DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING
FACULTY OF ENGINEERING & ARCHITECTURE
JAI NARAIN VYAS UNIVERSITY: JODHPUR

NO. JNVU/FE/P&I/2019/1107-1108 Date: 21.11.2019

The Assistant Registrar
Academic Section
JNV University
Jodhpur.

Subject: Minutes of Meeting of Departmental Council held on 18.11.2019

Dear Sir,

Please find enclosed herewith Minutes of Departmental Council held on 18.11.2019 of the Department alongwith relevant Annexures-1 & 2.

This is for information and necessary action.

Thanking you
Yours sincerely

(Dr. Milind Kumar Sharma)
Professor & Head

Enclosed:- Minutes of Departmental Council.

Copy to:-

The Dean, Faculty of Engineering & Architecture, JNV University, Jodhpur for information alongwith minutes of DC & Annex. 1 & 2.

Professor & Head

O/C

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING
FACULTY OF ENGINEERING & ARCHITECTURE, JAI NARAIN VYAS UNIVERSITY, JODHPUR

Minutes of the Meeting of the Departmental Council, held on 18.11.2019 (Monday) at 10.00 am in the chamber of the Professor & Head, Department of Production & Industrial Engineering.

Following members were present in the meeting:-

1. Dr. Arvind Kumar Verma, Professor	: Member
2. Dr. Vikas Kapoor, Professor	: Member
3. Dr. Manish Kumar, Professor	: Member
4. Mrs. Rama Mehra, Associate Professor	: Member
5. Shri Naveen Kumar Suniya, Assistant Professor	: Member
6. Dr. Milind Kumar Sharma, Professor	: Convener – Head of Department

At the outset, Head, Dept. of Production and Industrial Engineering welcomed all members. The Departmental Council (DC) put on record its appreciation for the services of the outgoing Head Prof. Manish Kumar. The DC also welcomed the new Head & Convener of DC Prof. Milind Kumar Sharma.

ITEM NO. 1
AGENDA: To confirm the Minutes of the Departmental Council Meetings held on 05.07.2019

Resolved to confirm the Minutes of the Meetings of the Departmental Council held on 05.07.2019.

ITEM NO. 2
AGENDA: To discuss, prepare & finalize the Teaching & Examination Scheme and Syllabi of II BE P&I (III & IV Semester) 2021, III BE P&I Engg. (V & VI Semester) 2022 & IV BE P&I Engg.(VII & VIII Semester) 2023.

Committee resolved that Teaching & Examination Scheme and Syllabi of II BE P&I (III & IV Semester) 2021, III BE P&I Engg. (V & VI Semester) 2022 & IV BE P&I Engg.(VII & VIII Semester) 2023 will remain same as it was approved for Year i.e. 2020-2021-2022.

ITEM NO. 3
AGENDA: To discuss, prepare & finalize the Teaching & Examination Scheme and Syllabi of ME Industrial Engineering and Management [IEM]- Self Sufficiency Course) for 1ST Year (I & II Semester 2021) and 2nd Year (III & IV Semester 2022).

Committee resolved & approved the Teaching & Examination Scheme and Syllabi of ME Industrial Engineering and Management [IEM]- Self Sufficiency Course) for 1ST Year (I & II Semester 2021) and 2nd Year (III & IV Semester 2022) as suggested by a three member committee constituted vide Office Order No. JNVU/FE/P&I/2019/1000 Dated 31.07.2019. The Teaching & Examination Scheme and Syllabi is enclosed as **Annexure-1 & 2** respectively. DC also put on record its deep appreciation to all committee members and its Chairman Prof. Vikas Kapoor for taking pain and active interest in the revision of the Teaching & Examination Scheme and Syllabi of ME Industrial Engineering and Management [IEM] - Self Sufficiency Course).

ITEM NO. 4 Any other Item.

Agenda: To reaffirm and update "Panel of Experts' for nomination of various Selection Committees for selection/promotion of Teaching Staff required as per Letter No. JNVU/Estt/Reg/4541 Dated 08.11.2019, issued by Registrar, JNV University, Jodhpur.

Committee reaffirmed and updated "Panel of Experts", which is enclosed as **Annexure-3.**

The Meeting ended with a vote of thanks to the Chair.

(Dr. Milind Kumar Sharma)
Professor & Head

MASTER OF ENGINEERING

INDUSTRIAL ENGINEERING AND MANAGEMENT
IN

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING

ON

SELF FINANCING COURSE
(SEMESTER SCHEME)

ME EXAMINATION (I & II SEM) 2020-21
ME EXAMIANTION (III & IV SEM) 2021-22

JAI NARA IVERSITY

NOTIFICATION

In compliance of decision of the Hon'ble High Court all students are required to fulfill 75% attendance rule in each subject and there must be 75% attendance of the student

CONTENTS

MASTER OF ENGINEERING

General Rules for Students

1. **Duration :**

   The course of study for Master of Engineering (M.E.) degree in various branches departments (as per Table I) shall extend over a period of four semesters spread over two academic sessions for regular students and six semesters spread over three

academic sessions for part time students. On satisfactory completion of the course and after passing the final examination including the dissertation, a candidate shall be awarded M.E. degree in the respective course/specialization.

2. **Eligibility :**

(a) A candidate for admission to Master of Engineering (M.E.) degree in various Branches/Specializations must have obtained qualifications as per Table I from this University or from any other University or Institute recognized as equivalent thereto.

