

2018.2.20

विश्वविद्यालय के आगामी शैक्षणिक सत्र 2018-19 हेतु विभिन्न विभागों द्वारा परास्नातक पाठ्यक्रमों में किये गये संशोधनों (परास्नातक पाठ्यक्रमों में कोई नया विषय आरम्भ किया जाना है, किसी विषय के **Credit Structure** में कोई संशोधन किया जाना है अथवा किसी विषय के पाठ्यक्रम में संशोधन) पर विचार एवं अनुमोदन।

विश्वविद्यालय के आगामी शैक्षणिक सत्र 2018-19 हेतु विभिन्न विभागों द्वारा परास्नातक पाठ्यक्रमों में किये गये संशोधनों यथा नया विषय आरम्भ किया जाना, किसी विषय के Credit Structure में कोई संशोधन अथवा किसी विषय के पाठ्यक्रम में किये गये संशोधन विद्या परिषद के माननीय सदस्यों के अवलोकनार्थ पृष्ठ संख्या 349 से पृष्ठ संख्या 482 पर प्रस्तुत है:-

विभाग	पाठ्यक्रम	प्रभावी होने का सत्र
जनपदीय अभियंत्रण विभाग	एम0टेक0	2018-19
कम्प्यूटर साइंस एण्ड इंजी0	एम0टेक0	2018-19
	एम0सी0ए0	2018-19
विद्युत अभि0 विभाग	एम0टेक0	2018-19
विद्युतकण एवं संचार अभि0	एम0टेक0	2018-19
यांत्रिक अभियंत्रण	एम0टेक0	2018-19

विद्या परिषद के माननीय सदस्यों से अनुरोध है कि कृपया उक्त का अनुमोदन प्रदान करने की कृपा करें।



**MADAN MOHAN MALAVIYA UNIVERSITY OF
TECHNOLOGY,
GORAKHPUR – 273 010 (UP) INDIA**
(formerly M. M. M. Engineering College, Gorakhpur)
ELECTRICAL ENGINEERING DEPARTMENT

Minutes of Meeting of Members of Board of Studies (BOS) held on 19.05.2018 at 11.00 A.M. in the Office of Head, Electrical Engineering Department

Following members were present:

1.	Prof. S.K. Srivastava	Chairman
2.	Prof. K. G. Upadhyay	Internal Member
3.	Sri K.P. Singh	Internal Member
4.	Prof. A.K. Pandey	Internal Member
5.	Dr. Prabhakar Tiwari	Internal Member
6.	Dr. L.B. Prasad	Internal Member
7.	Dr. Awadhesh Kumar	Internal Member
8.	Dr. Navdeep Singh	Internal Member
9.	Sri Shekhar Yadav	Internal Member
10.	Prof. K. S. Verma	External Member
11.	Er. Ajay Kumar	External Member

Prof. G.K. Singh (External Member), Er. Himanshu Sharma (External Member), Prof. A.N. Tiwari (Internal Member), Sri K.B. Sahay (Internal Member) could not attend the meeting.
The following decisions have been taken:

1. The syllabus of both M. Tech. course programs (PED & CI) were discussed, restructured and modified.
2. **MEE-103 Power Converter-I** is renamed as "**Introduction to Power Converters**" with revised syllabus (enclosed) in M.Tech- 1st year Power Electronics & Drives (First semester) and M.Tech 1st year Control & Instrumentation (First semester) as a common subject with objective to provide basic fundamental knowledge of Power Electronics to students w.e.f. session 2018-19 batch.
3. **MEE-105 Power converter-II** is renamed as "**Advance Power Converters**" with revised syllabus (enclosed), for M.Tech-1st year Power Electronics & Drives in second semester w.e.f. session 2018-19 batch.
4. **MEE-202, Optimal Control** subject for M.Tech-1st year Control & Instrumentation has been shifted from 1st semester to 3rd semester as program core subject in place of one program elective and it will be effective from session 2019-2020.
5. **MEE-160, Electric Power Quality** subject will be for M.Tech Power Electronics & Drives students as a program core subject in place of one program elective in 3rd semester w.e.f session 2019-2020.

Handwritten signatures and initials are present at the bottom of the page, including 'ATF', 'Yadav', 'K. S. Verma', 'Sri K.P. Singh', 'Prof. A.K. Pandey', 'Dr. Prabhakar Tiwari', 'Dr. L.B. Prasad', 'Dr. Awadhesh Kumar', 'Dr. Navdeep Singh', 'Sri Shekhar Yadav', 'Prof. K. S. Verma', and 'Er. Ajay Kumar'. There is also a date stamp '19/5/18' at the bottom right.

6. **MEE-151, Power System Planning & Optimization** is renamed as **Power System Planning & Restructuring** with revised syllabus as program elective for both specializations of M. Tech programs.
7. **MEE-152, Power Semiconductor Controlled Drives** is renamed as "**Power Semiconductor Controlled Industrial drives**" in view of industrial need-based applications subject as a program elective for Power Electronics & Drive students.
8. In 3rd semester of both M.Tech programs, one program elective has been reduced instead of two program electives w.e.f. session 2019-2020 batch.

Meeting ended with Vote of thanks to the Chair.



(Shekhar Yadav)


(Navdeep Singh)


(Awadhesh Kumar)


(A. K. Pandey)


(Prabhakar Tiwari)


(L. B. Prasad) 19.05.2018


(K. P Singh)


(K.G. Upadhyay)


(Ajay Kumar)


(K.S Verma) 19/5/18


(S.K. Srivastava) 19/5/18

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ELECTRICAL ENGINEERING DEPARTMENT
M. M. M. UNIVERSITY OF TECHNOLOGY GORAKHPUR

Credit Structure for M.Tech. (Power Electronics & Drives)
(from Session 2018-2019)

Sub Category \ Semester	I	II	III	IV	Total Credits
Maths (M)	5	-	-	-	5
Programme Core (PC)	14	9	4	-	27
Programme Electives (PE)	-	8	4	-	12
Minor Project (MP)	-	-	4	-	4
Dissertation (D)			4	14	18
Seminar (S)	-	-	-	2	2
Total Credits	19	17	16	16	68

Curriculum for M.Tech. (Power Electronics & Drives)

Junior Year, Semester-I

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	M	MAS-101	Numerical Methods & Engineering Optimization	3	1	2	5
2	PC	MEE-101	Advance Microprocessor & Applications	3	1	2	5
3	PC	MEE-102	Electric Drives & Traction	3	1	0	4
4	PC	MEE-103	Introduction to Power Converters	3	1	2	5
5	AC		Audit Subject				-
Total				12	4	6	19

