

2007-2008

**ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS**

**METALLURGY AND
MATERIAL
TECHNOLOGY**

For

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2007-2008)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
KUKATPALLY, HYDERABAD - 500 085.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD - 500 085

Academic Regulations 2007

for

B. Tech (Regular)

(Effective for the students admitted into I year
from the Academic Year 2007-2008 and onwards)

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B. Tech. Degree if he fulfils the following academic regulations:

- Pursued a course of study for not less than four academic years and not more than eight academic years.
- Registered for 224 credits and secured 216 credits with compulsory subjects as listed in Table-1.

Table 1: Compulsory Subjects

Sl. No.	Subject Particulars
1.	All the first year subjects
2.	All practical subjects
3.	Industry oriented mini project
4.	Comprehensive Viva-Voce
5.	Seminar
6.	Project work

- Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech course.

3. Courses of study

The following courses of study are offered at present for specialization for the B. Tech. Course:

Branch Code	Branch
I.	Aeronautical Engineering.
II.	Automobile Engineering.
III.	Bio-Medical Engineering.
IV.	Biotechnology.
V.	Chemical Engineering.
VI.	Civil Engineering.
VII.	Computer Science and Engineering.
VIII.	Computer Science and Systems Engineering.
IX.	Electrical and Electronics Engineering.
X.	Electronics and Communication Engineering.
XI.	Electronics and Computer Engineering.
XII.	Electronics and Control Engineering.
XIII.	Electronics and Instrumentation Engineering.
XIV.	Electronics and Telematics Engineering.

- XV. Information Technology.
- XVI. Instrumentation and Control Engineering.
- XVII. Mechanical Engineering (Mechatronics).
- XVIII. Mechanical Engineering (Production).
- XIX. Mechanical Engineering.
- XX. Metallurgical Engineering.
- XXI. Metallurgy and Material Technology.

and any other course as approved by the authorities of the University from time to time.

4. Credits

	I Year		Semester	
	Periods / Week	Credits	Periods / Week	Credits
Theory	03	06	04	04
	02	04		
	04	08	—	—
Practical	03	04	03	02
	06	08	06	04
Drawing	03	04	03	02
	06	08	06	04
Mini Project	—	—	—	02
Comprehensive Viva Voce	—	—	—	02
Seminar	—	—	—	02
Project	—	—	—	12

5. Distribution and Weightage of Marks

- i. The performance of a student in each semester / I year shall be evaluated subject -wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, Industry oriented mini-project, seminar and project work shall be evaluated for 50, 50 and 200 marks respectively.
 - ii. For theory subjects the distribution shall be 20 marks for Internal Evaluation and 80 marks for the End-Examination.
 - iii. For theory subjects, during the semester there shall be 4 tests, which include, 2 objective type tests each for duration of 20 minutes each and 2 subjective type tests each for duration of 90 minutes each. One objective type test and one subjective test to be conducted in 1-4 units and one objective type test and one subjective type test are to be conducted in 5-8 units of each semester. The best 3 tests will be considered for awarding 20 sessional marks. For the I year class which shall be on yearly basis, there shall be 6 tests which include, 3 objective type tests and 3 subjective type tests with the same duration and weightage for each test as mentioned above. However, the performance in the best 4 tests will be considered for awarding 20 sessional marks. The distribution of syllabus for the conduct of objective and subjective type tests in the first year shall be as follows:
- | | |
|-------------|--|
| 1 - 2 Units | one Objective type and one Subjective type test. |
| 3 - 5 Units | one Objective type and one Subjective type test. |
| 6 - 8 Units | one Objective type and one Subjective type test. |
- Each objective test question paper shall contain 20 objective type questions

for 20 marks. Each subjective type test question paper shall contain 5 questions out of which any 3 questions need to be answered. The subjective type question paper should also be for 20 marks. Though the test pattern is different, all the tests (objective and subjective type tests) have equal weightage.

- iv. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Of the 25 marks for internal, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and another member of the staff of the same department.
- v. For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 20 marks for internal evaluation (10 marks for day-to-day work and 10 marks for internal tests) and 80 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall consider for the award of marks for internal tests. However in the I year class, there shall be three tests and the best two will be taken into consideration.
- vi. There shall be an industry-oriented mini-Project, in collaboration with an industry of their specialization, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated with the project work in IV year II Semester. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall evaluate for 50 marks. The committee consists of an external examiner, head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.
- vii. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.
- viii. There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of (i) Head of the Department (ii) two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he / she studied during the B.Tech course of study. The Comprehensive Viva-Voce is valued for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-voce.
- ix. Out of a total of 200 marks for the project work, 40 marks shall be for Internal Evaluation and 160 marks for the End Semester Examination. The End Semester Examination (viva-voce) shall be conducted by the same committee appointed for industry oriented mini project. In addition the project supervisor shall also be included in the committee. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project.

- x. Laboratory marks and the sessional marks awarded by the College are not final. They are subject to scrutiny and scaling by the University wherever felt desirable. The sessional and laboratory marks awarded by the College will be referred to a Committee. The Committee will arrive at a scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.
- 6. Attendance Requirements:**
- A student shall be eligible to appear for University examinations if acquires a minimum of 75% of attendance in aggregate of all the subjects.
 - Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester / 1 year may be granted by the College Academic Committee.
 - A student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester / 1 year, as applicable. They may seek re-admission for that semester / 1 year when offered next.
 - Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
 - Students whose shortage of attendance is not condoned in any semester / 1 year are not eligible to take their end examination of that class and their registration shall stand cancelled.
 - A stipulated fee shall be payable towards condonation of shortage of attendance.
- 7. Minimum Academic Requirements:**
- The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 6
- A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together.
 - A student shall be promoted from II to III year only if he fulfils the academic requirement of 42 credits from one regular and one supplementary examinations of I year, and one regular examinations of II year I semester irrespective of whether the candidate takes the examination or not.
 - A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of total 70 credits from the following examinations, whether the candidate takes the examinations or not.
 - Two regular and two supplementary examinations of I year.
 - Two regular and one supplementary examinations of II year I semester.
 - One regular and one supplementary examinations of II year II semester.
 - One regular examination of III year I semester.
 - A student shall register and put up minimum attendance in all 224 credits and earn the 216 credits. Marks obtained in the best 216 credits shall be considered for the calculation of percentage of marks.
 - Students who fail to earn 216 credits as indicated in the course structure including compulsory subjects as indicated in Table-1 within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

8. Course pattern:

- The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.
- A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the supplementary examination.
- When a student is detained due to lack of credits / shortage of attendance he may be re-admitted when the semester / year is offered after fulfilment of academic regulations. Whereas the academic regulations hold good with the regulations he /she first admitted.

9. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	From the aggregate marks secured from the best 216 Credits.
First Class with Distinction	70% and above	
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

10. Minimum Instruction Days:

The minimum instruction days for each semester / 1 year shall be 95/180 clear instruction days.

- There shall be no branch transfers after the completion of admission process.
- There shall be no place transfer within the Constituent Colleges and Units of Jawaharlal Nehru Technological University.

13. General:

- Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.
- The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD - 500 085

Academic Regulations for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2008-2009 and onwards)

- The Students have to acquire 160 credits from II to IV year of B.Tech. Program (Regular) for the award of the degree.
Registered for 168 credits and secured 160 credits with compulsory subjects as listed in Table-1.

Table 1: Compulsory Subjects

SI. No.	Subject Particulars
1.	All practical subjects
2.	Industry oriented mini project
3.	Comprehensive Viva-Voce
4.	Seminar
5.	Project work

- Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
- The same attendance regulations are to be adopted as that of B. Tech. (Regular).

Promotion Rule:

A student shall be promoted from third year to fourth year only if he fulfils the academic requirements of 42 credits from the examinations.

- Two regular and one supplementary examinations of II year I semester.
- One regular and one supplementary examinations of II year II semester.
- One regular examination of III year I semester.

Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes:

First Class with Distinction	70% and above	From the aggregate marks secured from the best 160 Credits (i.e. II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

- All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

METALLURGY AND MATERIAL TECHNOLOGY

IYEAR B.TECH.
COURSE STRUCTURE

CODE	SUBJECT	T	P/D	C
07A1BS01	English	2+1*	0	4
07A1BS02	Mathematics - I	3+1*	0	6
07A1BS03	Engineering Physics	2+1*	0	4
07A1EC08	Metallurgical Analysis	2+1*	0	4
07A1EC09	Engineering Mechanics	3+1*	0	6
07A1EC10	Computer Programming and Numerical Methods	2+2*	0	4
07A11891	Engineering Graphics	0	6	8
07A11892	Engineering Workshop Practice Lab	0	3	4
07A11893	English Language Communication			
07A11894	Skills Lab	0	3	4
07A11895	Metallurgical Analysis Lab	0	3	4
	Computer Programming and Numerical Methods Lab	0	6	8
Total		21	21	56

COURSE STRUCTURE

II YEAR

I SEMESTER

CODE	SUBJECT	T	P	C
07A3BS01	Mathematics - II	4+1*	0	4
07A3EC19	Electrical Engineering	4+1*	0	4
07A3EC07	Mechanics of Solids	4+1*	0	4
07A3EC06	Object Oriented Programming	4+1*	0	4
07A3EC18	Physical Metallurgy	4+1*	0	4
07A30602	Metallurgical thermodynamics and Kinetics	4+1*	0	4
07A31891	Java Lab	0	3	2
07A31892	Physical Metallurgy Lab	0	3	2
Total		30	6	28

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METALLURGY AND MATERIAL TECHNOLOGY

COURSE STRUCTURE		II SEMESTER		
II YEAR		T	P	C
CODE	SUBJECT			
07A4BS02	Mathematics - III	4+1*	0	4
07A4EC15	Mechanics Of Fluids	4+1*	0	4
07A4EC01	Environmental Studies	4+1*	0	4
07A40602	Fuels, Furnaces and Refractories	4+1*	0	4
07A40405	Basic Electronics	4+1*	0	4
07A4EC16	Mineral Dressing	4+1*	0	4
07A41891	Fuels, Furnaces and Refractories Lab	0	3	2
07A41892	Mineral Dressing Lab	0	3	2
TOTAL		30	6	28

COURSE STRUCTURE		I SEMESTER		
III YEAR		T	P	C
CODE	SUBJECT			
07A5BS01	Probability and Statistics	4+1*	0	4
07A5HS01	Managerial Economics and Financial Analysis	4+1*	0	4
07A50604	Mechanical Metallurgy	4+1*	0	4
07A5EC14	Heat Treatment Technology	4+1*	0	4
07A50605	Iron Production	4+1*	0	4
07A5EC22	Welding Technology	4+1*	0	4
07A51891	Mechanical Metallurgy Lab	0	3	2
07A51892	Heat Treatment Technology Lab	0	3	2
Total		30	6	28

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METALLURGY AND MATERIAL TECHNOLOGY

COURSE STRUCTURE		II SEMESTER		
III YEAR		T	P	C
CODE	SUBJECT			
07A6HS01	Management Science	4+1*	0	4
07A6EC10	Non Ferrous Extractive Metallurgy	4+1*	0	4
07A60604	Mechanical Working of Metals	4+1*	0	4
07A6EC11	Foundry Technology	3+1*	0	3
07A60605	Steel Making	3+1*	0	3
07A61801	Polymeric Materials	4+1*	0	4
07A61891	Advanced English Communication Skills Lab	0	3	2
07A61892	Mechanical Working of Metals Lab	0	3	2
07A61893	Foundry Technology Lab	0	3	2
Total		28	9	28

COURSE STRUCTURE		I Semester		
IV Year		T	P	C
CODE	SUBJECT			
07A7EC26	Electro Metallurgy and Corrosion	4+1*	0	4
07A71801	Ceramic Science and Technology	4+1*	0	4
07A7EC31	Powder Metallurgy	4+1*	0	4
07A70606	X-Ray Metallography	4+1*	0	4
ELECTIVE-I		4+1*	0	4
07A7EC27	Semi Conductors and Magnetic Materials			
07A70607	Non Destructive Testing			
07A7EC02	Non Conventional Sources of Energy			
07A7EC28	Computer Graphics			
ELECTIVE-II		4+1*	0	4
07A7EC29	CAD/CAM			
07A70608	Light Metals and Alloys			
07A71802	Nano Materials			
07A7EC30	Metallurgical Instrumentation			
07A71891	Electro Metallurgy and Corrosion Lab	0	3	2
07A71892	Metallurgical Computations Lab	0	3	2
Total		30	6	28

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HYDERABAD

METALLURGY AND MATERIAL TECHNOLOGY

IV YEAR

II SEMESTER

CODE	SUBJECT	T	P	C
07A81801	Composite Materials	4+1*	0	4
ELECTIVE-III		4+1*	0	4
07A80604	Super Alloys			
07A8EC16	Ferro Alloy Technology			
07A8EC15	Simulation and Data Processing			
07A8EC17	Experimental Techniques in Metallography			
ELECTIVE-IV		4+1*	0	4
07A8EC14	Metallurgical Problems			
07A80605	Advanced Materials			
07A8EC13	Operations Research			
07A81802	Nuclear Metallurgy			
07A81891	Industry Oriented Mini Project	-	-	2
07A81892	Seminar	-	-	2
07A81893	Project Work	-	-	10
07A81894	Comprehensive Viva	-	-	2
Total		15	0	28

NOTE: All University Examinations (Theory and Practical) are of 3 hours duration.