Table I: Eligibility for Master of Engineering

S. No.	Specialization	GAS/SFS	Department (Offered by)	Qualifications
				Course* With minimum 55% or CGPA 7.00
1	Water Resources and Irrigation	SFS	Civil Engineering	BE(Civil, BCT, Agriculture)
2	Geotechnical	GAS	Civil Engineering	BE(Civil, Agriculture, BCT)
3	Environment Engineering	GAS	Civil Engineering	BE(Civil/ BCT/ Chemical/ Mechanical/ Mining/ Metallurgical/ P&I / Biotechnology) and B.Arch.
4	Computer Science and Engineering	SFS	Computer Science and Engineering	BE(Computer Science & Engineering /Information Technology/ Electronics & Communication /Electronics & Computer)
				MCA (min 60%) and valid GATE score in CS
5	Control Systems	GAS	Electrical Engg	BE (Electrical, Electronics and communications, Electrical and Electronics, Electronics and Computer, Instrumentation and Control)
6	Power Systems	GAS	Electrical Engg	BE(Electrical, Electrical and Electronics Engineering)
7	Digital Communications	GAS	Electronics and Communications Engg	BE(Electronics and communications, Electrical and Electronics, Electronics and Computer, Information Technology, Computer Science & Engineering)
8	Thermal	GAS	Mechanical Engg	BE(Mechanical, Automobile, Aeronautics)
9	Production and Industrial	GAS	Mechanical Engg	BE(Mechanical, P&I, Manufacturing, Production)
10	Design	GAS	Mechanical Engg	BE(Mechanical, Aeronautics, Automobile)
11	Mining	GAS	Mining Engg	BE(Mining)
12	Industrial Management and Engineering	SFS	Production and Industrial Engg	BE of All Branches
13	ME Civil (Structural Engg)	GAS	Structure Engg	BE (Civil,BCT)
*From this University or from any other University or Institute recognized as equivalent thereto.				

(b) For Part Time Candidates:

Teachers, Research Fellows/Scholars or Engineers or Technical Staff employed in this University, serving engineers in the departments/industries/self employed engineers/teachers in Polytechnic college/Engineers employed in research laboratories and other organizations in Jodhpur fulfilling the eligibility criteria specified in 2(a) may be admitted to the M.E. course as part-time students.

(c) For Sponsored Candidates:

The candidate applying for sponsored seat

(i) Must have minimum qualifications as of general category candidate.

(ii) Must be working in technical field or technical teaching of at least degree level for minimum two years.

(iii) The sponsoring organization must be an organization registered with appropriate government department for engineering manufacturing or trading of engineering items or Technical Institutes.

(iv) The application of the candidate should be forwarded by sponsoring organization (Candidate may submit advance copy of application). The fee of the sponsored candidate will be paid by the sponsoring organization and sponsoring organization will award full pay study leave to the candidate for the duration of the course if candidate gets admission in the course. A declaration by the sponsoring organization has to be produced by the candidate in this regards at the time of interview.

3. **Admission Process:**

(a). All the applications, received for admission to M.E. degree in the respective department, will be screened by the department. The eligible/provisionally eligible applicants, will be required to appear in a written test followed by an interview before the Committee constituted by the Department for this purpose.

(b). Total weightage of written test and interview will be 70% and 30% respectively, however the absence in any of them will disqualify the candidature.

(c). A candidate may be permitted by the Head of the Department to change his specialization, subject to the availability of seats as per merit cum preference. He /She shall undergo the regular course prescribed for specialization.

(d). A candidate can be permitted to change from regular to part time after completing the first semester, if he / she fulfill the conditions of Part Time candidate.

4. **Attendance**

The attendance requirement in the Faculty of Engineering & Architecture shall be, "In compliance of the decision of the Hon'ble High Court all students are required to fulfill the 75% attendance rule in each subject and there must be 75% attendance of the student before he/she could be permitted to appear in the examination".

(a) **Condonation of shortage of attendance:**

The shortage of attendance up to the limits specified below may be condoned on valid reasons:

(i) Upto 6% in each subject plus 5 attendances in all aggregate of subject/papers may be condoned by the Vice-Chancellor on the recommendation of the Head of the Department for the Post-graduate students.

(ii) The N.C.C./N.S.S. Cadets sent out to parades and camps and such students who are deputed by the University to take part in games, athletics or cultural activities may for- purposes of attendance be treated as present for the days of these absence in connection with the

aforesaid activities and that period shall be added to their subject wise attendance.

5. **Subject Allocation for Part time students**

The programme of instruction for a part-time student shall be drawn up by the Head of the Department so as to suit the requirements of the student concerned, and availability of resources.

(a) To part time students, half of the subjects (rounding to upper whole number) mentioned in teaching and examination scheme of First Semester (for full time) shall be allocated in First semester and remaining shall be allocated in Third semester, considering theory and practical as a separate unit.

(b) To part time students, half of the subjects (rounding to upper whole number) mentioned in teaching and examination scheme of Second Semester (for full time) shall be allocated in Second semester and remaining shall be in Fourth semester, considering theory and practical as a separate unit. For the purpose of round off, in case of total odd number of subjects in teaching and examination scheme of the Second semester(for Full Time), one extra subject shall be allocated in Second semester for part time students.

6. **Examination Rules**

(a). For Full Time candidates

There shall be an examination at the end of each semester.

