Microcontrollers

EI 5.5 **L T P C**

3 1 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Objective :

The objective of the Microprocessor and Microcontrollers is to do the students familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules. The student can also understand of 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers. Student able to do any type of industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

Section A

8086/8088 Microprocessor: Pin Assignment, Architecture, Functional Diagram, Register Organization, Memory address space & data organization, Segment registers & Memory segmentation, Dedicated & general use of memory, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams, Interrupts, Bus timings, Demultiplexing. Assembly Language Programming of 8086: Instruction Format, Instruction Set, Data Transfer instructions, Arithmetic instructions, Logical instruction, Shift instructions, Rotate instructions, Flag control instructions, Compare instructions, Jump instructions, Subroutine & the subroutine handling instructions, Loop & loop handling instructions, String instructions.

Section B

Peripheral Devices and Their Interfacing: Introduction, memory and I/O interfacing with 8086, data transfer schemes, programmable peripheral interface (8255), programmable DMA controller (8257), programmable interrupt controller (8259), programmable communication interface (8251), programmable counter/interval timer (8253 and 8254), special purpose interfacing devices, elements and circuits for interfacing. Communication Interface: Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tolls, MDS.

Section C

Introduction to Microcontrollers: Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and

Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming. 8051 Interrupts Communication: Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming. Interfacing & Industrial Applications: Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

TEXT BOOKS:

1. Kenneth J Ayala, **"The 8051 Micro Controller Architecture, Programming and Applications",** Thomson Publishers, 2nd Edition.
2. D.V.Hall, **"Micro Processor and Interfacing"**, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Ajay V. Deshmukh, "Microcontrollers - theory applications", Tata McGraw-Hill Companies-2005.
2. Ray and Bhurchandi. "Advanced Micro Processors", Tata McGraw Hill.
3. Kenneth J. Ayala, "The 8086 Micro Processors Architecture, Programming and Applications", Thomson Publishers, 2005.
4. Microcomputer Systems: The 8086/8086 Family: Architecture, Programming and Design, 2nd ed., Liu & Gibson.

Microprocessors and Microcontrollers Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

Write a program to calculate the addition of 16-bit No.
Write a program to calculate the addition of 32-bit No.
To transfer the content of one memory location to other memory location.
To exchange the content of one memory location to other memory location.
To find out the maximum of N given nos.
To generate the fibonacci series.
To find location of given nos.
To find out the multiplication of two 16 –bit nos.
To find out the minimum of N given

Digital Signal Processing

EI 5.7 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Introduction of Signals, Systems and Signal Processing, Classification of Signals and Systems, Advantages of digital over analog Signal processing, Signal Models - Continuous Time versus Discrete time signals, Periodic and aperiodic Signals, Phasor Signals and Spectra, Energy and Power Signals, System Modeling Concepts, The superposition integral for Fixed and Linear Systems, Impulse Response of a Fixed and Linear System - Fourier Series - Trigonometric Series- Exponential Fourier Series-Symmetry Properties of the Fourier Coefficients. Fourier Integral, Energy Spectral Density, FourierTransforms in the Limit, Fourier Transform Theorems and Pairs, System Analysis with Fourier Transform, Lap lace Transform Theorems, Network Analysis using the Lap lace Transform.

Section B

Discrete Time Signals and Systems - Review of Sampled Data Systems, Time Domain Representations of Discrete Time Signals, Frequency Domain Representation of Discrete Time Signals, Discrete Time Signals obtained by sampling, Discrete Fourier Transform. Z-Transform - Definition and Examples, Inverse Z-Transform, Properties of the Z-Transform, Introduction to Realization of Digital Systems - Block Diagrams and Signal Flow Graphs. Introduction to Realization of an IIR and FIR systems, Discrete Fourier Transforms (DFT) and Fast Fourier Transform (FFT).

Section C

Design of Digital Filters: Introduction to Filters, A comparison of IIR and FIR Digital Filters. Design of IIR Digital Filters –Impulse Invariant Transformation, Bilinear Transformation, Design of Digital Butter worth and Chebyshev Filters. Design of FIR Digital Filters - Windowing and Rectangular Window, Filter Designs using Windows, Frequency Sampling Technique. DSP tools and DSP techniques in various applications.

Text Books:

1. Johnson Johnny R.: **Introduction to Signal Processin:** Prentice-Hall of India, 1998.
2. Oppenheim V. Alan: **Signal & Systems:** Prentice-Hall of India, 1995.