* : Tutorials

T : Theory periods per week

P/D : Practical /Drawing Periods per week

C : Total Credits for the subject

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

I Year B.Tech MMT

T	P	C
2+1*	0	4

(07A1BS01) ENGLISH

1. INTRODUCTION :

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure by the students. Hence, it is suggested that they read it on their own with topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. However, the stress in this syllabus is on skill development and practice of language skills.

2. OBJECTIVES:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects with greater facility through the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.

3. SYLLABUS :

Listening Skills:

Objectives

- To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
- To equip students with necessary training in listening so that can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills :

Objectives

- To make students aware of the role of speaking in English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.

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- Oral practice
- Describing objects/situations/people
- Role play - Individual/Group activities (Using exercises from all the nine units of the prescribed text: *Learning English : A Communicative Approach.*)
- Just A Minute(JAM) Sessions.

Reading Skills:**Objectives**

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

NOTE : The students will be trained in reading skills using the prescribed text for detailed study.

They will be examined in reading and answering questions using 'unseen' passages which

may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.

Writing Skills :**Objectives**

1. To develop an awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Editing a passage

4. TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into **Eight Units**, are prescribed:

For Detailed study

1. **LEARNING ENGLISH: A Communicative Approach.** Hyderabad: Orient Longman, 2006. (Six Selected Lessons)

For Non-detailed study

2. **WINGS OF FIRE: An Autobiography - APJ Abdul Kalam**, Abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

A STUDY MATERIAL:

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Unit-I

1. Astronomy from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
2. Chapters 1-4 from **Wings of Fire: An Autobiography - APJ Abdul Kalam**, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004

Unit-II

3. Information Technology from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
4. Chapters 5-8 from **Wings of Fire: An Autobiography - APJ Abdul Kalam**, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004

Unit-III

5. Humour from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
6. Chapters 9-12 from **Wings of Fire: An Autobiography - APJ Abdul Kalam**, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004

Unit-IV

7. Environment from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
8. Chapters 13-16 from **Wings of Fire: An Autobiography - APJ Abdul Kalam**, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004

Unit-V

9. Inspiration from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
10. Chapters 17-20 from **Wings of Fire: An Autobiography - APJ Abdul Kalam**, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

Unit -VI

11. Human Interest from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
12. Chapters 21-24 from **Wings of Fire: An Autobiography - APJ Abdul Kalam**, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

* Exercises from the lessons not prescribed shall also be used for classroom tasks.

Unit - VII

Exercises on

- Reading and Writing Skills
- Reading Comprehension
- Situational dialogues
- Letter writing
- Essay writing

Unit - VIII

Practice Exercises on Remedial Grammar covering

- Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions,
- Tense and aspect

Vocabulary development covering

- Synonyms & Antonyms, one-word substitutes, prefixes & suffixes,
- Idioms & phrases, words often confused.

REFERENCES:

1. **Strengthen Your English**, Bhaskaran & Horsburgh, Oxford University Press
2. **Basic Communication Skills for Technology**, Andrea J Rutherford, Pearson Education Asia.

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- Oral practice
- Describing objects/situations/people
- Role play - Individual/Group activities (Using exercises from all the nine units of the prescribed text: *Learning English : A Communicative Approach.*)
- Just A Minute(JAM) Sessions.

Reading Skills:**Objectives**

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

NOTE : The students will be trained in reading skills using the prescribed text for detailed study.

They will be examined in reading and answering questions using 'unseen' passages which

may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.

Writing Skills :**Objectives**

1. To develop an awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Editing a passage

4. TEXTBOOKS PRESCRIBED:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Eight Units, are prescribed:

For Detailed study

1. **LEARNING ENGLISH: A Communicative Approach**, Hyderabad: Orient Longman, 2006. (Six Selected Lessons)

For Non-detailed study

2. **WINGS OF FIRE: An Autobiography - APJ Abdul Kalam**, Abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

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Unit-I

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Unit-III

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Unit-V

9. Inspiration from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.
10. Chapters 17-20 from Wings of Fire: An Autobiography - APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

Unit - VI

11. Human Interest from LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.
12. Chapters 21-24 from Wings of Fire: An Autobiography - APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

* Exercises from the lessons not prescribed shall also be used for classroom tasks.

Unit - VII**Exercises on**

- Reading and Writing Skills
- Reading Comprehension
- Situational dialogues
- Letter writing
- Essay writing

Unit - VIII**Practice Exercises on Remedial Grammar covering**

- Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions,
- Tense and aspect

Vocabulary development covering

- Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

REFERENCES:

1. **Strengthen Your English**, Bhaskaran & Horsburgh, Oxford University Press
2. **Basic Communication Skills for Technology**, Andrea J Rutherford, Pearson Education Asia.

3. Murphy's English Grammar with CD, Murphy, Cambridge University Press
4. English Skills for Technical Students by Orient Longman
5. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
6. English For Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
7. A Hand book of English for Engineers & Technologists by Dr. P. Eliah, B. S. Publications.
8. Developing Communication Skills by Krishna Mohan & Meera Benerji (Macmillan)
9. Speaking and Writing for Effective Business Communication, Francis Soundararaj, MacMillan India Ltd., 2007.
10. The Oxford Guide to Writing and Speaking, John Seely, Oxford

UNIT - I

Differential equations of first order and first degree - exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories.

UNIT - II

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $xV(x)$, method of variation of parameters.

UNIT - III

Rolle's Theorem - Lagrange's Mean Value Theorem - Cauchy's mean value Theorem - Generalized Mean Value theorem (all theorems without proof) Functions of several variables - Functional dependence- Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints

UNIT - IV

Radius, Centre and Circle of Curvature - Evolutes and Envelopes Curve tracing - Cartesian , polar and Parametric curves.

UNIT - V

Applications of integration to lengths, volumes and surface areas in Cartesian and polar coordinates multiple integrals - double and triple integrals - change of variables - change of order of integration.