At the end of First Semester – First Semester Examination for M.E. Degree

At the end of Second Semester – Second Semester Examination for M.E. Degree

At the end of Third Semester or thereafter – Seminar Presentation for M.E. Degree

At the end of Fourth Semester or thereafter – Dissertation Examination for M.E. Degree

(b). For Part-Time candidates

There shall be an examination at the end of each semester.

At the end of First Semester – First Semester Examination for M.E. Degree

At the end of Second Semester – Second Semester Examination for M.E. Degree

At the end of Third Semester – Third Semester presentation for M.E. Degree

At the end of Fourth Semester – Fourth Semester Examination for M.E. Degree

At the end of Fifth Semester or thereafter – Seminar Examination for M.E. Degree

At the end of Sixth Semester or thereafter – Dissertation Examination for M.E. Degree

(c). The examination shall be conducted by means of written papers, practicals including sessionals, presentations, viva-voce and dissertation as per the scheme of examination specified in the syllabus.

7. **ME First Year Examinations (for full time students and part time students)**

(a). A candidate who has undergone regular course of study for the first semester shall be eligible to appear at the First Semester Examination for the M.E.

Degree, and he/she shall be required to show competent knowledge of the subjects mentioned in the teaching and examination scheme for the respective course of study.

(c). A candidate who has passed the First Semester Examination and has undergone a regular course of study for the Second Semester shall be eligible for appearing at the Second Semester Examination for the M.E. Degree, and he/she shall be required to show competent knowledge of the subjects mentioned in the teaching and examination scheme for the respective course of study.

8. **ME Second Year Examinations (for part time students)**

(a). A candidate who has undergone regular course of study for the third semester shall be eligible to appear at the Third Semester Examination for the M.E. Degree.

(b). A candidate appearing at the Third Semester Examination for the M.E. Degree shall be required to show competent knowledge of the subjects mentioned in the teaching and examination scheme for the respective branch of study.

(c). A candidate who has passed the Third Semester Examination and has undergone a regular course of study for the Fourth Semester shall be eligible for appearing at the Fourth Semester Examination for the M.E. Degree.

(d). A candidate appearing at the Fourth Semester Examination for the M.E. Degree shall be required to show competent knowledge of the subjects mentioned in the teaching and examination scheme for the respective branch of study.

9. **ME Second Year Examinations (for full time students)/ ME Third Year Examinations (for part time students)**

(a) Seminar:

Each candidate shall submit for examination a seminar report embodying a critical review of the latest developments in a subject related to their M.E. Degree course. Two copies of the seminar report, duly signed and forwarded by supervisor/guide shall be submitted to the Head of the Department along with a note of recommendation from his/her supervisor.

(b) Dissertation:

Steps to be followed regarding dissertation work

(i) A proposal for dissertation shall be submitted by each student, to the head of the department, along with the precedence of choice of supervisors from the concerned department.

(ii) The approval of the subject for the dissertation and the allotment of a supervisor/guide shall be performed by the department council or the subcommittee of the department council. The allotment of supervisor shall be based on the consent of the teacher and avoidance of load unbalancing/polarization.

(iii) A synopsis of the dissertation, prepared under the guidance of the allotted supervisor shall be submitted to head of the department duly forwarded through the supervisor.

(iv) Each candidate shall submit for examination a dissertation embodying the research work carried out by him/her during the course of study. Total three copies of the dissertation report, duly signed and forwarded by supervisor/guide shall be submitted to the Head of the Department. The candidate shall submit a declaration that the matter embedded in the dissertation has not been submitted for the award of any other degree or diploma in this University or other Institution / University and be countersigned by the supervisor. The dissertation must contain a certificate from the supervisor, stating that the work has been undertaken, completed and written under his guidance & supervision and meets the requirements of the course.

(v) The dissertation shall be referred to two examiners, one External and one Internal. They shall examine the dissertation. The candidate shall also be required to appear for the Viva-voce examination conducted by a Board of Examiners consisting of the External Examiner, the Internal Examiner and the Head of the Department or his nominee who shall be the Chairman of the Board.

(vi) The dissertation examination shall be held only after the candidate has passed in all the theory papers, practicals and Sessionals, course work and Seminar.

10. **Criteria to Fail or to Allow To Keep Term**

(a) A candidate who passes in fifty percent or more units of the prescribed courses for him in that semester shall be allowed to keep term in the next semester. However he/she shall reappear and pass in the subjects in which he/she has failed (if any), in next regular examination of that semester. The course work marks obtained by him/her shall be carried over.

(b) A candidate fails, if he/she fails in more than fifty percent of the prescribed courses for him in that semester, he/she shall not be permitted to continue his/her studies in the next semester, and treated as an Ex-student.

For Ex-Student: All the marks obtained in course work, may be carried over.

A candidate who has passed all practicals and sessionals but failed as per 10(a) in theory papers of that semester shall appear in that semester examination as Ex-student in all theory papers. His practical and sessional marks of the semester shall be carried over.

(c) A candidate who fails any course work in any course shall not be permitted to take final examination of that course. He/she should join as a regular student in the course when it is offered next by the Department. In case, the course is discontinued in the Department, the student can take up, another course in lieu of the course discontinued, subject to approval of the Head of the Department.

(d). A candidate who fails in any elective subject may be permitted by the Head of the Department to change the elective subject. He/she shall be required to undergo a regular course of study for the new elective subject.

(e). In case the candidate is fail either in course work or viva exam, the candidate shall require to revise the dissertation work (i.e. Pass Separately).

(f). If a candidate fails in more than fifty percent of course work in the prescribed course shall not be permitted to appear in final examination of that semester. He/she has to attend as regular student in that semester.