3. Proakis G.John: **Digital Signal Processing:** Prentice-Hall of India, 3rd edition, 2002.

Bachelor of Technology

(Electronics and Instrumentation Engineering)

Sixth Semester

Power Electronics

EI 6.2 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Need of power electronics, Introduction to power electronics devices (static and dynamic characteristics) power diodes, power transistor, power MOSFETS, IGBT, MCT, GTOs, Triac. Thyristor SCR: Operational characteristics, Turn ON methods, switching characteristics, thyristor protection, over voltage protection, over current protection, gate protection, snubber circuit Firing circuits for Thyristors, heating, series and parallel combination of Thyristors.

Section B

Commutation Techniques: Load commutation, resonant- pulse commutation, complementary commutation, impulse commutation, line commutation, Phase controlled rectifier: Principal of phase control, single and three phase converters. Effect of source impedance on the performance of converters, dual converter (ideal and practical) DC choppers: Principle, control strategies, step-up and step-down choppers.

Section C

Inverters: Single-phase voltage source inverters 180 and 120 mode operation; Fourier analysis of single-phase inverter output voltage. Pulse width modulated inverters, Reduction of harmonics in the inverter output, single-phase current source inverters with ideal switch. Cyclo-converters: Step-up and step-down cyclo-converter, Single phase to single-phase cyclo-converters three-phase half wave cyclo-converters.

Text Books:

1. Rashid Muhammad H.: **Power Electronics Circuits, Devices And Applications:** PHI publication, 14th reprint Edition.
2. Bimbhra P.S.: **Power Electronics:** Khanna Publication, 3rd Edition.

Reference:

1. Rama Moorthy: **An Introduction To Thyristors And Their Application:** 2nd Edition, ISBN-81-85336-67-9.

Power Electronics Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study the V-I characteristics of a DIAC.
2. To study the V-I characteristics of a TRIAC.
3. To study the V-I characteristics of a SCR.
4. Micro controller based Problem Assignment.

Biomedical Instrumentation

EI 6.3

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Electrode electrolyte interface, half-cell potential, polarization and non-polarisable electrode, calomel electrode, needle and wire electrode, microelectrode-metal micropipette Ag/AgCl electrodes Microelectrodes, skin surface electrode, and lead for EG, ECG, EMG Transducer for biomedical applications, factors governing the selection of transducer pressure temperature, flow, biomedical ultrasonic transducer.

Section B

Low-Noise preamplifier, main amplifier and driver amplifier, inkjet recorder, thermal array recorder, photographic recorder, magnetic tape recorder, X-Y recorder, medical oscilloscope pH, PO^2, PCO2, pHCO3, Electrophoresis, colorimeter, spectro photometer, flame photometer, auto analyzer.

Section C

Respiration, heart rate, temperature, pulse blood pressure, cardiac output O2, CO2 measurements. Measurement of blood pressure, blood flow, and heart sound, cardiograph: Phonocardiography, vector cardiograph, Echocardiography pacemaker. defibrillators, Ventilator, Computer patient monitoring system.

Text Book:

1. Leslie Cromwell: “Biomedical Instrumentation and measurement”. Prentice hall of India, New Delhi, 1997.

References :

2. John G. Webster, "Medical Instrumentation Application and Design", John Wiley and sons, New York, 1998.
3. Khandpur R.S, "Handbook of Biomedical Instrumentation", Tata McGraw-Hill, New Delhi, 1997.
4. Joseph J.carr and John M. Brown, **"Introduction to Biomedical equipment Technology"** John Wiley and sons. New York, 1970.

Control Systems

EI 6.4

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Open loop and closed loop systems, servomechanism, mathematical model of systems, differential equations and transfer functions, Block diagram algebra, signal flow graphs; +ve and -ve feedback effects of feedback, servo- components, DC and AC servomotors, Techogenerators, synchors, stepper motor, op-amp, potentiometer as an error detector; comparison of AC and DC servomechanism.

Section B

Standard test signals, time response of first and second order systems, steady state errors and error constants, Design specifications of second order systems, effects of derivative and integral error compensation, PID controller, Design considerations for higher order systems in brief, performance indices.

Concept of stability, necessary conditions for stability, Routh Hurwitz stability criterion, relative stability criterion, relative stability in terms of Routh Hurwitz criterion; Root-locus technique.

Section C

Correlation between time and frequency response specifications; Frequency domain plots, polar plots, Bode plot, log magnitude versus phase plots; Gain-margin, Phase-margin, Nyquist stability criterion; Constant-M and constant-N circles; closed loop frequency response from these.

Preliminary considerations of classical design, cascade and feedback compensation, time-domain design using lag, lead and lag lead compensation, frequency domain design using lag.