Junior Year, Semester-II

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	PC	MEE-104	Modeling, Simulation & Evolutionary Techniques	3	1	2	5
2	PC	MEE-105	Advance Power Converters	3	1	0	4
3	PE1		Program Elective-1	3	1	0	4
4	PE2		Programme Electives-2	3	1	0	4
5	AC		Audit Subject				
Total				12	4	2	17

Senior Year, Semester-III

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	PC	MEE-160	Electric Power Quality	3	1	0	4
2	PE3		Programme Electives-3	3	1	0	4
3	MP	MEE-120	Minor Project	0	0	8	4
4	D	MEE-130	Dissertation Part-I	0	0	8	4
Total				6	2	16	16

Senior Year, Semester-IV

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	S	MEE-140	Seminar	0	0	4	2
2	D	MEE-150	Dissertation Part-II	0	0	28	14
Total				0	0	32	16


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Program Core for M. Tech. (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MAS-101	Numerical Methods & Engineering Optimization	-	3	1	0	4
2.	MEE-101	Advance Microprocessors & Applications	-	3	1	2	5
3.	MEE-102	Electric Drives & Traction	-	3	1	0	4
4.	MEE-103	Introduction to Power Converters	-	3	1	2	5
5.	MEE-104	Modeling, Simulation & Evolutionary Techniques	-	3	1	2	5
6.	MEE-105	Advance Power Converters	-	3	1	0	4
7.	MEE-160	Electrical Power Quality	-	3	1	0	4
8.	MEE-130	Dissertation Part-I	-	0	0	8	4
9.	MEE-120	Minor Project	-	0	0	8	4
10.	MEE-140	Seminar	-	0	0	4	2
11.	MEE-150	Dissertation Part-II	Dissertation Part-I	0	0	28	14

Programme Electives PE1 & PE2 (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-151	Power System Planning & Restructuring	-	3	1	0	4
2.	MEE-152	Power Semiconductor Controlled Industrial Drives	-	3	1	0	4
3.	MEE-153	System Reliability	-	3	1	0	4
4.	MEE-154	Operation Research	-	3	1	0	4
5.	MEE-155	Fuzzy, ANN and AI Systems	-	3	1	0	4
6.	MEE-156	Robotics & Automation	-	3	1	0	4
7.	MEE-157	FACTS Controllers & Devices	-	3	1	0	4
8.	MEE-158	Modeling and Simulation of Power Electronic Circuits	-	3	1	0	4

Programme Electives PE3 (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-159	New and Renewable Energy Resources	-	3	1	0	4
2.	MEE-161	Power System Instrumentation	-	3	1	0	4
3.	MEE-162	Digital Signal Processing	-	3	1	0	4
4.	MEE-163	HVDC Systems	-	3	1	0	4
5.	MEE-164	Energy Management	-	3	1	0	4
6.	MEE-165	Power System Dynamics & Control	-	3	1	0	4
7.	MEE-166	Special Electric Machine	-	3	1	0	4

Audit Courses for M.Tech. (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
I Semester							
1.	MCS-176	Information Systems and Data Management	-	3	1	0	4
2.	MAS-105	Applied Probability and Statistics	-	3	1	0	4
3.	MME-155	Robust Design	-	3	1	0	4
4.	MBA-109	Research Methodology	-	3	1	0	4
5.	MAS-109	Foreign Language-French	-	2	1	0	3
6.	MAS-110	Foreign Language-German	-	2	1	0	3

7.	MAS-111	Foreign Language-Spanish	-	2	1	0	3
II Semester							
1.	MBA-113	Management Information System	--	2	1	0	3
2.	BOE-17	Reliability & Maintenance Engineering	--	2	1	0	3
3.	BCS-68	Neural Network & Fuzzy Systems	--	3	1	0	4
4.	BCE-21	Environmental Impact Assessment & Management	--	3	1	0	4
5.	BCS-15	Database Management System	--	3	1	2	5

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Besides above elective Subjects student may be offered other elective subjects with prior approval of the ~~Competent~~ Competent authority.

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**ELECTRICAL ENGINEERING DEPARTMENT
M. M. M. UNIVERSITY OF TECHNOLOGY GORAKHPUR**

Credit Structure for M.Tech. (Control & Instrumentation)
(from Session 2018-2019)

Sub Category \ Semester	I	II	III	IV	Total Credits
Maths (M)	5	-	-	-	5
Programme Core (PC)	15	9	4	-	28
Programme Electives (PE)	-	8	4	-	12
Minor Project (MP)	-	-	4	-	4
Dissertation (D)			4	14	18
Seminar (S)	-	-	-	2	2
Total Credits	20	17	16	16	69

Curriculum for M.Tech. (Control & Instrumentation)

Junior Year, Semester-I

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	M	MAS-101	Numerical Methods & Engineering Optimization ✓	3	1	2	5
2	PC	MEE-201	Advance Control Systems	3	1	2	5
3	PC	MEE-103	Introduction to Power Converters ✓	3	1	2	5
4	PC	MEE-203	Advance Measurement & Instrumentation Technology	3	1	2	5
5	AC		Audit Subject				-
Total				12	4	8	20

Junior Year, Semester-II

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	PC	MEE-104	Modeling, Simulation & Evolutionary Techniques	3	1	2	5
2	PC	MEE-204	Nonlinear Systems & Adaptive Control	3	1	0	4
3	PE1		Program Elective-1	3	1	0	4
4	PE2		Programme Electives-2	3	1	0	4
5	AC		Audit Subject				
Total				12	4	2	17

Senior Year, Semester-III

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	PC	MEE-202	Optimal Control	3	1	0	4
2	PE3		Programme Electives-3	3	1	0	4
3	MP	MEE-220	Minor Project	0	0	8	4
4	D	MEE-230	Dissertation Part-I	0	0	8	4
Total				6	2	16	16

Senior Year, Semester-IV

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	S	MEE-240	Seminar	0	0	4	2
2	D	MEE-250	Dissertation Part-II	0	0	28	14
Total				0	0	32	16