11. **Result Computation**

(a) On the basis of percentage of obtained marks the process of result computation will be as follows, and followings will be awarded:

(i) For every subject: Grade and Score Point

(ii) For every semester: Semester Grade Point Average (SGPA) up to precision of two digits after decimal.

(i) For every semester: Cumulative Grade Point Average (CGPA) up to current semester, up to precision of two digits after decimal.

Step 1: For each subject the percentage of obtained marks will be converted into Grade as per Table II

Table II: Percentage of Obtained Marks to Grade Conversion

Percentage of Obtained Marks in Theory Subjects	Percentage of Obtained Marks in Practical/ Course work	Grade
85≤per	85≤per	O
70≤per<85	70≤per<85	A+
60≤per<70	60≤per<70	A
55≤per<60	55≤per<60	B+
50≤per<55	50≤per<55	B
45≤per<50	NA	C
35≤per<45	NA	P
per<35	per<50	F
Absent	Absent	AB

Step 2: For each subject convert the Grade to Score Point as per Table III.

Table III : Grade to Score Point

Grade	Score Points
O	10
A+	9
A	8
B+	7
B	6
C	5
P	4
F	0
AB	0

Step 3: Semester Grade Point Average (SGPA) of k^{th} semseter is

$$SGPA = \frac{\sum_{i=1}^{n} P_i * C_i}{\sum_{i=1}^{n} C_i}$$

Where P_i is Score Points in i^{th} subject,

C_i is Credits of i^{th} subject,

n is total number of subjects in current k^{th} semester

Step 4: Cumulative Grade Point Average (CGPA) of k^{th} semester is

$$CGPA = \frac{\sum_{j=1}^{m} S_j * C_j}{\sum_{j=1}^{m} C_j}$$

Where S_j is SGPA of j^{th} semester,

C_j is total Credits in j^{th} semester, and

m is total number of semesters upto current k^{th} semester.

(b) Awarded SGPA and CGPA shall be recalculated if a candidate passes a subject or all subjects of any semester in 2^{nd} or later attempt.

(d) To calculate SGPA and CGPA, obtained marks for all subjects shall be considered irrespective of whether it is F grade (Failed or Absent) or any other grade.

12. **Maximum Time Period and Extension**

(a). A candidate, who has not passed finally after six years from the date of admission, shall not be allowed to continue the course.

(b). However the Vice-Chancellor in consultation with the Head of the Department may waive this limit of six years for the candidate who could not complete their M.E. Courses in one stretch. The reasons for granting exemption shall be recorded in writing. Such extension shall not exceed one year, consecutive to the sixth year, resulting total seven year from the date of admission.

13. **Additional Subject**

A candidate may be permitted to take additional units, subjects in excess of the minimum requirements for the M.E. Degree, subject to be permitted by the Head of the department. The result of these additional units/subjects shall be separately mentioned in the mark-sheet and it will not be counted for the award of the division.

14. **Scholarship**

Candidates having valid qualified GATE (Graduate Aptitude Test for Engineers) score will be eligible for UGC/AICTE Scholarship, subject to fulfillment of conditions of funding agency, if any. However while availing scholarships; the candidates have to fulfill all the requirements as per the norms of funding agency, for which the certification will be provided by head of the department.

15. **Medium of Instruction and Examinations**

The medium of Instructions and Examination in all Master of Engineering examinations of Theory/Practical and Sessional, Seminar and Dissertation shall be English.

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING
LIST OF TEACHING STAFF

PROFESSORS

1.	Dr. Arvind Kumar Verma	B.E., M.E., Ph.D., MISTE
2.	Dr. Vikas Kapoor	B.E., M.E., Ph.D., MISTE, MIE
3.	Dr. Manish Kumar	B.E. (Hons), M.E., Ph.D., MISTE, MIE
4.	Dr. Milind Kumar Sharma	B.E., M.E. (Hons.), Ph.D.

ASSOCIATE PROFESSOR

5.	Mrs. Rama Mehra	B.E. MISTE

ASSISTANT PROFESSOR

6.	Shri Naveen Kumar Suniya	B.TECH. , M. TECH.

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING

ME IN INDUSTRIAL ENGINEERING AND MANAGEMENT (2020-21)

ME (IEM) **Semester-I**

Teaching and Examination Scheme

Subject Code	Subject	Lecture	Tutorial/Practical	Contact Hrs.	Practical	Credits	Exam Hrs.	Marks			Total
								Theory	Course Work	Practical and Sessionals	
A. **Theory Papers**											
	Written Papers										
PI 501A	Industrial Engineering and Management	4	1	5	-	5	3	100	25	-	125
PI 502A	Work Study & Ergonomics	4	2	6	-	6	3	100	25	-	125
PI 503A	Quality Management	4	2	6	-	6	3	100	25	-	125
MA 504A	Statistics for Decision Making	4	2	6	-	6	3	100	25	-	125
PI 505A*	Elective I	4	1	5	-	5	3	100	25	-	125
	Total (A)	**20**	**8**	**28**	**-**	**28**	**15**	**500**	**125**	**-**	**625**
B. **Practical and Sessional**											
PI 501 B	Simulation Lab	-	-	-	4	2	2	-	25	100	125
	Total (B)	**-**	**-**	**-**	4	2	2	-	25	100	125
Total (A+B)		**20**	**8**	**28**	**4**	**30**	**17**	**500**	**150**	**100**	**750**