Text/ReferenceBooks:

1. I.J. Nagrath and M. Gopal: **Control System & Engineering 2nd Ed.:** Wiley Eastern Ltd.,1985.
2. Katsushiko Ogata: **Modern Control Engineering 3rd Ed.**: Printice Hall of India Pvt. Ltd., 2001

Control Systems Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study and controlling action using PID controller and calculate the first overshoot temperature and plot the graph.
2. To study the DC position controller and find out the tachometer gain.

Fiber Optics and Laser Instrumentation

EI 6.5

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Fiber optical waveguides, different types of fibers and their properties, Dispersion, losses optical fiber connectors, measurement of fiber characteristics: attenuation, dispersion' refractive index profile, optical time domain reflectometer. Light emitting diode: radiative recombination, LED materials, constructions & response time. Junction detectors: p-n and p-i-n photodiode, response times, APD.

Section B

LASER: Emission and absorption of radiation, Einstein relation, Absorption of radiation, Population inversion, Optical feedback, Threshold conditions, line shape functions, laser modes, Class of lasers:, solid state, semiconductors, gas & liquid laser. Single'mode operation, Q-switching & mode locking. Laser for measurement of distance and velocity.

Section C

Fibre optic sensors: measurement of length, displacement, pressure, temperature, current voltage, liquid level, fiber optic gyroscope. Holography: basic principle and applications, Laser in material processing:

interaction of high-power laser beams with materials, laser welding, cutting, hole drilling and trimming of materials.

Text Books:

1. Wilson & Hawkes: Opto Electronics, an introduction. III edition, PHI Publication
2. James T. Luxon, David E. Parker, Industrial lasers and their applications, Prentice- Hall International.

Reference Books:

1. John M. Senior: Optical Fiber Communication, III edition, PHI Publication.
2. John F Read, Industrial applications of lasers, Academic Press, 1978.

Fiber Optics and Laser Instrumentation Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study up a fiber optics analog and digital link.
2. To study the losses in fiber optics
3. To study numerical aperture of optical fiber
4. To study the characteristics a optical fiber and LED
5. To study V I Characteristics of photo detector.
6. To study operation of Optical power meter.
7. Fiber Optic Temperature Sensor.
8. Micro bending / pressure sensor
9. Optical Time-Domain Reflectometry (OTDR)
10. Characterization of LASER.

Law View Lab

EI 6.6

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

Exercise 1 - Examine the Signal Generation and Processing VI and run it.
Exercise 2 - Complete the following steps to create a VI that takes a number representing. degrees Celsius and converts it to a number representing degrees Fahrenheit.
Exercise 3 - Understanding of Sub VI.

Exercise 4 - Complete the following steps to build a VI that uses the Formula Node to perform a complex mathematical operation and graphs the results.

Exercise 5 - To use a While Loop and a waveform chart to acquire and display data.

Exercise 6 - Use shift registers on For Loops and While Loops to transfer values from one loop interation to the next.

Exercise 7 - Understanding of using waveform graphs.

Exercise 8 - Understanding of Error clusters.

Exercise 9 - Create a VI using state machine architecture that simulates a simple test sequence.

Exercise 10 - To use the Format into String, concatenate Strings, and String Length functions.

Exercise 11 - Temperature Data Acquisition (DAQ) and display.

Virtual Instrumentation

EI 6.7 **L T P C**

4 0 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Virtual Instrumentation: Historical perspectives, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, and comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems. Embedded Controller, OPC, HMI / SCADA software, Active X programming.

VI programming techniques: VIS and sub-VIS, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

Section B

Data acquisition basics: Introduction to data acquisition on PC, Sampling fundamentals, Input/ Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.

VI Chassis requirements. Common Instrument Interfaces: Current loop RS 232C/ RS485, GPIB.

Section C

Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI.

Networking basics for office & Industrial applications, VISA and IVI.

VI toolsets. Distributed I/O modules. Application of Virtual Instrumentation: Instrument Control, Development of process database management system.

Simulation of systems using VI, Development of Control system. Industrial Communication, Image acquisition and processing. Motion control.

TEXT BOOKS:

1. Gary Johnsongv, Lab VIEW Graphical Programming, 2nd edition, McGraw Hill, Newyork, 1997.
2. Lisa K. wells & Jeffrey Travis, Lab VIEW for everyone, Prentice Hall, New Jersey, 1997.

REFERENCES:

1. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.

Bachelor of Technology
(Electrical and Electronics Engineering)
Fifth Semester
Electrical Machines-I

EE 5.2 **L T P C**
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Principles of Electro-mechanical Energy Conversion*:* Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems(defining energy & Co-energy), ***Singly Excited Systems:*** determination of mechanical force, mechanical energy, torque equation, ***Doubly excited Systems:*** Energy stored in magnetic field, electromagnetic torque, Generated emf in machines; torque in machines with cylindrical air gap.