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Program Core for M. Tech. (Control & Instrumentation)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MAS-101	Numerical Methods & Engineering Optimization	-	3	1	0	4
2.	MEE-201	Advance Control System	-	3	1	2	5
3.	MEE-103	Introduction to Power Converters	-	3	1	2	5
4.	MEE-203	Advance Measurement & Instrumentation Technology	-	3	1	2	5
5.	MEE-104	Modeling, Simulation & Evolutionary Techniques	..	3	1	2	5
6.	MEE-202	Optimal Control	..	3	1	0	4
7.	MEE-204	Nonlinear Systems & Adaptive Control	..	3	1	0	4
8.	MEE-230	Dissertation Part-I	-	0	0	8	4
9.	MEE-210	Minor Project	-	0	0	8	4
10.	MEE-240	Seminar	-	0	0	4	2
11.	MEE-250	Dissertation Part-II	Dissertation Part-I	0	0	28	14

Programme Electives PE1 & PE2 (Control & Instrumentation)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-151	Power system Planning & Restructuring	-	3	1	0	4
2.	MEE-251	Biomedical Engineering	-	3	1	0	4
3.	MEE-252	Digital Control Systems	-	3	1	0	4
4.	MEE-153	System Reliability	-	3	1	0	4
5.	MEE-154	Operation Research	-	3	1	0	4
6.	MEE-155	Fuzzy, ANN and AI Systems	-	3	1	0	4
7.	MEE-156	Robotics & Automation	-	3	1	0	4
8.	MEE-157	FACTS Controllers & Devices	-	3	1	0	4

Programme Electives PE3 (Control & Instrumentation)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-159	New and Renewable Energy Resources	-	3	1	0	4
2.	MEE-160	Electric Power Quality	-	3	1	0	4
3.	MEE-253	Bio-Medical Signal Processing	-	3	1	0	4
4.	MEE-161	Power System Instrumentation	-	3	1	0	4
5.	MEE-162	Digital Signal Processing	-	3	1	0	4
6.	MEE-164	Energy Management	-	3	1	0	4
7.	MEE-165	Power System Dynamics & Control	-	3	1	0	4
8.	MEE-254	Digital Image Processing	-	3	1	0	4

Audit Courses for M.Tech. (Control & Instrumentation)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
I Semester							
1.	MCS-176	Information Systems and Data Management	-	3	1	0	4
2.	MAS-105	Applied Probability and Statistics	-	3	1	0	4
3.	MME-155	Robust Design	-	3	1	0	4
4.	MBA-109	Research Methodology	-	3	1	0	4
5.	MAS-109	Foreign Language-French	-	2	1	0	3
6.	MAS-110	Foreign Language-German	-	2	1	0	3
7.	MAS-111	Foreign Language-Spanish	-	2	1	0	3


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II Semester							
1.	MBA-113	Management Information System	--	2	1	0	3
2.	BOE-17	Reliability & Maintenance Engineering	--	2	1	0	3
3.	BCS-68	Neural Network & Fuzzy Systems	--	3	1	0	4
4.	BCE-21	Environmental Impact Assessment & Management	--	3	1	0	4
5.	BCS-15	Database Management System	--	3	1	2	5

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Besides above elective subjects, Student may ^{be} offered other elective subjects with prior approval of the Competent authority.



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MEE-103

INTRODUCTION TO POWER CONVERTERS

5 Credits (3-1-2)

UNIT I

9

Power Semiconductor Devices: Structure, Characteristics, ratings and protection of SCR, triac and Gate Turn Off Thyristor.

UNIT II

9

Cyclo-Converter: Single phase and three phase cyclo-converters, circulating and non-circulating current operations, performance characteristics, control of harmonics, voltage and frequency control, control circuit.

UNIT III

9

Line Commutated Converters: Single and three phase fully controlled and half controlled converters, performance characteristics, effect of source inductance, discontinuous current operation, inverter operation, power factor improvement techniques, sequence control, 12-pulse converters, dual converter, triggering circuits.

UNIT IV

9

AC Voltage Controllers: Single phase AC voltage controllers feeding resistive and resistive-inductive loads, sequence control, three phase AC voltage controllers.

EXPERIMENTS

1. Study of 1-phase AC to DC controlled converter (half controlled and full controlled).
2. Study the of 3- phase AC to DC full controlled converter.
3. Study of a Triac based single phase ac regulator and determine of Thyristor switching characteristics and pulse transformer characteristics.
4. Study of Thyristors based dc to dc converter (dc chopper).
5. Study of a 3 phase PWM inverter with fixed output frequency and study of a non -PWM type inverter with 120 degree conduction of switches.
6. Study of an inverter fed adjustable speed drive for a 3 phase induction motor.
7. Study of a Thyristor based dc-drive with closed loop speed control.
8. MOSFET based dc to dc converter (buck, boost and buck-boost types with non-isolated output voltage)
9. Study of an industrial type fly-back dc to dc converter with isolated and regulated voltage.
10. Study of a single phase PWM AC to DC converter.

Books & References:

1. Power Electronics-P. C. Sen (Tata McGraw Hill), 1987
2. Power Electronics-R. S. Ananda Murthy and V. Nattarasu (Pearson India Publication), 2010
3. Fundamental of Electrical Drives- G. K. Dubey (Alpha Science). 2001
- Power Electronics by M. D. Singh and K. B. Khanchandani, (Tata McGraw-Hill Publishing Company Limited), 2008
4. Textbook of Power Electronics by S. N. Singh (Dhanpat Rai & Co (P) Ltd) 2005

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A/E

18/2 AB

UNIT I

9

DC-AC Inverters: Single phase and three phase voltage source and current source inverters, commutation methods, voltage and frequency control, harmonics reductions

UNIT II

9

Resonant Inverters: Classification, series and parallel resonant inverters, load resonant inverters, zero voltage switching and zero current switching resonant inverters, resonant dc link inverters

UNIT III

9

Power Semiconductor Devices: Structure, characteristics and ratings of Power Transistor, MOSFET, Insulated Gate Bipolar Transistor (IGBT) and MOS – Controlled Thyristor (MCT), drive and snubber circuits.