*** List of Papers in Elective I (PI 505A)**

PI 505 A(a): Organizational Behaviour
PI 505 A(b): Industrial Environmental and Policy
PI 505 A(c): Personnel Management & Industrial Relations
PI 505 A(d): Costing & Finance
PI 505 A(e): Terotechnology
PI 505 A(f): Advance Operations Research
PI 505 A(g): Programming, Data Structures and Algorithm using Python

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING

ME IN INDUSTRIAL ENGINEERING AND MANAGEMENT (2020-21)

ME (IEM) **Semester-II**

Teaching and Examination Scheme

Subject Code	Subject	Lecture	Tutorial/Practical	Contact Hrs.	Practical	Credits	Exam Hrs.	Marks			Total
								Theory	Course Work	Practical and Sessionals	
B. **Theory Papers**											
	Written Papers										
PI 506A	Supply Chain Management	4	2	6	-	6	3	100	25	-	125
PI 507A	Marketing & Financial Management	4	2	6	-	6	3	100	25	-	125
PI 508A	Operations Management	4	2	6	-	6	3	100	25	-	125
PI 509A	Sustainable Production Practices	4	1	5	-	5	3	100	25	-	125
PI 510A*	Elective II	4	1	5	-	5	3	100	25	-	125
	Total (A)	**20**	**8**	**28**	**-**	**28**	**15**	**500**	**125**	**-**	**625**
C. **Practical and Sessional**											
PI 506 B	ERP and Project Management Lab	**-**	**-**	**-**	4	2	2	-	25	100	125
	Total (B)	**-**	**-**	**-**	4	2	2	-	25	100	125
Total (A+B)		**20**	**8**	**28**	**4**	**30**	**17**	**500**	**150**	**100**	**750**

***List of Papers in Elective II (PI 510A)**

PI 510 A(a): Data Base Management Systems & Management Information Systems
PI 510 A(b): Patenting in Engineering
PI 510 A(c): Advances in Management Problem Solving
PI 510 A(d): Facilities Planning
PI 510 A(e): Product Design Management
PI 510 A(f): Software Engineering
PI 510(g): Engineering & Management Economics

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING

ME IN INDUSTRIAL ENGINEERING AND MANAGEMENT (2021-22)

ME (IEM) **Semester-III**

Teaching and Examination Scheme

Subject Code	Subject	Lecture	Tutorial/ Practical	Contact Hrs.	Credits	Exam Hrs.	Marks	
							Course Work & Presentation	Total
PI 511	Seminar	-	-	-	10	-	100	100
	Total	**-**	**-**	**-**	**10**	**-**	**100**	**100**

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ENGINEERING

ME IN INDUSTRIAL ENGINEERING AND MANAGEMENT (2021-22)

ME (IEM) **Semester IV**

Teaching and Examination Scheme

Subject Code	Subject	Lecture	Tutorial/ Practical	Contact Hrs.	Credits	Exam Hrs.	Marks		
							Course Work Presentation	Presentation & Viva	Total
PI 512	Dissertation	-	-	-	20	-	100	100	200

	Total	**-**	**-**	**-**	**20**	**-**	**100**	**100**	**200**

	Grand Total (Semester I, II III & IV)	**-**	**-**	**-**	**90**	**-**	**-**	**-**	**1800**

ME (IEM) SEMESTER I EXAMINATION SCHEME

PI 501A – Industrial Engineering and Management

4L, 1T **3 hours, 100 Marks**
Credits 5

PRODUCTIVITY: Definition of productivity, individual enterprises, task of management ,Productivity of materials, land, building, machine and power. Measurement of productivity, factors affecting the productivity, productivity improvement programs, wages and incentives (simple numerical problems).

DESIGN OF MAN-MACHINE SYSTEM: Fatigue in industrial workers, Quantitative qualitative representation and alphanumeric displays, Controls and their design criteria, control types, relation between controls and displays, layouts of panels and machines. Design of work places, influence of climate on human efficiency. Influence of noise, vibration and light.
CURRENT TRENDS: Introduction to Agile manufacturing, Lean and Six Sigma, Value Engineering, Just in time, Total quality management, Enterprise resource planning

PI 502A –WORK STUDY & ERGONOMICS

4L, 2T **3 hours, 100 Marks**
Credits 6

Work Study: Concept of Work and Productivity, Methods Study, Charting Techniques, Concept of Standard Time and Bench Mark Jobs, Timing Techniques and Work Sampling, Elemental Motions, THERBLIGS and Principles of Motion Economy, Introduction to Predetermined Motion Time Standards. MTM System and its application to Production and Maintenance. Integration of Methods and Time, Learning Theory implications on Standard Time.

Human Factors Engineering: Introduction to Ergonomics and Human Factors Engineering, Physiological Basis of Human Performance, Biomechanics, Psychology of work and work load perception, Physical Work Environment. Anthropometric standards or safety standards.

Theories of accident causation. Development of a systems approach towards collecting and analyzing accident data. Organization and management of a safety program in a company. Prevention of common safety hazards. Design of warnings signals and training for catastrophe.

PI 503A – QUALITY MANAGEMENT

4L, 2T **3 hours, 100 Marks**
Credits 6

Basic Concepts of Quality Assurance System, Statistical Quality Control, Process Capability Analysis, Inspection Standards, Control Charts for Process Control, Acceptance Sampling including Sampling Tables, Quality Costs Estimation and Reduction, Quality Circles including Fault-tree Analysis, Total Quality Control including Automation, Product & System Reliability: Basic Concepts, Quantitative Measurement, Prediction, Evaluation & Optimisation, Maintainability, Case Studies on/in Quality and Reliability Management in manufacturing and service organizations. Introduction to Advanced Quality Management Tools.