Section B

D.C. Machines*:* Construction of DC Machines, Armature winding, Emf and torque equation, Armature Reaction, Commutation, Interpoles and Compensating Windings, Performance Characteristics of D.C. generators. Performance Characteristics of D.C. motors ,Starting of D.C. motors; 3 point and 4 point starters, Speed control of D.C. motors: Field Control, armature control and Voltage Control (Ward Lenonard method); Efficiency and Testing of D.C. machines (Hopkinson's and Swinburn's Test).

Section C

Single Phase Transformer*:* Phasor diagram, efficiency and voltage regulation, all day efficiency. Testing of Transformers**:** O.C. and S.C. tests, Sumpner;s test, polarity test. ***Auto Transformer:*** Single phase Auto-transformer, Volt-amp relation, efficiency, Conversion of a two-winding Transformer to an Auto transformer, Saving in conductor material, Advantages, disadvantages and applications of autotransformers.

Three Phase Transformers*:* Three phase transformer Construction, Three – phase unit transformer and Bank of three single phase transformers with their advantages, Three-phase transformer Groups (Phasor groups) and their connections, Y-△connection, Open delta connection, Three-phase/ 2 phase Scott connection and it's application. Sumpner's test, All day efficiency, polarity test Excitation Phenomenon in Transformers, Harmonics in Single phase and 3-phase transformers , Parallel operation and load sharing of Single phase and three phase transformers, Three winding transformers, Tertiary winding

Text Books:

1. I.J. Nagrath & D.P.Kothari," Electrical Machines", Tata McGraw Hill

2. Husain Ashfaq ," Electrical Machines", Dhanpat Rai & Sons
3. A.E. Fitggerald, C.Kingsley Jr and Umans,"Electric Machinery" 6th Edition McGraw Hill, International Student Edition.
4. B.R. Gupta & Vandana Singhal, "Fundamentals of Electrical Machines, New Age International.

Reference Books:

1. Irving L.Kosow, "Electric Machine and Tranformers" Prentice Hall of India.
2. M.G. Say, "The Performance and Design of AC machines", Pit man & Sons.
3. Bhag S. Guru and Huseyin R. Hizirogulu, "Electric Machinery and Transformers" Oxford University Press, 2001.

Electrical Machine - I Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1) Determination of Power factor.
2) Short circuit and open circuit test of transformer.
3) Parallel operation of two single phase transformer.
4) Safety demonstration.
5) To study house wiring system.
6) Speed control of series DC motor.
7) Speed control of DC separately excited motor.
8) To study Compound motor-generator set.

Elements of Power System

EE 5.3

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Power System Components: Single line Diagram of Power system, Brief description of power system elements, Synchronous machine, transformer, transmission line, bus bar, circuit breaker and isolator. ***Supply System:*** Different kinds of supply system and their comparison, choice of transmission voltage. ***Transmission Lines:*** Configurations, types of conductors, resistance of line, skin effect, Kelvin's law, Proximity effect. ***Over Head Transmission Lines:*** Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission

lines, Representation and performance of short, medium and long transmission lines, Ferranti effect. Surge impedance loading

Section B

Corona and Interference: Phenomenon of corona, corona formation, calculation of potential gradient, corona loss, factors affecting corona, methods of reducing corona and interference. Electrostatic and electromagnetic interference with communication lines. ***Overhead line Insulators:*** Type of insulators and their applications, potential distribution over a string of insulators, methods of equalizing the potential, string efficiency. Mechanical ***Design of transmission line:*** Catenary curve, calculation of sag & tension, effects of wind and ice loading, sag template, vibration dampers. Insulated cables: Type of cables and their construction, dielectric stress, grading of cables, insulation resistance, capacitance of single phase and three phase cables, dielectric loss, heating of cables

Section C

Neutral grounding: Necessity of neutral grounding, various methods of neutral grounding, earthing transformer, grounding practices. ***Electrical Design of Transmission Line:*** Design consideration of EHV transmission lines, choice of voltage, number of circuits, conductor configuration, insulation design, selection of ground wires. ***EHV AC and HVDC Transmission:*** Introduction to EHV AC and HVDC transmission and their comparison, use of bundle conductors, kinds of DC links, and incorporation of HVDC into AC system.

Text Books:

1. W.D. Stevenson, “Element of Power System Analysis” McGraw Hill, USA
2. C. L. Wadhwa, “Electrical Power Systems” New age international Ltd. Third Edition
3. Asfaq Hussain, “‘Power System”, CBS Publishers and Distributors, India
4. B. R. Gupta, “Power System Analysis and Design” Third Edition, S. Chand & Co.
5. M. V. Deshpande, “Electrical Power System Design” Tata Mc Graw Hill.