UNIT IV

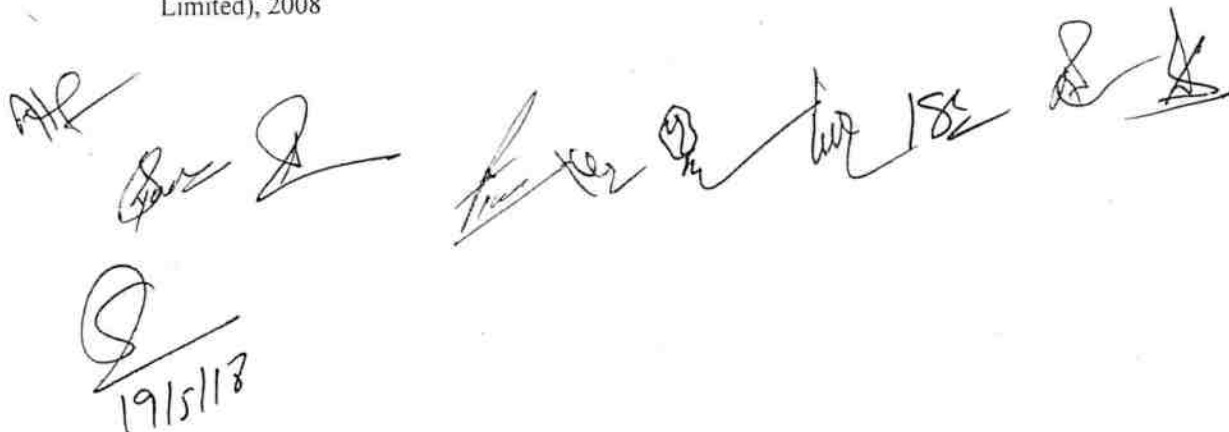
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DC-DC Converters: Review of chopper fundamentals, Step down chopper with resistive and resistive-inductive loads with continuous and discontinuous current operations, step up chopper, commutation techniques, impulse commutated and resonant pulse choppers, multi-quadrant and multiphase choppers. Switching Mode Converters, Buck, Boost, Buck-Boost and Cuk regulators

Books & References:

1. Power Electronics- M. H. Rashid (Pearson Prentice Hall), 2009
2. Fundamental of Electrical Drives- G. K. Dubey (Alpha Science), 2001
3. Power Electronics by M. D. Singh and K. B. Khanchandani, (Tata McGraw-Hill Publishing Company Limited), 2008

APR
19/5/18

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MEE-151 POWER SYSTEM PLANNING & RESTRUCTURING 4 Credits (3-1-0)

UNIT I

9

Introduction to restructuring of power industry. Key issues and challenges facing power industries, Power system restructuring models, Ancillary services in restructured electric market,

UNIT II

9

Transmission pricing in restructured electricity market, cost components of transmission system, congestion management, Electricity supply structure under deregulation in India

UNIT III

9

Concepts of FACTS devices & Controllers, General aspects of HVAC and HVDC transmission systems, Types of HVDC links –comparison, economic, technical performance ability & limitation, properties of thyristor converter based HVDC station, custom Power and custom power devices.

UNIT IV

9

Automatic generation control, load frequency control (LFC), VAR Control, Economic Operation of Power Systems, Reactive Power management, shunt compensation, series compensation, power factor improvement

Books & References:

1. Electric Power Applications of Optimization - James A. Momoh (Marcel Dekker), 2001
2. Optimization of Power System Operation - Jizhong Zhu (Wiley), 2009
3. Power system Optimization - D. P. Kothari, J. S. Dhillon (PHI Publication), 2011
4. K. R. Padiyar, "HVDC Power Transmission System", Wiley Eastern Limited, New Delhi, First Edition 1990.
5. T.J.E. Miller, "Reactive Power Control in Electrical System", John Wiley and Sons, New York, 1982.
6. N.G.Hingorani, "Understanding FACTS :Concepts and Technology of FACTS Systems", IEEE Press, 2000.
7. K.R.Padiyar "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Ltd. 2007.
8. NarinG.Hingorani, "Power Electronics in Electric Utilities: Role of Power Electronics in Future power systems", Proc. of IEEE, Vol.76, no.4, April 1988.

19/5/14

MEE-152 POWER SEMICONDUCTOR CONTROLLED INDUSTRIAL DRIVES (3-1-0) 4 Credits

UNIT I

9

Need for Industrial drives, Solid state controlled electric drive-Concept, elements and salient features, power converter motor system, closed loop control of electric drives, sensing of speed and current, performance parameters.

UNIT II

9

Control of D.C. separately and series excited motor drives using controlled converters (single phase and three phase) and choppers, static Ward-Leonard control scheme, solid state electric braking schemes, closed loop control of solid state DC drives.

UNIT III

9

Operation of induction and synchronous motor drives from voltage source and current source inverters slip power recovery, pump drives using AC line controllers, self-controlled synchronous motor drives, brushless DC motor drive, switched reluctance motor drive.

UNIT IV

9

Function of microprocessor in electric drive control, salient features of microprocessor control microprocessor based control scheme for D.C. induction and synchronous motor drives, applications.

Books & References:

1. Power Semiconductor Drives- S. Sivanagaraju, M. Balasubba Reddy and A. M. Prasad (PHI), 2009
2. Fundamental of Electric Drives- G. K. Dubey (Alpha Science), 2001



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old Course Structure
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**ELECTRICAL ENGINEERING DEPARTMENT
M. M. M. UNIVERSITY OF TECHNOLOGY
GORAKHPUR**

Credit Structure for M.Tech. (Control & Instrumentation)
(For newly admitted students from Session 2014-2015)

Category	Semesters	I	II	III	IV	Total Credits
Maths (M)		5	-	-	-	5
Programme Core (PC)		14	9	-	-	23
Programme Electives (PE)		-	8	8	-	16
Minor Project (MP)		-	-	4	-	4
Dissertation (D)		-	-	4	14	18
Seminar (S)		-	-	-	2	2
Total		19	17	16	16	68

Curriculum for M.Tech. (Control & Instrumentation)

Junior Year, Semester-I

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1.	M	MAS-101	Numerical Methods & Engineering Optimization	3	1	2	5
2.	PC	MEE-201	Advance Control Systems	3	1	2	5
3.	PC	MEE-202	Optimal Control	3	1	0	4
4.	PC	MEE-203	Advance Measurement & Instrumentation Technology	3	1	2	5
5.	AC		Audit Subject				-
Total				12	4	4	19

Junior Year, Semester-II

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1.	PC	MEE-104	Modeling, Simulation & Evolutionary Techniques	3	1	2	5
2.	PC	MEE-204	Nonlinear Systems & Adaptive Control	3	1	0	4
3.	PE1	MEE-***	Programme Elective-1	3	1	0	4
4.	PE2	MEE-***	Programme Electives-2	3	1	0	4
5.	AC		Audit Subject				-
Total				12	4	2	17

Senior Year, Semester-III

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1.	PE3	MEE-***	Programme Elective-3	3	1	0	4
2.	PE4	MEE-***	Programme Elective-4	3	1	0	4
3.	MP	MEE-220	Minor Project	0	0	8	4
4.	D	MEE-230	Dissertation Part-I	0	0	8	4
Total				6	2	16	16