MA 504A –STATISTICS FOR DECISION MAKING

4L, 2T **3 hours, 100 Marks**
Credits 6

Bi-variate data; bi-variate, marginal and conditional frequency distribution. Variance and co-variance of a linear function of variates. Karl Pearson's correlation coefficient, rank correlation. Partial and multiple correlation. Simple and multiple regression.

Probability: Classical, relative frequency and axiomatic approach of probability. Additive law of probability, conditional probability, Statistical independence of events, multiplicative law of probability, Baye's theorem and its simple application.

Random Variable and Probability Distribution: Discrete random variable, probability mass function, continuous random variable, probability density function. Expectation and different measures of random variables. Binomial, Poisson, Normal, Gamma and Beta distributions. Central Limit theorem, Chi square Test

Statistical Inference: Concept of Sampling distribution and standard errors, Parameter & estimator, Point and interval estimation. Testing of hypothesis:

Two types of errors, level of significance and power of the test. Large sample tests, tests based on student t, χ^2 and F distribution.

Design of experiments: Analysis of variance, one way and two way classification including multiple but equal number of observations per cell. The completely randomized design, Randomized block design and Latin square design. Factorial experiments, the main and interaction effects, Layout and analysis in of 2^2 and 2^3 factorial experiments carried out in a RBD. (without any derivation).

PI 505A (a) – ORGANIZATIONAL BEHAVIOUR (ELECTIVE I)

4L, 1T **3 hours, 100 Marks**
Credits 5

A Social Systems Approach Human Behaviour- Perception, Learning & motivation Theories of Personality, Formation of Attitudes and Value Systems, Group Dynamics, Leadership and Team Building, Factors affecting group performance, Resolving conflicts, Management of Changes, Systems Approaches to Changes, The role of Industrial Engineer as a Change Agent, Organizational Development; and small group activity, Research studies and case studies in organizational behaviour.

PI 505A (b) – INDUSTRIAL ENVIRONMENTAL AND POLICY (ELECTIVE I)

4L, 1T **3 hours, 100 Marks**
Credits 5

Planning and Development Framework of India, Industrial Regulations and Controls, Law and Legislation, Indian Industry Productivity Scenario and Bottlenecks, Resource endowment, Technology Environment, Socioeconomic Environment, Industrial Relations Environment, Institutional Financing-International Environment of Business Trade and Balance of Payments, Study of Corporate Policy as an integrative exercise. Factory act Introduction

PI 505A (c) –PERSONNEL MANAGEMENT & INDUSTRIAL RELATIONS (ELECTIVE I)

4L, 1T **3 hours, 100 Marks**
Credits 5

Personnel Function: Its Evaluation, Objectives Principles, Philosophies, Duties and Responsibilities of the Personnel Management in India. Manpower Planning: Its uses and benefits; problems and limitations; Manpower Inventory; Manpower Forecasting; Manpower skills: Analysis and Practices in the Indian Industry. Recruitment: Selection Process, Psychological Testing; Interviewing Techniques, Transfer, promotion and its Policies; Induction placement and exit Interview Wage and salary Administration.

Training and Development: Its objective and Policy Planning and organising the training department, Training manager and his job, on and off the job Training, Techniques, Career Planning; Objective of Performance Appraisal and its Methods.

Industrial Relations: Problems of labour Management Relations; Causes for poor Industrial Relations; conditions of good Industrial Relations; Trade Union Act; Objectives and Advantages of Trade Unions; Collective Bargaining; Industrial Disputes Act, Disciplinary Action and Domestic Enquiries; Machinery for Settlement of Dispute; Grievance Procedure and its Handling; Counselling; Lay-off, Lockouts, Strikes, Retrenchment; Labour Participation in Management, Joint Management Councils, Factories Act and other Social Security Acts relevant to the course.

PI 505A (d) –COSTING & FINANCE (ELECTIVE I)

4L, 1T **3 hours, 100 Marks**
Credits 5

Analysis and interpretation of Final Accounts, Ration Analysis and interfirm comparison, Cost Accounting, Human resource accounting, Fixed and Variable costs, Process costs, Standard Costs, Cost Estimation and Cost Control, corporate Finance; Cost of Capital and Sources of Funds, Working Capital Management.

PI 505A (e) –Terotechnology
(ELECTIVE I)

4L, 1T **3 hours, 100 Marks**
Credits 5

Probability distributions – density and distribution functions for uniform, exponential, razeligh, weibull, normal distribution - Non-maintained systems – Reliability definition and its important – method of improving reliability redundancy techniques – failure data analysis.

Reliability models- Hazard models – constant, linearly increasing and Weibull models-estimating of reliability, failure density and MTTF for hazard models.