UNIT - VI

Sequences - series - Convergences and divergence - Ratio test - Comparison test - Integral test - Cauchy's root test - Raabe's test - Absolute and conditional convergence

UNIT - VII

Vector Calculus: Gradient- Divergence- Curl and their related properties of sums-products- Laplacian and second order operators. Vector Integration - Line integral - work done - Potential function - area- surface and volume integrals Vector integral theorems: Green's theorem-Stoke's and Gauss's Divergence Theorem (With out proof). Verification of Green's - Stoke's and Gauss's Theorems.

UNIT - VIII

Laplace transform of standard functions - Inverse transform - first shifting Theorem, Transforms of derivatives and integrals - Unit step function - second shifting theorem - Dirac's delta function - Convolution theorem - Periodic function - Differentiation and integration of transforms-Application of Laplace transforms to ordinary differential equations Partial fractions-Heaviside's Partial fraction expansion theorem.

Text Books:

1. A text Book of Engineering Mathematics, Vol-1 T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
3. A text Book of Engineering Mathematics, Shahnaz Bathul, Right Publishers.
4. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

References:

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thomson Book Collection.

UNIT I

OPTICS : Interference - Superposition of waves - Young's double slit experiment - Coherence - Interference in thin films by reflection - Newton's rings - Diffraction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction at a Single slit - Double slit - Diffraction grating - Grating spectrum - Resolving power of a grating - Rayleigh's criterion for resolving power - Polarization - Types of Polarization - Double refraction - Nicol prism.

UNIT II

ULTRASONICS : Introduction - Production of ultrasonic waves - Magnetostriction method - Piezo electric method - Detection of ultrasonic waves - Properties of ultrasonic waves - Use of ultrasonics for nondestructive testing - Applications of ultrasonics.

ACOUSTICS OF BUILDINGS: Basic requirement of acoustically good hall - Reverberation and time of reverberation - Sabine's formula for reverberation time - Measurement of absorption coefficient of a material - Factors affecting the architectural acoustics and their remedy.

UNIT III

MAGNETIC PROPERTIES: Permeability - Magnetization - Origin of magnetic moment - Classification of magnetic materials - Dia, para and ferro magnetism - Hysteresis curve - Soft and hard magnetic materials.

SUPERCONDUCTIVITY: General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization - DC and AC Josephson effect -BCS Theory - Applications of superconductors.

UNIT IV

CRYSTAL STRUCTURES AND X-RAY DIFFRACTION: Introduction - Space lattice - Basis - Unit cell - Lattice parameter - Bravais lattices - Crystal systems - Structure and packing fractions of Simple cubic - Body centered cubic - Face centered cubic crystals - Directions and planes in crystals - Miller indices - Separation between successive $[h k l]$ planes - Diffraction of X-rays by crystal planes - Bragg's law - Laue method - Powder method.

UNIT V

LASERS : Introduction - Characteristics of lasers - Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby laser - Helium-Neon laser - CO₂ laser - Semiconductor laser - Applications of lasers in industry, scientific and medical fields.

UNIT VI

FIBER OPTICS AND HOLOGRAPHY: Introduction - Principle of optical fiber - Acceptance angle and acceptance cone - Numerical aperture - Types of optical fibers and refractive index profiles - Attenuation in optical fibers - Application of optical fibers - Basic principles of holography - Construction and reconstruction of image on hologram - Applications of holography.

UNIT VII

DIELECTRIC PROPERTIES: Introduction - Dielectric constant - Electronic, ionic and

orientational polarizations - Internal fields in solids - Clausius - Mossotti equation - Dielectrics in alternating fields - Frequency dependence of the polarizability - Ferro and Piezo electricity.

THERMAL PROPERTIES : Introduction - Specific Heat of Solids - Einstein Model - Debye Model - Lattice Vibrations - Phonons - Thermal Conductivity.

UNIT VIII

SCIENCE & TECHNOLOGY OF NANOMATERIALS: Introduction to Nano materials - Basic principles of Nanoscience & Technology - Fabrication of nano materials - Physical & chemical properties of nanomaterials - Carbon nanotubes - Applications of nanotechnology.

TEXT BOOKS:

1. **Physics Volume 2** by Halliday, Resnick and Krane; John Wiley & Son.
2. **Applied Physics 2nd Edition** by Dr. P. Appala Naidu & Dr. M. Chandra Shekar, V.G.S. Book links.
3. **Engineering Physics** by R.K. Gaur & S.L. Gupta; Dhanpat Rai and Sons.

REFERENCES:

1. **Nanotechnology** by Mark Ratner and Daniel Ratner, Pearson Education.
2. **Introduction to solid state physics** by C. Kittel; Wiley Eastern Ltd.
3. **Materials Science and Engineering** by V. Raghavan; Prentice-Hall India.
4. **Engineering Physics** by Dr. M. Arumugam; Anuradha Agencies.
5. **Nanomaterials** by A.K. Bandyopadhyay; New Age International Publishers.
6. **Engineering Physics** by M.N. Avadhanulu & P.G. Kshirasagar; S. Chand & Company Ltd.

I Year B.Tech MMT

T	P	C
2+1*	0	4

(07A1EC08) METALLURGICAL ANALYSIS

UNIT-I : importance of chemical analysis, scope of metallurgical analysis, classification of various methods used in metallurgical analysis. Solution preparations, normality, molarity, molality, Equivalent weight. Dissolution of ores in general, dissolution of metals and alloys.

UNIT-II : Chemical Analysis - Basic Principles - theory of indicators -Conventional solution methods for qualitative analysis of ores, fluxes, slags, metals and refractories.

UNIT-III : Qualitative analysis of common non-ferrous alloys such as brasses, bronzes and solders. Estimation of C, S, Si, Mn and P in cast iron and steel.

UNIT-IV : Estimation of Cr, Ni, Mo, W and V in alloy steels.

UNIT-V : Determination of iron in iron ore, manganese in manganese ores, lime in limestone, fire-assay of precious metals.

UNIT-VI : Instrumental analysis: Importance of instrumental analysis -Comparison with standard wet chemical methods - Fundamental Physicochemical principles involved and equipment required in absorptiometry i.e, colorimetry and spectrophotometry, colorimetric titration.

UNIT-VII : Spectroscopy, potentiometry, amperometric titration.

UNIT-VIII : Calorimetric titrations, polarography, conductometry, electro-analysis and flame photometry.

TEXT BOOK:

1.S.K.Jain-Metallurgical analysis.

REFERENCES:

1. Agarwal, B.C. and Jain S.P., A Text Book of Metallurgical Analysis, Khanna Publishers, Delhi-1963.
2. Iyer V.G., Metallurgical Analysis: BHU Press, Varanasi.
3. Snell Foster D and Frank M Biffen: Commercial methods of analysis / Che. Publishing Co., 1964
4. Vogel Al., A Text Book of Quantitative Inorganic Analysis Longman ELBS 1962.
5. Willard H.H. et.al: Instrumental Methods of analysis Van Nostrand.