Senior Year, Semester-IV

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	S	MEE-240	Seminar	0	0	4	2
2	D	MEE-250	Dissertation Part-II	0	0	28	14
Total				0	0	32	16

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Programme Core for M.Tech. (Control & Instrumentation)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MAS-101	Numerical Methods & Engineering Optimization	-	3	1	0	4
2.	MEE-201	Advance Control System	-	3	1	2	5
3.	MEE-202	Optimal Control	-	3	1	0	4
4.	MEE-203	Advance Measurement & Instrumentation Technology	-	3	1	2	5
5.	MEE-104	Modeling, Simulation & Evolutionary Techniques	-	3	1	2	5
6.	MEE-204	Nonlinear Systems & Adaptive Control	-	3	1	0	4
7.	MEE-230	Dissertation Part-I	-	0	0	8	4
8.	MEE-210	Minor Project	-	0	0	8	4
9.	MEE-240	Seminar	-	0	0	4	2
10.	MEE-250	Dissertation Part-II	Dissertation Part-I	0	0	28	14

Programme Electives PE1 & PE2

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-151	Power System Planning & Optimization	-	3	1	0	4
2.	MEE-251	Biomedical Engineering	-	3	1	0	4
3.	MEE-252	Digital Control Systems	-	3	1	0	4
4.	MEE-153	System Reliability	-	3	1	0	4
5.	MEE-154	Operation Research	-	3	1	0	4
6.	MEE-155	Fuzzy, ANN and AI Systems	-	3	1	0	4
7.	MEE-156	Robotics & Automation	-	3	1	0	4
8.	MEE-157	FACTS Controllers & Devices	-	3	1	0	4

Programme Electives PE3 & PE4

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-159	New and Renewable Energy Resources	-	3	1	0	4
2.	MEE-160	Electric Power Quality	-	3	1	0	4
3.	MEE-253	Bio-Medical Signal Processing	-	3	1	0	4
4.	MEE-161	Power System Instrumentation	-	3	1	0	4
5.	MEE-162	Digital Signal Processing	-	3	1	0	4
6.	MEE-164	Energy Management	-	3	1	0	4
7.	MEE-165	Power System Dynamics & Control	-	3	1	0	4
8.	MEE-254	Digital Image Processing	-	3	1	0	4

Audit Courses for M. Tech. (Control & Instrumentation)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
I Semester							
1.	MCS-176	Information Systems and Data Management	-	3	1	0	4
2.	MAS-105	Applied Probability and Statistics	-	3	1	0	4
3.	MME-155	Robust Design	-	3	1	0	4
4.	MBA-109	Research Methodology	-	3	1	0	4
5.	MAS-109	Foreign Language-French	-	2	1	0	3
6.	MAS-110	Foreign Language-German	-	2	1	0	3
7.	MAS-111	Foreign Language-Spanish	-	2	1	0	3
II Semester							

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1.	MBA-113	Management Information System	-	2	1	0	3
2.	BOE-17	Reliability & Maintenance Engineering	-	2	1	0	3
3.	BCS-68	Neural Network & Fuzzy Systems	-	3	1	0	4
4.	BCE-21	Environmental Impact Assessment & Management	-	3	1	0	4
5.	BCS-15	Database Management System	-	3	1	2	5





 19/5/18

Old Course Structure -
404

**ELECTRICAL ENGINEERING DEPARTMENT
M. M. M. UNIVERSITY OF TECHNOLOGY
GORAKHPUR**

Credit Structure for M.Tech. (Power Electronics & Drives)
(For newly admitted students from Session 2014-2015)

Category	Semesters	I	II	III	IV	Total Credits
Maths (M)		5	-	-	-	5
Programme Core (PC)		14	9	-	-	23
Programme Electives (PE)		-	8	8	-	16
Minor Project (MP)		-	-	4	-	4
Dissertation (D)		-	-	4	14	18
Seminar (S)		-	-	-	2	2
Total		19	17	16	16	68

Curriculum for M.Tech. (Power Electronics & Drives)

Junior Year, Semester-I

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	M	MAS-101	Numerical Methods & Engineering Optimization	3	1	2	5
2	PC	MEE-101	Advance Microprocessors & Applications	3	1	2	5
3	PC	MEE-102	Electric Drives & Traction	3	1	0	4
4	PC	MEE-103	Power Converter-I	3	1	2	5
5	AC		Audit Subject				-
Total				12	4	6	19

Junior Year, Semester-II

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1	PC	MEE-104	Modeling, Simulation & Evolutionary Techniques	3	1	2	5
2	PC	MEE-105	Power Converter -II	3	1	0	4
3	PE1	MEE-1**	Programme Electives-1	3	1	0	4
4	PE2	MEE-1**	Programme Electives-2	3	1	0	4
5	AC		Audit Subject				-
Total				12	4	2	17

Senior Year, Semester-III

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1.	PE3	MEE-1**	Programme Electives-3	3	1	0	4
2.	PE4	MEE-1**	Programme Electives-4	3	1	0	4
3.	MP	MEE-120	Minor Project	0	0	8	4
4.	D	MEE-130	Dissertation Part-I	0	0	8	4
Total				6	2	16	16

Senior Year, Semester-IV

S.N.	Category	Paper Code	Subject Name	L	T	P	Credits
1.	S	MEE-140	Seminar	0	0	4	2
2.	D	MEE-150	Dissertation Part-II	0	0	28	14
Total				0	0	32	16

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Programme Core (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
11.	MAS-101	Numerical Methods & Engineering Optimization	-	3	1	0	4
12.	MEE-101	Advance Microprocessors & Applications	-	3	1	2	5
13.	MEE-102	Electric Drives & Traction	Power Electronic	3	1	0	4
14.	MEE-103	Power Converter -I	-	3	1	2	5
15.	MEE-104	Modeling, Simulation & Evolutionary Techniques	-	3	1	2	5
16.	MEE-105	Power Converter -II	Power Converter -I	3	1	0	4
17.	MEE-130	Dissertation Part-I	-	0	0	8	4
18.	MEE-120	Minor Project	-	0	0	8	4
19.	MEE-140	Seminar	-	0	0	4	2
20.	MEE-150	Dissertation Part-II	Dissertation Part-I	0	0	28	14

Programme Electives PE1 & PE2 (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-151	Power system Planning & Optimization	-	3	1	0	4
2.	MEE-152	Power Semiconductor Controlled Drives	-	3	1	0	4
3.	MEE-153	System Reliability	-	3	1	0	4
4.	MEE-154	Operation Research	-	3	1	0	4
5.	MEE-155	Fuzzy, ANN and AI Systems	-	3	1	0	4
6.	MEE-156	Robotics & Automation	-	3	1	0	4
7.	MEE-157	FACTS Controllers & Devices	-	3	1	0	4
8.	MEE-158	Modeling and Simulation of Power Electronic Circuits	-	3	1	0	4