Reference Books

1. M. V. Deshpandey, “Elements of Power System Design”, Tata McGraw Hill, India
2. Soni, Gupta & Bhatnagar, “A Course in Electrical Power”, Dhanpat Rai & Sons, India
3. S. L. Uppal, “Electric Power”, Khanna Publishers, India
4. S.N.Singh, “ Electric Power Generation, Transmission & distribution.” PHI, New Delhi

Elements of Power Systems Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. Acquaintance With Matlab.
2. Various Matrix Operations Using Matlab.
3. Study of Various Plot Commands In Matlab.
4. Study of Logical Operations And Loop Statements In Matlab.
5. Transient Analysis of Series RC Circuit.
6. Transient Analysis of Series RL Circuit.
7. Introduction of Simulink In Matlab.
8. Generation of Besic Signals (Impulse,Step,Ramp etc.) Using Simulink.

Network Analysis

EE 5.4

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Graph Theory : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Nodal methods of analysis.

Section B

Network Theorems (Applications to ac networks): Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

Network Functions : Concept of Complex frequency, Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot.

Section C

Two Port Networks: Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & Representation.

Text Books:

1. M.E. Van Valkenburg, "Network Analysis", Prentice Hall of India
2. A.Chakrabarti, "Circuit Theory" Dhanpat Rai & Co.

3. C.L Wadhwa, “Network Analysis and Synthesis” New Age International Publishers, 2007.
4. D.Roy Choudhary, “Networks and Systems” Wiley Eastern Ltd.
5. Donald E. Scott: “An Introduction to Circuit analysis: A System Approach” McGraw Hill

Reference Books:

1. M.E. Van Valkenburg, “An Introduction to Modern Network Synthesis”, Wiley Eastern Ltd.
2. N.C. Jagan and C. Lakshminarayana, “Newwork Analysis” B.S. Publications, 2008.
3. K.S. Suresh Kumar, “Electric Circuits and Networks” Pearson Education, 2009.
4. A Ramakalyan, “Linear Circuits: Analysis and Synthesis” Oxford University Press, 2005.

Network Analysis Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To verify the Kirchhoff's Current law.
2. To verify the Kirchhoff's Voltage law.
3. To verify the Superposition theorem.
4. To verify the Thevenin's theorem.
5. To verify the Norton's theorem.
6. To verify the Reciprocity theorem.
7. To verify the Maximum Power transfer theorem.
8. To Study Y-parameters using - network.
9. To Study Y-parameters using T- network.

Power Electronics

EE 5.5

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Need of power electronics, Introduction to power electronics devices (static and dynamic characteristics) power diodes, power transistor, power MOSFETS, IGBT, MCT, GTOs, Triac. Thyristor SCR: Operational characteristics, Turn ON methods, switching characteristics, thyristor protection, over voltage protection, over current protection, gate

protection, snubber circuit Firing circuits for Thyristors, heating, series and parallel combination of Thyristors.

Section B

Commutation Techniques: Load commutation, resonant- pulse commutation, complementary commutation, impulse commutation, line commutation, Phase controlled rectifier: Principal of phase control, single and three phase converters. Effect of source impedance on the performance of converters, dual converter (ideal and practical) DC choppers: Principle, control strategies, step-up and step-down choppers.

Section C

Inverters: Single-phase voltage source inverters 180 and 120 mode operation; Fourier analysis of single-phase inverter output voltage. Pulse width modulated inverters, Reduction of harmonics in the inverter output, single-phase current source inverters with ideal switch. Cyclo-converters: Step-up and step-down cyclo-converter, Single phase to single-phase cyclo-converters three-phase half wave cyclo-converters.

Text Books:

1. Rashid Muhammad H.: **Power Electronics Circuits, Devices And Applications:** PHI publication, 14th reprint Edition.
2. Bimbhra P.S.: **Power Electronics:** Khanna Publication, 3rd Edition.

Reference:

1. Rama Moorthy: **An Introduction To Thyristors And Their Application:** 2nd Edition, ISBN-81-85336-67-9.

Power Electronics Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study the V-I characteristics of a DIAC.
2. To study the V-I characteristics of a TRIAC.
3. To study the V-I characteristics of a SCR.
4. Micro controller based Problem Assignment.

Analog Integrated Circuits

EE 5.6

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Feedback Amplifiers : Classifications of amplifiers, general feedback structure, properties of negative feedback, feedback topologies, Transfer gain with feedback, General Characteristics of negative feedback amplifiers, input resistance, output resistance. Method of analysis, voltage series and current series feedback, current shunt and voltage shunt feedback.