Maintenance systems and economics of reliability - Maintainability and availability concepts, MTBF, MTTR, MTBM & MDT repair hazard rate, maintainability and availability, functions and their mathematical expressions
Maintenance and spares management - preventive replacement- individual breakdown, replacement policy - individual preventive replacement policy - preventive group replacement.
Condition based maintenance - advantages and disadvantages - vibration monitoring - vibration parameters - vibration instruments

PI 505A (f) - ADVANCE OPERATIONS RESEARCH
(ELECTIVE I)

4L, 1T **3 hours, 100 Marks**
Credits 5

Introduction to Operations Research and Modelling, Role of Operations Research in Problem Solving and Decision Making, Formulation of Decision Problems as LP, Revised Simplex Methods, Computer Applications, Duality, Post Optimality Analysis and their Applications, Dual simplex method Transportation and Assignments Models, Game Theory, Queuing Theory, Simulation

PI 505A (g) - PROGRAMMING, DATA STRUCTURES AND ALGORITHM USING PYTHON (ELECTIVE I)

4L, 1T **3 hours, 100 Marks**
Credits 5

Introduction to python programming: variables, operations, control flow, assignments, conditionals, loops, expressions, strings, lists, tuples, python memory model: names, mutable and immutable value. List operations. Introduction to functions, optional arguments, default values, passing function as arguments. Exception handling, Basic Input/Output, handling files, string processing. Scope in python: local global non-local names. Nested functions classes and objects in python.
Basic algorithm analysis, recursion, searching and sorting algorithm, recurrence relation.
Data structures: dynamic arrays, python list implementation stacks and queues, linked lists, maps and tress. Hashing array.

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ME (IEM) SEMESTER II EXAMINATION SCHEME

PI 506A –SUPPLY CHAIN MANAGEMENT

4L, 2T **3 hours, 100 Marks**
Credits 6

Introduction to Supply Chain Management (SCM): Concept of Logistics Management, Concept of supply management and SCM, Core competency, Value chain, Elements of supply chain efficiency, Flow in supply chains, Key issues in supply chain management, Sourcing and Procurement: Outsourcing benefit, Importance of suppliers, Evaluating a potential supplier, Supply contracts, Competitive bidding and Negotiation, E-procurement
Introduction to Inventory Management: Selective Control Techniques, MUSIC-3D systems,
Various costs, Deterministic Models, Quantity Discounts - all units, incremental price; Sensitivity, Make-or-buy decisions. Independent Demand Systems (Probabilistic Models): Q- system, P- system, Mathematical modelling under known stock out costs and service levels, Bullwhip effect, Information and supply chain trade-offs.
Decision making and application: Decision making in SC – Applications of SCM – warehouse management system – product data management – E –Commerce – Reverse logistics –
Cases in Paper industry – Furniture industry.

PI 507A –MARKETING & FINANCIAL MANAGEMENT

4L, 2T **3 hours, 100 Marks**
Credits 6

Marketing philosophy of business, Monitoring the Environment, Analyzing Influences on Consumer Behaviour, Understanding Consumer's Decision Processes, Analyzing Organizational Markets, Gathering Marketing Information, Segmenting markets and positioning products, Formulating Marketing Strategies, Planning Marketing Programmes, Managing Products, Developing New Products, Marketing Intermediaries, Managing Market Logistics, Price Theory, Establishing and Managing Prices, Designing the Promotion Mix, Managing the Advertising Programme, Managing the Sales Force, Managing the Sales Territory, Controlling the Marketing Function, Service Marketing, Marketing in Non-Profit Organization and Social Marketing, Global Marketing, Marketing and Technological Innovations, Efficiency and Effectiveness in Marketing.

Concepts of Financial Accounting in Industries, Principle of Double Entry Book Keeping, Preparation of Ledger Accounts, Coding and Classification or Accounts, Revenue, Deferred and Capital Expenditure, Trial Balance, Profit and Loss Account, Balance Sheet, Income and Expenditure Account, Fund Flow Analysis.

PI 508A –OPERATIONS MANAGEMENT

4L, 2T **3 hours, 100 Marks**
Credits 6

Operations Management: Historical evolution of Production and Operations Management; A Systems View of Operations; The strategic role of Operations; Trends in Operations management; Operations strategies for competitive advantage, Designing Products, Services and Processes, New Product Development; Design of Service and Service Processes; Recent advances in Manufacturing System.

Forecasting: Forecasting in operations; Useful forecasting models for operations; Selection of Forecasting Models, Make or buy decisions.

Aggregate Planning: Planning Horizon, Master Production Schedule, Bill of Materials, Product Structure Tree, Capacity Requirement Planning, Line Balancing.

Material Requirements Planning: Requirement Planning Concepts; Inventory Planning Systems; MRP; MRP II; ERP;OPT.

Operations Scheduling: Scheduling Concepts; Job shop Scheduling; Batch Shop Scheduling; Scheduling for High Volume Systems; Scheduling for Service Systems; Priority Sequencing; Detailed Scheduling; Expediting.

Project Management: Project Planning; Project Scheduling Models; Deployment of Resources, Resource Leveling and Resource Smoothing, LOB Technique.

PI 509A – SUSTAINABLE PRODUCTION PRACTICES

4L, 1T **3 hours, 100 Marks**
Credits 5

Principles of green manufacturing including (1) lower usage of materials and energy (2) substitution of non-renewable with renewable input materials (3) reduction of unwanted outputs/waste (4) closing the loop (convert outputs to inputs through recycling, recovery, reuse) (5) re-engineering the structure of the systems through revised supply chain structure and changing the ownership concept in the system (introduction to Product Service Systems).