Programme Electives PE3 & PE4 (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	MEE-159	New and Renewable Energy Resources	-	3	1	0	4
2.	MEE-160	Electric Power Quality	-	3	1	0	4
3.	MEE-161	Power System Instrumentation	-	3	1	0	4
4.	MEE-162	Digital Signal Processing	-	3	1	0	4
5.	MEE-163	HVDC Systems	-	3	1	0	4
6.	MEE-164	Energy Management	-	3	1	0	4
7.	MEE-165	Power System Dynamics & Control	-	3	1	0	4
8.	MEE-166	Special Electric Machine	-	3	1	0	4

Audit Courses for M.Tech. (Power Electronics & Drives)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
I Semester							
1.	MCS-176	Information Systems and Data Management	-	3	1	0	4
2.	MAS-105	Applied Probability and Statistics	-	3	1	0	4
3.	MME-155	Robust Design	-	3	1	0	4
4.	MBA-109	Research Methodology	-	3	1	0	4
5.	MAS-109	Foreign Language-French	-	2	1	0	3
6.	MAS-110	Foreign Language-German	-	2	1	0	3
7.	MAS-111	Foreign Language-Spanish	-	2	1	0	3
II Semester							
8.	MBA-113	Management Information System	-	2	1	0	3
9.	BOE-17	Reliability & Maintenance Engineering	-	2	1	0	3

10.	BCS-68	Neural Network & Fuzzy Systems	-	3	1	0	4
11.	BCE-21	Environmental Impact Assessment & Management	-	3	1	0	4
12.	BCS-15	Database Management System	-	3	1	2	5



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शैक्षिक सत्र 2017-18 के आड सेमेस्टर के समस्त M.Tech., MCA एवं MBA के पाठ्यक्रमों हेतु बोर्ड आफ स्टडीज द्वारा अनुमोदित परीक्षकों की सूची का अवलोकन एवं एवं विभिन्न स्नातक/परास्नातक पाठ्यक्रमों के सैलेबस में आंशिक संशोधन सहित सत्र 2017-18 के आड सेमेस्टर से प्रभावी किये जाने का अनुमोदन।

शैक्षिक सत्र 2017-18 के आड सेमेस्टर के समस्त M.Tech., MCA एवं MBA पाठ्यक्रमों हेतु विभागीय बोर्ड आफ स्टडीज द्वारा संस्तुत लिखित एवं प्रायोगिक परीक्षा का पैनल प्राप्त किया गया, जिसे मा0 कुलपति महोदय के अनुमोदनोपरान्त परीक्षा नियंत्रक को अग्रिम कार्यवाही हेतु प्रेषित किया गया।

निम्न विभागों द्वारा पाठ्यक्रमों में किये गये संशोधन पृष्ठ संख्या 142 से पृष्ठ संख्या 150 पर संलग्न है। पाठ्यक्रमों का विवरण निम्नवत् है:-

विभाग	विषय कोड	विषय का नाम	प्रभावी होने का सत्र
प्रयुक्त विज्ञान विभाग	MAS-101 A	Numerical Methods and Engineering Optimization	2018-19
	MAS-112 A	Advanced Engineering Mathematics	2018-19
	MAS-113 A	Probabilistic Modelling	2017-18
विद्युतकण एवं संचार अभि० विभाग	MEC - 167	Organic Electronics Devices and Circuits	2018-19

विद्या परिषद के माननीय सदस्यों से अनुरोध है कि कृपया उक्त का अनुमोदन प्रदान करने की कृपा करें।

**DEPARTMENT OF APPLIED SCIENCES
MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY
GORAKHPUR**

**Minutes of Board of Studies of Department of Applied Sciences M.M.M. University of Technology,
Gorakhpur held on Dated: 23.09.2017**

The Following were present:-

1.	Dr. B. K. Pandey	Chairman	
2.	Prof. D. K. Dwivedi	Member Internal	
3.	Dr. D. Kandu	Member Internal	
4.	Dr. P.P. Pande	Member Internal	
5.	Dr. S.P. Singh	Member Internal	
6.	Dr. A.K. Barnwal	Member Internal	
7.	Dr. Harish chandra	Member Internal	
8.	Sri Ravi Kumar Gupta	Member Internal	
9.	Dr. Krishna Kumar	Member Internal	
10.	Dr. Abhijit Mishra	Member Internal	
11.	Dr. Abhishek Kr. Gupta	Member Internal	
12.	Dr. Ram Keval	Member Internal	
13.	Prof. Sanjay Chaubey	Member External	
14.	Prof. G. Anantharaman	Member External	

The Following decisions were taken

1. The list of Examiners for Theory & Practical Examination of Mathematics & Humanities for ODD Semester 2017-18 session was prepared.
2. The revised syllabus of Advanced Engineering Mathematics (MAS-112) has been recommended, which will be effective from the session 2018-19.
3. The revised syllabus of Numerical Method & Engineering Optimization (MAS-101) has been recommended, which will be effective from the session 2018-19.
4. The revised syllabus of Probabilistic Modeling (MAS-113) has been recommended, which will be effective from the session 2017-18 (Even Semester).

The meeting ended with thanks to the chairman

HASD

No. MUT/Appl. Sc./ /2017

Date: 23 Sept . 2017

Copy for information & necessary action to:-

1. Dean PGS, R&D

MAS 101	Numerical Methods and Engineering Optimization	
Course category	:	Basic Sciences & Maths (BSM)
Pre-requisites	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, assignments, quizzes, Minor and Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course
<ol style="list-style-type: none"> 1. To find the root of a curve using iterative methods 2. To interpolate a curve using Gauss, Newton's interpolation formula. 3. Use the theory of optimization methods and algorithms developed for various types of optimization problems. 4. To apply the mathematical results and numerical techniques of optimization theory to Engineering problems. 		
Topics Covered		
UNIT-I		
Numerical Methods I: Solution of algebraic and transcendental equations by Bisection, Regula-Falsi and Newton-Raphson methods. Interpolation: Newton's forward and backward interpolation formulae, Lagrange's formula and Newton's divided difference formula.		9
UNIT-II		
Numerical Methods II: Solution of system of linear equations by Gauss Jacobi method, Gauss-Siedel method, Relaxation method and LU decomposition method, Cholesky method. Numerical differentiation, Numerical Integration: Trapezoidal Rule, Simpson's one-third and three-eighth rules.		9
UNIT-III		
Classical Optimization Techniques: Introduction, Review of single and multi-variable optimization methods with and without constraints, Non-linear one-dimensional minimization problems, Examples.		9
UNIT-IV		
Constrained Optimization Techniques: Introduction, Direct Methods, Cutting plane method, Indirect methods, Convex programming problems, Exterior penalty function method, Examples and		9

22/4/2020

problems. Unconstrained optimization techniques: Introduction, Descent methods, Steepest Descent methods Newton's method, Quasi-Newton's method.