Power amplifiers : Cassification, operation, analysis and design of Class A, Class B, Class-AB, Class C, power dissipation and efficiency calculations, amplifier distortion.

Section B

High Frequency Amplifiers : Hybrid-pi CE transistor model, Hybrid-pi Conductance, Hybrid-pi Capacitances, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, gain-bandwidth product, **Multistage Amplifiers :** frequency response, Effect of Cascading on bandwidth, RC Coupled amplifier, Low frequency response of an RC coupled stage, Effect of emitter bypass capacitor, High frequency response of two cascaded CE transistor stages, Multistage CE amplifier cascaded at high frequencies.

Section C

Operational amplifier & its Applications : BJT Differential Amplifier : DC and AC analysis, transfer characteristics, differential and common modes gain. ideal op-amp, inverting and non-inverting amplifier, offset voltage, offset currnent, bias current, slew rate, CMMR, design of Integrator and differentiator, summing amplifiers, differential and instrumentation amplifiers, Active filters, OP-AMP RC Oscillator circuits : Wien-Bridge, Phase-Shift, Precision rectifier, comparator, Schmitt trigger, 555 IC timer.

Text Books:

1. Millman and Halkias : Integrated electronics, TMH, 1991.
2. Boylestad, Nashelshy, **Electronic Devices and Circuit Theory,** Pearson publication, Tenth Edition, 2009.
3. Gayakwad Ramakant A., "OP-AMP & Linear Integrated circuits", New Delhi (Prentice Hall) fourth Edition 2010.

Reference Book :

1. Adel Sedra & Kenneth Smith, **MICROELECTRONIC CIRCUITS Theory and applications" FIFTH edition International version :** Oxford University Press, 2009.

Analog Integrated Circuit Lab

L T P C
0 0 2 1
Max. Marks : 15

(CA : 5 + ESA : 10)

1. To design the Astable Multivibrator using 555
2. To design the Monostable Multivibrator using 555
3. To design summer using 741 IC
4. To design Intergrator using 741 IC
5. To design Schmitt Trigger using 741/555 IC
6. To design Differentiator using 741 IC
7. To design peak detector using 741 IC
8. To design scalar using 741 IC
9. To study active filters : LPF, HPF, BPF.
10. To design Voltage to frequency converter.
11. To study phase locked loop.
12. To study frequency shift keying using PLL 565.

Sixth Semester

Communication Engineering

EE 6.2 **L T P C**

3 1 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Section A

Amplitude Modulation: Amplitude modulation and detection, Generation and detection of DSB-SC, SSB and vestigial side band modulation, carrier acquisition AM transmitters and receivers, super hetrodyne receiver, IF amplifiers, AGC circuits Frequency Division multiplexing

Angle Modulation: Basic definitions Narrow band and wideband frequency modulation, transmission bandwidth of FM Signals, Generation and detection of frequency modulation

Section B

sampling process. Analog Pulse Modulation Systems-Pulse Amplitude Modulation, Quantization process, quantization noise, Pulse code Modulation, Differential Pulse code Modulation, Delta Modulation, Types of digital modulation, waveforms for amplitude, frequency and phase shift keying, methods of generation of coherent and noncoherent, ASK,FSK and PSK, comparison of above digital techniques.

Section C

Time Division Multiplexing: Fundamentals, Electronic Commulator, Bit/byte interleaving, Tl carrier system, synchronization and signaling of Tl, TDM and PCM hierarchy, synchronization techniques

Introduction to Information Theory: Measure of information, Entropy & Information rate, channel capacity, Hartley Shannan law, Huffman coding, shannan Fano coding.

Text Books:

1. Simon Haykin, **"Communication Systems"** John Wiley & Son?; 4th Edition
2. G.Kennedy and B. Davis, **"Electronic Communication Systems"** 4th Edition, Tata McGraw Hill
3. Simon Haykin, **"Digital Communications"** John Wiley & Sons

Reference Books:

1. B.P. Lthi, **"Modern Analog & Digital Communication Systems"** Oxford University Press.
2. Taub & Schilling, **"Communication System: Analog and Digital"** Tata Me Graw Hill
3. R.P.Singh & S.D. Sapre, **"Communication Systems Analog and Digital"** Tata McGraw Hill.

Electrical Machine-II

EE 6.3

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section-A

Synchronous Machine I: Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage Regulation using Synchronous Impedance Method, MMF Method, Potier's Triangle Method, Parallel Operation of synchronous generators, operation on infinite bus, synchronizing power and torque co-efficient ***Synchronous Machine II:*** Two Reaction Theory, Power flow equations of cylindrical and salient pole machines, operating characteristics ***Synchronous Motor:*** Starting methods, Effect of varying field current at different loads, V- Curves, Hunting & damping, synchronous condenser

Section-B

Three phase Induction Machine – I: Constructional features, Rotating magnetic field, Principle of operation Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, no load & blocked rotor tests, efficiency, Induction generator & its applications. ***Three phase Induction Machine- II:*** Starting, Deep bar and double cage

rotors, Cogging & Crawling, Speed Control (with and without emf injection in rotor circuit.)