PI 510A (a) – DATA BASE MANAGEMENT SYSTEMS & MANAGEMENT INFORMATION SYSTEMS (ELECTIVE II)

4L, 1T **3 hours, 100 Marks**
Credits 5

Introduction to DBMS, Models of DBMS- Hierarchical, Network, Relational, Normalization- 1NF, 2NF, 3NF, 4NF, 5NF, File Design- Determinaly diagrams, Entity-Relationship Modelling, Relational Model, SQL and introduction to ORACLE or INGRESS, CODASYL Model, Concepts and Principles of MIS- Evolution of MIS in an organization, System development life cycle model, Pitfalls in MIS development, Long term MIS planning, Case Studies- Custom order processing and invoicing system, Production Information System, Information based manufacturing, Financial Accounting System, Distributed Data Base, Introduction to Decision Support systems.

PI 510A(b): PATENTING IN ENGINEERING (ELECTIVE II)

4L, 1T **3 hours, 100 Marks**
Credits 5

Introduction: Introduction to Intellectual Property Rights, Various forms of Intellectual Property Rights: , Copyrights, Trademarks, Patents, Geographical Indications and Traditional Knowledge, Industrial Designs, Semiconductor and Integrated Circuits, Trade Secrets etc.

Indian Patent Act, 1970: Introduction to Indian Patent Act and Rules, Types of Patent Applications, Patent Filing procedure, Forms and Fees for patent Application.

Exploitation of Patents: Rights of the Patentee, Infringement & remedies, Literal Infringement, Infringement by Equivalents – Doctrine of equivalents, Defences to Infringement.

Patent Search and Landscape Analysis: Introduction and Importance of Prior Art and Patent Search, Different kinds of Patent Searches: Patentability Search, Infringement Search, Invalidity Search, Freedom To Operate Search; Patent Search Methodology, Patent Classification Code systems(IPC) , Use of Classification Codes in Patent Search.

Patent Landscape and Analysis: Introduction to Landscape Analysis- Significance of analysis, Uses, Types of analysis, Patent maps- Types of Patent Maps,

Specifications and Claims for a Patent Application: Importance and significance of Specification and claims in the patent application, Point of novelty, types of claims, Patent Drawings.

IPR Management and Valuation: IP portfolio management -Importance and significance of IP portfolio management in an organization, IP Audit, IP Valuations.

International Patent Filing System: Patent Cooperation Treaty (PCT), Components of PCT, Filing of PCT application, Chapter I and II in the pct Process, PCT request and Demand forms.

PI 510A(C) –ADVANCES IN MANAGEMENT PROBLEM SOLVING (ELECTIVE-II)

4L, 1T **3 hours, 100 Marks**
Credits 5

Identification of complexities in Managerial Problems, Concept of problems hitherto unsolved, NP-hard problems, emphasis on specific problems, Travelling sales man problem, Introduction to various advanced problem solving techniques such as AI, Graph Theory, Fuzzy logic, Neural Networks, Genetic Algorithms their combinations etc. Their genesis & development, Comparative techniques and their suitability to management problems.

PI 510A (d) –FACILITIES PLANNING
(ELECTIVE II)

4L, 1T **3 hours, 100 Marks**
Credits 5

Facilities Location, Facilities Sizing, Facilities Layout including office Layout, land scaping etc. Facilities Design, Automated Storage and Retrieval System, Material handling, Automated Guided Vehicles, Group Layout, Line Balancing, Quantitative Methods in Location Layouts, Materials Handling, Computerization in Location, Layout Planning and Facilities Design.

PI 510A (e) – PRODUCT DESIGN MANAGEMENT
(ELECTIVE II)

4L, 1T **3 hours, 100 Marks**
Credits 5

Introduction to Design, Product Design, Design Management, Product Management.
Traditional & Modern Design, Design Process, Organizational Objectives.

Need related intelligence, Identification of latent needs, Technology related intelligence, Development of technological competence.

Organizational Strength & Weakness, Criteria for a new Product, Product Design and design methods, selection or methods appropriate to Design Stage. New Product Management, Forward Planning, Coordination and Communication.
Innovation, Creativity and diffusion, Techniques for creative idea generation.
Evaluation of New Products Ideas, Functions-technological, Ecological, Legal.
Investigating User Behaviour – User Habits, Expectations, Perception, and Techniques for Investigating User Behaviour.
Design Evaluation- Analysis for maintenance and useful life.
Market preparation vendor search, Sales promotion, Test marketing product & introduction strategy. Value Engineering concepts, Principles, Methodologies and Standards, Methods of Functional Analysis.
Organizational Structure for effective product innovation and Role of Product Manager.

PI 510A (f) –SOFTWARE ENGINEERING
(ELECTIVE II)

4L, 1T **3 hours, 100 Marks**
Credits 5

Data Structures: Primitive Data Structures, Classification of data structures into static and dynamic structures, Arrays, Queues, Linked Lists, Trees.

File Organization: Sequential files, Indexed sequential files, Relative Files.
Structured Systems Analysis and Design: Tools for Analysis: DFD, DD, Decision Tree, Decision Table, Structured design: Structured Chart, Transaction and Transform Analysis, Coupling and Cohesion.

PI 510A(g) – ENGINEERING & MANAGEMENT ECONOMICS
(ELECTIVE II)

4L, 1T **3 hours, 100 Marks**
Credits 5

The Principle and use of Economic Analysis in Engineering Practice, Discounted Cash-flow Analysis, Corporate Tax and Investment, Depreciation & Economic Studies, Replacement Analysis, Valuation of Assets, Economic Analysis for Projects, Analysis of risk & Uncertainty, Elements of Demand Analysis & Forecasting, Theory of Firm as an owner and as a producer, Economic of Scale, Market Models, Production Function, Output and Pricing Decision, Long Run & Short Run Cost Curves.

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