Experiments:

1. To implement Regula Falsi method to solve algebraic equations.
2. To implement numerical integration to solve algebraic equations.
3. To implement Gauss-Siedel method for solution of simultaneous equations.
4. To implement Runge-Kutta method of order four to solve differential equations.
5. To implement Euler's method to find solution of differential equations.
6. To find optimum solution to problem parameters.
7. To find derivatives of static displacements and stresses.
8. To write Computer based algorithm and program for solution of Eigen-value problems.
9. Reduction of size of an optimization problem using Reduced basis technique.
10. To find Derivatives of Eigen-values and Eigen vectors.

Textbooks

1. Engineering Optimization: S.S.Rao; New Age International.
2. Applied Optimal Design: E.J. Haug and J.S. Arora; Wiley New York.
3. P. Kandasamy, K. Thilagavathy & K. Gunavathy, Numerical Methods, Schand Publishers.

The bottom section of the page contains several handwritten signatures and initials. From left to right, they include: 'Amil' with a checkmark, 'b. m. w.', 'Singh', 'Dank', 'A. G. S.', 'A.M.', 'M. Singh', and 'P. Manoh'. There are also some other less legible signatures and marks.

MAS 112	Advanced Engineering Mathematics	
Course category	:	Basic Sciences & Maths (BSM)
Pre-requisites	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through tutorials, assignments, quizzes, Minor and Major Theory Examination.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course
<ol style="list-style-type: none"> 1. to find out the dimension of vector spaces 2. describe the differences between finite-difference and finite-element methods for solving PDEs; 3. solve Elliptical (Laplace/Poisson) PDEs using finite differences; 4. solve functional using Euler method. 		
Topics Covered		
UNIT-I		
Vector spaces and Linear transformation: Vector spaces, subspaces, Linear dependence, Basis and Dimension, Linear transformations, Kernel & images, matrix representation of linear transformation, change of basis, Eigen values and Eigen vectors of linear operators, diagonalization.		9
UNIT-II		
Numerical Techniques: Solution of algebraic and transcendental equations using bisection, Regula Falsi and Newton Raphson's method, Numerical solution to linear system, LU factoring decomposition, Cholesky method, Gauss Seidal method, Numerical eigen value problem, Jacobi, Givens method		9
UNIT-III		
Calculus of Variation: Functionals, Euler's equation and its generalization. One and several independent variables. Initial value problems. Weierstrass's sufficiency condition for weak and strong minima and maxima		9
UNIT-IV		
Numerical Solution of Partial Differential Equations: Classification of partial differential equations of the second order. Laplace equations and its solution by Liebmann's process. Poisson equation. Solution of Parabolic, Elliptic and Hyperbolic Equations. Applications to Engineering.		9

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 Rank

Textbooks

1. K. Hoffman, R Kunze, Linear Algebra, Prentice Hall of India, 1971.
2. I. M. Gelfrand, S. V. Fomin, Calculus of Variation, Dover Publications.
3. M. D. Raisinghania, Advanced Differential Equations, Schand Publishers.

Total 10/10 Rank 1st
 Amal Singh
 5 marks
 P. R. Raisinghania
 AM. Singh
 5/5

COMPUTER PROGRAMMING LAB

Implement a C programme to calculate Probability, Means, Moments, Variance, Skewness, Standard Deviation, Coefficient of Variation. C program to generate random numbers, to implement various queue operations.

Textbooks

1. V. Rohatgi., An Introduction to probability and Mathematical Statistics, Wiley Eastern Ltd. New Delhi.
2. J.K. Sharma, Operation Research, Laxmi Publications.
3. K. Swaroop, P. K. Gupta, Man Mohan, Operation Research, Sultan chand Publishers.

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  A.M.   Planch
b. Smith  Abul

2017.3.13

शैक्षिक सत्र 2017-18 के आड सेमेस्टर के समस्त M.Tech., MCA एवं MBA के पाठ्यक्रमों हेतु बोर्ड आफ स्टडीज द्वारा अनुमोदित परीक्षकों की सूची का अवलोकन एवं एवं विभिन्न स्नातक/परास्नातक पाठ्यक्रमों के सैलेबस में आंशिक संशोधन सहित सत्र 2017-18 के आड सेमेस्टर से प्रभावी किये जाने का अनुमोदन।

शैक्षिक सत्र 2017-18 के आड सेमेस्टर के समस्त M.Tech., MCA एवं MBA पाठ्यक्रमों हेतु विभागीय बोर्ड आफ स्टडीज द्वारा संस्तुत लिखित एवं प्रायोगिक परीक्षा का पैनल प्राप्त किया गया, जिसे मा0 कुलपति महोदय के अनुमोदनोपरान्त परीक्षा नियंत्रक को अग्रिम कार्यवाही हेतु प्रेषित किया गया।

निम्न विभागों द्वारा पाठ्यक्रमों में किये गये संशोधन पृष्ठ संख्या 142 से पृष्ठ संख्या 150 पर संलग्न है। पाठ्यक्रमों का विवरण निम्नवत् है:-

विभाग	विषय कोड	विषय का नाम	प्रभावी होने का सत्र
प्रयुक्त विज्ञान विभाग	MAS-101 A	Numerical Methods and Engineering Optimization	2018-19
	MAS-112 A	Advanced Engineering Mathematics	2018-19
	MAS-113 A	Probabilistic Modelling	2017-18
विद्युतकण एवं संचार अभि० विभाग	MEC - 167	Organic Electronics Devices and Circuits	2018-19

विद्या परिषद के माननीय सदस्यों से अनुरोध है कि कृपया उक्त का अनुमोदन प्रदान करने की कृपा करें।

**DEPARTMENT OF APPLIED SCIENCES
MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY
GORAKHPUR**

**Minutes of Board of Studies of Department of Applied Sciences M.M.M. University of Technology,
Gorakhpur held on Dated: 23.09.2017**