I Year B.Tech MMT

T	P	C
3+1*	0	6

(07A1EC09) ENGINEERING MECHANICS

UNIT - I

Introduction to Engg. Mechanics - Basic Concepts. **Systems of Forces :** Coplanar Concurrent Forces - Components in Space - Resultant - Moment of Force and its Application - Couples and Resultant of Force Systems. **Equilibrium of Systems of Forces :** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces.

UNIT - II

Friction : Types of Friction - Limiting Friction - Laws of Friction - Static and Dynamic Frictions

Motion of Bodies: Wedge, Screw, Screw-jack, and Differential Screw-jack.

UNIT - III

Transmission of Power: Flat Belt Drives : Types of Flat Belt Drives - Length of Belt, Tensions, Tight side, Slack Side, Initial and Centrifugal Power Transmitted and Condition for Max. Power.

UNIT - IV

Centroid : Centroids of simple figures (from basic principles) - Centroids of Composite Figures

Centre of Gravity : Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorem.

UNIT - V

Area moments of Inertia : Definition - Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia :** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT - VI

Kinematics : Rectilinear and Curvilinear motions - Velocity and Acceleration - Motion of Rigid Body - Types and their Analysis in Planar Motion.

Kinetics : Analysis as a Particle and Analysis as a Rigid Body in Translation - Central Force Motion - Equations of Plane Motion - Fixed Axis Rotation - Rolling Bodies.

UNIT - VII

Work - Energy Method : Equations for Translation, Work-Energy Applications to Particle Motion, Connected System, Fixed Axis Rotation and Plane Motion, Impulse momentum method.

UNIT - VIII

Mechanical Vibrations : Definitions, Concepts - Simple Harmonic Motion - Free vibrations, simple and Compound Pendulums and its Applications -

TEXT BOOKS:

1. Engineering Mechanics / Fedinand . L. Singer / Harper - Collins.
2. Engg. Mechanics / Timoshenko & Young.
3. Engg. Mechanics / S.S. Bhavikatti & J.G. Rajasekharappa

REFERENCES:

1. Engg. Mechanics / Irving. H. Shames Prentice - Hall.
2. Engg. Mechanics Umesh Regl / Tayal.
3. Engg. Mechanics / R.V. Kulkarni & R.D. Askhekar
4. Engg. Mechanics/Khurmi/S.Chand.
5. Engg. Mechanics / KL Kumar / Tata McGraw Hill.

I Year B.Tech MMT

T	P	C
2+2*	0	4

(07A1EC10) COMPUTER PROGRAMMING AND NUMERICAL METHODS**UNIT-I:**

Algorithm, flowchart, program development steps, basic structures of C language, C tokens, data types and sizes, declaration of variables, assigning values, arithmetic, relational and logical operator, increment and decrement operators, conditional operator, bit-wise operators, type conversions, expressions, evaluation, input-output statements, blocks, if and switch statement, while, do-while and for statements, C programs covering all the above aspects.

UNIT-II:

One dimensional & Two dimensional arrays, initialization, string variables-declaration, reading, writing, Basics of functions, String handling function, user-defined functions, recursive functions, variables and storage classes, scope rules, block structure, header files, C preprocessor, example C programs.

UNIT-III:

Pointer and Arrays: Pointers and addresses, Pointers and Arrays, Pointers And function arguments, Address arithmetic, character pointers and functions, pointers to pointers, multi-dimensional arrays, initialization of pointer arrays, command line arguments, pointers to functions.

UNIT-IV:

Structures: Definition, initializing, assigning values, passing of structures as arguments, Arrays of structures, pointers to structures, self referential structures. Unions and files, C program examples.

UNIT-V:

Linear DataStructures: Introduction to DataStructures, representing stacks and queues in C using arrays, Infix, Postfix & Prefix programs, circular queues.

UNIT-VI:

Solution of Algebraic and Transcendental Equations : Introduction - The Bisection Method - The Method of False Position - The Iteration Method - Newton-Raphson Method.

UNIT-VII:

Interpolation: Introduction- Errors in Polynomial Interpolation - Finite differences- Forward Differences-Backward differences-Central differences - Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation - Central difference interpolation Formulae - Gauss' Central Difference Formulae -Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT-VIII:

Numerical Differentiation and Integration: The Cubic Spline Method - Trapezoidal rule - Simpson's 1/3 Rule-Simpson's 3/8 Rule-Boole's and Weddle's Rules. Numerical solution of Ordinary Differential equations: Solution by Taylor's series Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods-Predictor-Corrector Methods- Adams-Moulton Method-Milne's Method.

TEXT BOOKS:

1. C And Data structures - P.Padmanabham, BS Publications
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI Pearson

REFERENCES:

1. Computer Programming and Numerical Methods - Ashok N.Kamthane, Pearson Education.
2. The C Programming Language - B.W. Kernighan, Dennis M.Ritchie, PHI/ Pearson Education
3. C & Data Structures - Prof. P.S.DeshPande, Prof O.G.Kakde, Wiley Dreamtech Pvt. Ltd., NewDelhi.
4. DataStructures Using C - A.S.Tanenbaum, PHI/Pearson education
5. Applied Numerical methods for Engineers using MATLAB and C, Robert J. Schilling, Sandra L. Harries, Thomson.
6. Numerical Methods in C, J.G.Kori, Laxmi publications.
7. Introductory Methods of Numerical Analysis: S.S.Sastry, Prentice Hall of India, Pvt Ltd.

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I Year B.Tech MMT

T	P	C
0	6	8

(07A11891) ENGINEERING GRAPHICS

UNIT - I

INTRODUCTION TO ENGINEERING DRAWING : Principles of Engineering Graphics and their Significance - Drawing Instruments and their Use - Conventions in Drawing - Lettering - BIS Conventions. Curves used in Engineering Practice & their Constructions - Conic Sections including the Rectangular Hyperbola (General method only) - Cycloid, Epicycloid and Hypocycloid - Involute - Helices - scales used in engineering practice and representative fraction- the principals - construction of plain diagonal and vernier scales

UNIT - II

DRAWING OF PROJECTIONS OR VIEWS ORTHOGRAPHIC PROJECTION IN FIRST ANGLE

PROJECTION ONLY : Principles of Orthographic Projections - Conventions - First and Third Angle Projections Projections of Points and Lines inclined to both planes, True lengths, traces.