Section-C

Single phase Induction Motor: Double revolving field theory, Equivalent circuit, No load and blocked rotor tests, Starting methods, repulsion motor

AC Commutator Motors: Universal motor, Single phase a.c. series compensated motor, stepper motors

Text Books:

1. D.P.Kothari & I.J.Nagrath, "Electric Machines", Tata Mc Graw Hill
2. Ashfaq Hussain"Electric Machines" Dhanpat Rai & Company
3. Fitzerald,A.E.,Kingsley and S.D.Umans"Electric Machinery", MC Graw Hill

Reference Books:

1. P.S.Bimbhra, "Electrical Machinery", Khanna Publisher
2. P.S. Bimbhra, " Generalized Theory of Electrical Machines", Khanna Publishers
3. M.G.Say, "Alternating Current Machines",Pitman & Sons

Electrical Machine - II Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. Perform no load test in a single phase induction motor..
2. Obtain the losses and efficiency of DC shunt machine by Hopkinson's test.
3. Obtain the efficiency and losses of DC machine by Swinburne's test.
4. Perform load test of single phase IM.
5. To perform Sumpners test of single phase transformer.
6. Study of cut section model of single and three phase Induction motor.
7. Speed control of compound DC motor.
8. To study motor-generator set.

Power System Analysis

EE 6.4

L T P C
4 0 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Representation of Power System Components: Synchronous machines, Transformers, Transmission lines, One line diagram, Impedance and reactance diagram, per unit System. ***Symmetrical components:*** Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks. ***Symmetrical fault analysis:*** Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions.

Section B

Unsymmetrical faults: Analysis of single line to ground fault, lineto-line fault and Double Line to ground fault on an unloaded generators and power system network with and without fault impedance. Formation of Zbus using singular transformation and algorithm, computer method for short circuit calculations. ***Load Flows:*** Introduction, bus classifications, nodal admittance matrix *(YBUS),* development of load flow equations, load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R method, line flow equations and fast decoupled method.

Section C

Power System Stability: Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method. Factors affecting steady state and transient stability and methods of improvement. ***Traveling Waves:*** Wave equation for uniform Transmission lines, velocity of propagation, surge impedance, reflection and transmission of traveling waves under different line loadings. Bewlay's lattice diagram, protection of equipments and line against traveling waves.

Text Books:

1. W.D. Stevenson, Jr. " Elements of Power System Analysis", Mc Graw Hill.
2. C.L. Wadhwa, "Electrical Power System", New Age International.
3. Kothari & Nagrath, "Modern Power System Analysis", Tata Mc Graw Hill.

4. Chakraborthy, Soni,Gupta & Bhatnagar, “Power System Engineering”, Dhanpat Rai & Co.
5. Stagg and El-Abiad, “Computer Methods in Power System Analysis” Tata Mc Graw Hill

Reference Books:

1. L. P. Singh; “Advanced Power System Analysis & Dynamics”, New Age International
2. Hadi Sadat; “Power System Analysis”, Tata McGraw Hill.
3. A. R. Bergen and V. Vittal; “Power System Analysis”, Pearson Publication.

Power System Analysis Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. Various Waveforms Analysis of Diode Connected 1 Phase M1 Converter Using R,RL,RLE Load Using Simulink.
2. Various Waveforms Analysis of Diode Connected B2 Converter Using R,RL,RLE Load Using Simulink.
3. Transient & Steady State Waveform Analysis of Series RC Circuit Using Simulink.
4. Transient & Steady State Waveform Analysis of Series RL Circuit Using Simulink.
5. Formation of Bus Admittance Matrix.
6. Formation of Bus Impedance Matrix.
7. Calculation of Vs,Vr, Line Loses and Power Factor of Short Transmission Line.
8. Calculation of Vs,Vr, Line Losses and Power Factor of Mediam Transmission Line.
9. Newton Raphson Analysis of Load Flow Solution.
10. Guess Siedal Analysis of Load Flow Solution.

Control Systems

EE 6.5

L T P C
3 1 0 4
Max. Marks : 60
(CA : 20 + ESA : 40)

Section A

Open loop and closed loop systems, servomechanism, mathematical model of systems, differential equations and transfer functions, Block diagram algebra, signal flow graphs; +ve and -ve feedback effects of feedback, servo- components, DC and AC servomotors, Techogenerators, synchors, stepper motor, op-amp, potentiometer as an error detector; comparison of AC and DC servomechanism.