The Following were present:-

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4.	Dr. P.P. Pande	Member Internal	
5.	Dr. S.P. Singh	Member Internal	
6.	Dr. A.K. Barnwal	Member Internal	
7.	Dr. Harish chandra	Member Internal	
8.	Sri Ravi Kumar Gupta	Member Internal	
9.	Dr. Krishna Kumar	Member Internal	
10.	Dr. Abhijit Mishra	Member Internal	
11.	Dr. Abhishek Kr. Gupta	Member Internal	
12.	Dr. Ram Keval	Member Internal	
13.	Prof. Sanjay Chaubey	Member External	
14.	Prof. G. Anantharaman	Member External	

The Following decisions were taken

1. The list of Examiners for Theory & Practical Examination of Mathematics & Humanities for ODD Semester 2017-18 session was prepared.
2. The revised syllabus of Advanced Engineering Mathematics (MAS-112) has been recommended, which will be effective from the session 2018-19.
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4. The revised syllabus of Probabilistic Modeling (MAS-113) has been recommended, which will be effective from the session 2017-18 (Even Semester).

The meeting ended with thanks to the chairman

HASD

No. MUT/Appl. Sc./ /2017

Date: 23 Sept . 2017

Copy for information & necessary action to:-

1. Dean PGS, R&D

MAS 101	Numerical Methods and Engineering Optimization	
Course category	:	Basic Sciences & Maths (BSM)
Pre-requisites	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, assignments, quizzes, Minor and Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course
<ol style="list-style-type: none"> 1. To find the root of a curve using iterative methods 2. To interpolate a curve using Gauss, Newton's interpolation formula. 3. Use the theory of optimization methods and algorithms developed for various types of optimization problems. 4. To apply the mathematical results and numerical techniques of optimization theory to Engineering problems. 		
Topics Covered		
UNIT-I		
Numerical Methods I: Solution of algebraic and transcendental equations by Bisection, Regula-Falsi and Newton-Raphson methods. Interpolation: Newton's forward and backward interpolation formulae, Lagrange's formula and Newton's divided difference formula.		9
UNIT-II		
Numerical Methods II: Solution of system of linear equations by Gauss Jacobi method, Gauss-Siedel method, Relaxation method and LU decomposition method, Cholesky method. Numerical differentiation, Numerical Integration: Trapezoidal Rule, Simpson's one-third and three-eighth rules.		9
UNIT-III		
Classical Optimization Techniques: Introduction, Review of single and multi-variable optimization methods with and without constraints, Non-linear one-dimensional minimization problems, Examples.		9
UNIT-IV		
Constrained Optimization Techniques: Introduction, Direct Methods, Cutting plane method, Indirect methods, Convex programming problems, Exterior penalty function method, Examples and		9

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problems. Unconstrained optimization techniques: Introduction, Descent methods, Steepest Descent methods Newton's method, Quasi-Newton's method.

Experiments:

1. To implement Regula Falsi method to solve algebraic equations.
2. To implement numerical integration to solve algebraic equations.
3. To implement Gauss-Siedel method for solution of simultaneous equations.
4. To implement Runge-Kutta method of order four to solve differential equations.
5. To implement Euler's method to find solution of differential equations.
6. To find optimum solution to problem parameters.
7. To find derivatives of static displacements and stresses.
8. To write Computer based algorithm and program for solution of Eigen-value problems.
9. Reduction of size of an optimization problem using Reduced basis technique.
10. To find Derivatives of Eigen-values and Eigen vectors.

Textbooks

1. Engineering Optimization: S.S.Rao; New Age International.
2. Applied Optimal Design: E.J. Haug and J.S. Arora; Wiley New York.
3. P. Kandasamy, K. Thilagavathy & K. Gunavathy, Numerical Methods, Schand Publishers.

The bottom section of the page contains several handwritten signatures and initials. From left to right, they include: 'Amil' with a checkmark, 'b. maw', 'Singh', 'Dank', 'Ablush', 'A.M.', 'Singh', and 'P. Manoh'. There are also some other less legible signatures and marks.

MAS 112	Advanced Engineering Mathematics	
Course category	:	Basic Sciences & Maths (BSM)
Pre-requisites	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through tutorials, assignments, quizzes, Minor and Major Theory Examination.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course
<ol style="list-style-type: none"> 1. to find out the dimension of vector spaces 2. describe the differences between finite-difference and finite-element methods for solving PDEs; 3. solve Elliptical (Laplace/Poisson) PDEs using finite differences; 4. solve functional using Euler method. 		
Topics Covered		
UNIT-I		
Vector spaces and Linear transformation: Vector spaces, subspaces, Linear dependence, Basis and Dimension, Linear transformations, Kernel & images, matrix representation of linear transformation, change of basis, Eigen values and Eigen vectors of linear operators, diagonalization.		9
UNIT-II		
Numerical Techniques: Solution of algebraic and transcendental equations using bisection, Regula Falsi and Newton Raphson's method, Numerical solution to linear system, LU factoring decomposition, Cholesky method, Gauss Seidal method, Numerical eigen value problem, Jacobi, Givens method		9
UNIT-III		
Calculus of Variation: Functionals, Euler's equation and its generalization. One and several independent variables. Initial value problems. Weierstrass's sufficiency condition for weak and strong minima and maxima		9
UNIT-IV		
Numerical Solution of Partial Differential Equations: Classification of partial differential equations of the second order. Laplace equations and its solution by Liebmann's process. Poisson equation. Solution of Parabolic, Elliptic and Hyperbolic Equations. Applications to Engineering.		9

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Textbooks

1. K. Hoffman, R Kunze, Linear Algebra, Prentice Hall of India, 1971.
2. I. M. Gelfrand, S. V. Fomin, Calculus of Variation, Dover Publications.
3. M. D. Raisinghania, Advanced Differential Equations, Schand Publishers.

Total 10/10 Rank 1st
 Amal Singh
 5 marks
 P. Ramesh
 AM. Singh
 DUT

COMPUTER PROGRAMMING LAB

Implement a C programme to calculate Probability, Means, Moments, Variance, Skewness, Standard Deviation, Coefficient of Variation. C program to generate random numbers, to implement various queue operations.

Textbooks

1. V. Rohatgi., An Introduction to probability and Mathematical Statistics, Wiley Eastern Ltd. New Delhi.
2. J.K. Sharma, Operation Research, Laxmi Publications.
3. K. Swaroop, P. K. Gupta, Man Mohan, Operation Research, Sultan chand Publishers.

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