UNIT - III

PROJECTIONS OF PLANES & SOLIDS : Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes. Projections of Regular Solids inclined to both planes - Auxiliary Views. Sections and Sectional views of Right Regular Solids - Prism, Cylinder, Pyramid, Cone - Auxiliary views.

UNIT - IV

DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right Regular Solids - Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids - Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT - V

ISOMETRIC PROJECTIONS : Principles of Isometric Projection - Isometric Scale - Isometric Views - Conventions - Isometric Views of Lines, Plane Figures, Simple and Compound Solids - Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

UNIT - VI

TRANSFORMATION OF PROJECTIONS : Conversion of Isometric Views to Orthographic Views - Conventions.

UNIT - VII

PERSPECTIVE PROJECTIONS : Perspective View : Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods(General Method only).

UNIT - VIII

Introduction to Computer aided Drafting: Generation of points, lines, curves, polygons, simple solids, dimensioning.

TEXT BOOK:

- Engineering Drawing, N.D. Bhat / Charotar
- Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishers
- Engineering Drawing, Narayana and Kannaiah / Scitech publishers.

REFERENCES:

- Engineering Drawing and Graphics, Venugopal / New age.
- Engineering Drawing- Johle/Tata Macgraw Hill.
- Computer Aided Engineering Drawing- Trymbaka Murthy- I.K. International.

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I Year B.Tech MMT

T	P	C
0	3	4

(07A11892) ENGINEERING WORK SHOP PRACTICE LAB

I TRADES FOR EXERCISES:

- Carpentry
- Fitting
- Tin-Smyth and Development of jobs carried out and soldering.
- Black Smithy
- House-wiring
- Foundry
- IT Workshop-I : Computer hard ware , identification of parts , Disassembly, Assembly of computer to working condition, Simple diagnostic exercises.
- IT workshop-II : Installation of Operating system windows and Linux , simple diagnostic exercises.

II TRADES FOR DEMONSTRATION & EXPOSURE:

- Plumbing
- Welding
- Machine Shop
- Power tools in construction, Wood working, Electrical Engg & Mechanical Engg
- Metal Cutting (water plasma)

Text Books: Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech publishers

I Year B.Tech MMT

T	P	C
0	3	4

(07A11893) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives:

1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

SYLLABUS:

The following course content is prescribed for the English Language Laboratory sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
4. Oral Presentations- Prepared and Extempore.
5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
9. Telephoning Skills.
10. Giving Directions.

Minimum Requirement:

The English Language Lab shall have two parts:

- i) The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
- ii) The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo -audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

- i) P - IV Processor
 - a) Speed - 2.8 GHZ
 - b) RAM - 512 MB Minimum
 - c) Hard Disk - 80 GB
- ii) Headphones of High quality

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- The Rosetta Stone English Library

- Clarity Pronunciation Power - Part I
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd with CD.
- Oxford Advanced Learner's Compass, 7th Edition
- Learning to Speak English - 4 CDs
- Microsoft Encarta with CD
- Murphy's English Grammar, Cambridge with CD
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
2. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
3. Spoken English- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
4. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai
5. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
6. A Practical Course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
7. A text book of English Phonetics for Indian Students by T.Balasubramanian (Macmillan)
8. English Skills for Technical Students, WBSCTE with British Council, OL

DISTRIBUTION AND WEIGHTAGE OF MARKS**English Language Laboratory Practical Paper:**

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

I Year B.Tech MMT

T	P	C
0	3	4

(07A11894) METALLURGICAL ANALYSIS LAB

1. Estimation of Iron in Iron ore. – to determine the percentage of Iron in Iron Ore by KMnO₄ method and K₂Cr₂O₇ method.
2. Estimation of Silicon in Cast Iron.
3. Estimation of Carbon in Steel by Strohlein apparatus method.
4. Estimation of Copper in Brass by Electrolytic method.
5. Estimation of manganese in cast iron.
6. Estimation of Chromium in Steel.
7. Estimation of Sodium and Potassium in Chloride Salts by Flame Photometry.
8. Estimation of lime in Limestone.
9. Estimation of the concentration of KMnO₄ in the solution using Digital Spectrophotometer.
10. Estimation of Sulphur and Phosphorus in cast irons.
11. Estimation of Chromium in Stainless steels.
12. Estimation of Mn, Cr and Si in Ferro-Alloys

EQUIPMENT:

1. C & S Strohlein apparatus
2. Flame Photometer
3. Digital Spectrophotometer
4. Electronic digital balances - 2 No's

I Year B.Tech MMT

T	P	C
0	6	8

(07A11895) COMPUTER PROGRAMMING AND NUMERICAL METHODS LAB

1. Write a C program the evaluates the following algebraic expressions after reading necessary values from the user:
 a) $ax+b/ax-b$
 b) $2.5 \log x + \cos 320 + |x^2 - y^2| + \sqrt{2xy}$
 c) $1/???$
 2. Write a C program for the following
 a) Printing three given integers in ascending order
 b) Sum of $1 + 2 + 3 + \dots + n$
 c) $1 + x^2/2! + x^2/4! + \dots$ upto ten terms
 d) $x + x^3/3! + x^5/5! + \dots$ upto 7th digit accuracy
 e) Read x and compute $Y = 1$ for $x > 0$
 $Y = 0$ for $x = 0$
 $Y = -1$ for $x < 0$
 3. Write C program using FOR statement to find the following from a given set of 20 integers.
 i) Total number of even integers. ii) Total number of odd integers.
 iii) Sum of all even integers. iv) Sum of all odd integers.
 4. Write a C program to obtain the product of two matrices A of size (3X3) and B of size (3X2). The resultant matrix C is to be printed out along with A and B. Assume suitable values for A & B.
 5. Using switch-case statement, write a C program that takes two operands and one operator from the user, performs the operation and then prints the answer. (consider operators +, -, /, *, and %).
 6. Write C procedures to add, subtract, multiply and divide two complex numbers ($x+iy$) and ($a+ib$). Also write the main program that uses these procedures.
 7. A cloth show room has announced the following seasonal discounts on purchase of items.
 Purchase Amount | Discount (Percentage) | Mill Cloth | Handloom items
 1-100- 5.0 | 101-200- 7.5 | 201-300- 10.0 | Above 300- 15.0
 - Write a C program using switch and If statements to complete the net amount to be paid by a customer.
 - Given a number, write C program using while loop to reverse the digits of the number. Example 1234 to be written as 4321.
 - The Fibonacci sequence of numbers is 1,1,2,3,5,8... based on the recurrence relation
 $f(n) = f(n-1) + f(n-2)$ for $n > 2$.
- Write C program using do-while to calculate and print the first m Fibonacci numbers.