Section B

Standard test signals, time response of first and second order systems, steady state errors and error constants, Design specifications of second order systems, effects of derivative and integral error compensation, PID controller, Design considerations for higher order systems in brief, performance indices.

Concept of stability, necessary conditions for stability, Routh Hurwitz stability criterion, relative stability criterion, relative stability in terms of Routh Hurwitz criterion; Root-locus technique.

Section C

Correlation between time and frequency response specifications; Frequency domain plots, polar plots, Bode plot, log magnitude versus phase plots; Gain-margin, Phase-margin, Nyquist stability criterion; Constant-M and constant-N circles; closed loop frequency response from these.

Preliminary considerations of classical design, cascade and feedback compensation, time-domain design using lag, lead and lag lead compensa- tion, frequency domain design using lag.

Text/ReferenceBooks:

1. I.J. Nagrath and M. Gopal: **Control System & Engineering 2nd Ed.:** Wiley Eastern Ltd.,1985.
2. Katsushiko Ogata: **Modern Control Engineering 3rd Ed.**: Printice Hall of India Pvt. Ltd., 2001

Control Systems Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. To study and controlling action using PID controller and calculate the first overshoot temperature and plot the graph.
2. To study the DC position controller and find out the tachometer gain.

Microprocessors and Microcontrollers

EE 6.6 **L T P C**

3 1 0 4

Max. Marks : 60

(CA : 20 + ESA : 40)

Objective :

The objective of the Microprocessor and Microcontrollers is to do the students familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules. The student can also understand of 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers. Student able to do any type of industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

Section A

8086/8088 Microprocessor: Pin Assignment, Architecture, Functional Diagram, Register Organization, Memory address space & data organization, Segment registers & Memory segmentation, Dedicated & general use of memory, Addressing modes, Instructions, Functional schematic, Minimum and Maximum mode operations of 8086, 8086 Control signal interfacing, Timing Diagrams, Interrupts, Bus timings, Demultiplexing. Assembly Language Programming of 8086: Instruction Format, Instruction Set, Data Transfer instructions, Arithmetic instructions, Logical instruction, Shift instructions, Rotate instructions, Flag control instructions, Compare instructions, Jump instructions, Subroutine & the subroutine handling instructions, Loop & loop handling instructions, String instructions.

Section B

Peripheral Devices and Their Interfacing: Introduction, memory and I/O interfacing with 8086, data transfer schemes, programmable peripheral interface (8255), programmable DMA controller (8257), programmable interrupt controller (8259), programmable communication interface (8251), programmable counter/interval timer (8253 and 8254), special purpose interfacing devices, elements and circuits for interfacing. Communication Interface: Serial Communication Standards, USART Interfacing RS-232, IEEE-488, 20mA Current Loop, Prototyping and Trouble shooting, Software Debugging tolls, MDS.

Section C

Introduction to Microcontrollers: Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and

Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming. 8051 Interrupts Communication: Interrupts, Timer/Counter and Serial Communication, Programming Timer Interrupts, Programming External H/W interrupts, Programming the serial communication interrupts, Interrupt Priority in the 8051, Programming 8051 Timers, Counters and Programming. Interfacing & Industrial Applications: Applications of Micro Controllers, Interfacing 8051 to LED's, Push button, Relay's and Latch Connections, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing.

TEXT BOOKS:

1. Kenneth J Ayala, **"The 8051 Micro Controller Architecture, Programming and Applications",** Thomson Publishers, 2nd Edition.
2. D.V.Hall, **"Micro Processor and Interfacing"**, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Ajay V. Deshmukh, "Microcontrollers - theory applications", Tata McGraw-Hill Companies-2005.
2. Ray and Bhurchandi. "Advanced Micro Processors", Tata McGraw Hill.
3. Kenneth J. Ayala, "The 8086 Micro Processors Architecture, Programming and Applications", Thomson Publishers, 2005.
4. Microcomputer Systems: The 8086/8086 Family: Architecture, Programming and Design, 2nd ed., Liu & Gibson.

Microprocessors and Microcontrollers Lab

L T P C
0 0 2 1
Max. Marks : 15
(CA : 5 + ESA : 10)

1. Write a program to calculate the addition of 16-bit No.
2. Write a program to calculate the addition of 32-bit No.
3. To transfer the content of one memory location to other memory location.
4. To exchange the content of one memory location to other memory location.
5. To find out the maximum of N given nos.
6. To generate the fibonacci series.
7. To find location of given nos.
8. To find out the multiplication of two 16 –bit nos.
9. To find out the minimum of N given

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