10. Write a C program to extract a portion of a character string and print the extracted string. Assume that m characters are extracted starting with the nth character.

11. Write a function that will scan a character string passed as an argument and convert all lower case characters into their upper case equivalents.

12. Implement the following data structures using Arrays i) Stacks ii) Linear Queues iii) Circular queues

13. Simple expression evaluator, that can handle +,-,/ and *.

14. Implement the algorithms for the following Iterative Methods Using C to find one root of the equation $f(x)=x\sin x+\cos x=0$

a) Bisection b) False Position

c) Newton-Raphson d) Successive Approximation

15. Implement the algorithms for the following iterative methods using C to find one root of the equation

$$9x_1+2x_2+4x_3=20$$

$$x_1+10x_2+4x_3=6$$

$$2x_1-4x_2+10x_3=-15.$$

16. Write Computer programs to implement the Lagrange interpolation and Newton-Gregory forward interpolation.

17. Implement in 'C' the linear regression and polynomial regression algorithms.

18. Implement Trapezoidal and Simpson methods.

UNIT - I

Matrices: Elementary row transformations - Rank - Normal form - Echelon form - Consistency - Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

UNIT - II

Eigen values, Eigen vectors - properties - Cayley-Hamilton Theorem - Inverse and powers of a matrix by Cayley-Hamilton theorem - Diagonalization of matrix. Calculation of powers of matrix - Modal and spectral matrices.

UNIT-III

Real matrices - Symmetric, skew - symmetric, orthogonal, Linear Transformation - Orthogonal Transformation. Complex matrices: Hermitian, Skew-Hermitian and Unitary - Eigen values and Eigen vectors of complex matrices and their properties Quadratic forms - Reduction of quadratic form to canonical form - Rank - Positive, negative definite - semi definite - index - signature - Sylvester law.

UNIT - IV

Fourier Series: Determination of Fourier coefficients - Fourier series - even and odd functions - Fourier series in an arbitrary interval - even and odd periodic continuation - Half-range Fourier sine and cosine expansions.

UNIT-V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations.

UNIT - VI

Method of separation of variables - Classification of second order linear Partial Differential Equations, solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT - VII

Fourier integral theorem - Fourier sine and cosine integrals. Fourier transforms - Fourier sine and cosine transforms - properties - inverse transforms - Finite Fourier transforms.

UNIT - VIII

Z-transform - inverse z-transform - properties - Damping rule - Shifting rule - Initial and final value theorems. Convolution theorem - Solution of difference equation by z-transforms.

Text Books:

1. A text Book of Engineering Mathematics, Vol-II T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
3. A text Book of Engineering Mathematics, Shahnaz Bathul, Right Publishers.
4. A text Book of Engineering Mathematics, P. Nageswara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

References:

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thomson Book Collection.

II Year B.Tech. MMT I Sem

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(07A3EC19) ELECTRICAL ENGINEERING

UNIT I

BASIC CONCEPTS: SI Units - Ohm's law, series, and parallel circuits, Kirchhoff's laws, Star-delta transformation (Simple Problems) Force on a current carrying conductor in magnetic field electromagnetic induction, Faraday's law, Lenz's law Self and mutual inductances.

UNIT II

A.C. CIRCUIT FUNDAMENTALS: Average and rms values of Sinusoidal quantity representation of alternating quantities by phasors single phase series and parallel circuits (simple problems) Series resonance three phase balanced systems single and three phase power calculations.

UNIT III

D.C. GENERATORS: Principle of operation of DC machines emf equation types of generators Magnetization and Load characteristics of DC generators

UNIT-IV

D.C. MOTORS: Principle of operation of DC Motor, Types of Motors, Back EMF Equation, Characteristics of DC motor, Torque Equation, DC Motor Starter (Three Point starter), Efficiency Calculation, Swinburne's Test and speed control.

UNIT V

TRANSFORMERS: Construction and principle of operation of single-phase transformer emf equation O.C. & S.C. tests efficiency and regulation

UNIT-VI

INDUCTION MOTORS: Principle and operation of three-phase induction motors types of motors, Squirrel cage and slip ring motor slip torque characteristics.

UNIT-VII

ALTERNATORS: Principle and operation of alternators O.C. & S.C. tests regulation by synchronous impedance method.

UNIT VIII

ELECTRICAL INSTRUMENTS: Electrical Instruments: Basic principles of indicating instruments moving coil and moving iron instruments (Ammeters and voltmeters).

TEXT BOOKS:

1. Introduction to Electrical Engineering by M.S. Naidu and S. Kamakshiah, TMH
2. Basic Electrical Engineering by T.K. Nagasarkar and M.S. Sukhija, Oxford University Press, 2005

REFERENCES:

1. Theory and Problems of Basic Electrical Engineering by D.P. Kothari & I.J. Nagrath Pearson Education/PHI
2. Essentials of Electrical and Computer Engineering by David V. Kerns, Jr, J. David Irwin; Pearson Education.

II Year B.Tech. MMT I Sem

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(07A3EC07) MECHANICS OF SOLIDS

UNIT - I

SIMPLE STRESSES AND STRAINS: Elasticity and plasticity - Types of stresses and strains - Hooke's law - stress - strain diagram for mild steel - Working stress - Factor of safety - Lateral strain, Poisson's ratio and volumetric strain - Elastic moduli and the relationship between them - Bars of varying section - composite bars - Temperature stresses. Strain energy - Resilience - Gradual, sudden, impact and shock loadings.

UNIT - II

SHEAR FORCE AND BENDING MOMENT: Definition of beam - Types of beams - Concept of shear force and bending moment - S.F. and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads - Point of contraflexure - Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT - III

FLEXURAL STRESSES: Theory of simple bending - Assumptions - Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis - Determination bending stresses - section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections - Design of simple beam sections.

UNIT - IV

SHEAR STRESSES: Derivation of formula - Shear stress distribution across various beams sections like rec tanguler, circular, triangular, I, T angle sections.

UNIT - V

ANALYSIS OF PIN-JOINTED PLANE FRAMES: Determination of Forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply - supported trusses - by method of joints, method of sections and tension coefficient methods.

UNIT - VI

DEFLECTION OF BEAMS: Bending into a circular arc - slope, deflection and radius of curvature - Differential equation for the elastic line of a beam - Double integration and Macaulay's methods - Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. uniformly varying load. Mohr's theorems - Moment area method - application to simple cases including overhanging beams.

UNIT - VII

THIN CYLINDERS: Thin seamless cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and Volumetric strains - changes in dia, and volume of thin cylinders - Riveted boiler shells - Thin spherical shells.

UNIT - VIII

Thick cylinders - lame's equation - cylinders subjected to inside and out side pressures - compound cylinders.

TEXT BOOKS:

1. Strength of Materials by Andrew Pytel and Ferdinand L. Singer Longman.
2. Strength of Materials by Jondar, Galgotia Publications.

REFERENCES:

1. Strength of Materials by Bensal, Lakshmi Publications.
2. Strength of Materials by S. Tumoshenko.
3. Strength of Materials by R.S. Khurmi, S.Chand & Co. 2005.

II Year B.Tech. MMT I Sem

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(07A3EC06) OBJECT ORIENTED PROGRAMMING

UNIT-I:

Introduction: Creation of Java, importance of Java to internet, byte code, Java buzzwords, OOP Principles, Encapsulation, Inheritance and Polymorphism, data types, variables, declaring variables, dynamic initialization, scope and life time of variables, arrays, operators, control statements, type conversion and casting, compiling and running of simple Java program.

UNIT-II:

Classes and Objects: Concepts of classes and objects, class fundamentals, Declaring objects, assigning object reference variables, introducing methods, constructors, usage of static with data and methods, usage of final with data, access control, this key word, garbage collection, overloading methods and

constructors, parameter passing - call by value, recursion, nested classes and inner classes, exploring the String class.

UNIT-III:

Inheritance: Basic concepts, member access rules, usage of super key word, forms of inheritance, method overriding, abstract classes, dynamic method dispatch, using final with inheritance, the Object class.

UNIT-IV:

Packages and Interfaces: Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT-V:

Exception Handling and Multithreading: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes. Concepts of Multithreading, differences between process and thread, thread life cycle, creating multiple threads using Thread class, Runnable interface, Synchronization, thread priorities, inter thread communication, daemon threads, deadlocks, thread groups.

UNIT-VI:

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. AWT: Concepts of components, container, panel, window, frame, canvas, Font class, Color class and Graphics.

UNIT-VII:

AWT Controls: Buttons, Labels, Text fields, Text area, Check boxes, Check box groups, Lists, Choice, Scrollbars, Menus, Layout Managers - Flow, Border, Grid, Card and Gridbag. Swing - JApplet, JFrame and JComponent, Icons and Labels, Handling threading issues; text fields, buttons - The JButton class, Check boxes, Radio buttons, Combo boxes; Tabbed Panes, Scroll Panes, Trees, and Tables. Applets - Concepts of Applets, differences between applets and applications, life cycle of an applet, types

UNIT-VIII:

Networking and Java Library: Basics of Networking, InetAddress, TCP/IP sockets, Datagram, URL, URL connection, String handling, java.util, java.io and java.net packages.

TEXT BOOKS:

1. The Complete Reference Java J2SE 5th Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi./PHI
2. Big Java 2nd Edition, Cay Horstmann, John Wiley and Sons.

REFERENCES:

1. Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education.
2. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
3. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
4. Beginning in Java 2, Iver Horton, Wrox Publications.

II Year B.Tech. MMT I Sem

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(07A3EC18) PHYSICAL METALLURGY

UNIT - I

Microscopy; Metallurgical Microscope, principles and construction, types of objectives and eyepieces, common defects of lenses, electron Microscope.

UNIT - II

Structure of Metals, Hume-Rotherys classification of metals, metallic bond-crystal structure of metals, coordination number, relationship between lattice parameter and atomic radius, packing factor and density calculations, interstitials, polymorphism, plane and directional indices, transformation of indices.

UNIT - III

Constitution of Alloys: Necessity of alloying, types of solid, Hume-Rotherys rules. Intermediate alloy phases, electro-chemical compounds, size factor, compounds and electron phases.

UNIT - IV

Equilibrium Diagrams: Experimental methods for construction of equilibrium diagrams, Isomorphous alloy systems, types of Nucleation, determination of the size of critical nucleus, equilibrium cooling and heating of alloys, lever rule, coring, miscibility gaps - eutectic reactions.

UNIT - V

Transformation in solid state, allotropy, order-disorder transformation, eutectoid, peritectoid reaction and complex phase diagrams, relation between equilibrium diagrams and physical properties of alloys.

UNIT - VI

Study of important binary phase diagrams Fe-Fe₃C, Cu-Zn, Cu-Sn, and Al-Cu.

UNIT - VII

Phase transformations in steels pearlitic, martensitic and bainitic transformations cooling curves.

UNIT - VIII

Isothermal transformation diagrams, transformations on continuous cooling.

TEXTBOOK:

- Introduction to Physical Metallurgy - S.H. Avner

REFERENCES:

- Engineering Physical Metallurgy and Heat Treatment - Y. Laktin.
- Elements of Physical Metallurgy - A. Guy
- Metallographic laboratory practice - Kehl
- Principles of Physical Metallurgy - Smith, M.
- Introduction to Metallurgy - A.H. Cottrell
- Physical Metallurgy principles-Reed Hill et al
- Metallurgy for Engineers Clark and Varney.
- Physical Foundations of Materials Science - G. Gottstein

II Year B.Tech. MMT I Sem

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(07A30602) METALLURGICAL THERMODYNAMICS AND KINETICS

UNIT-I

Objectives and limitations to thermodynamics, concepts of system and state, heterogeneous and homogeneous systems, extensive and intensive properties of system, thermodynamic variables, thermodynamic equilibrium. Reversible and irreversible processes.

First Law of thermodynamics:

Nature of first law, relationship between heat and work, internal energy and the first law of thermodynamics, calculations of work, constant capacity, reversible adiabatic processes, reversible isothermal pressure or volume changes of an ideal gas, enthalpy change with temperature, Kirchoff's equation.

UNIT-II

Second law of thermodynamics: Efficiency of a cyclic process, Carnot cycle, Carnot theorem, second law of thermodynamics, concept of entropy, entropy and quantification of irreversibility, reversible processes.

Third law of thermodynamics: Background of third law deductions from third law, applications of third law, and other methods of obtaining "S° for a reaction.

UNIT-III

Free energy functions: Purposes of the new functions, definition of Helmholtz and Gibbs free energy change, meaning of thermodynamically possible process, determination of "G from thermal data useful relationships between free energies and other thermodynamic functions, Maxwell's equation and Gibbs-Helmholtz equation.

Fugacity, activity and equilibrium constant: Concepts of fugacity, activity and equilibrium constant variation of the equilibrium constant with temperature, Tabular methods of recording thermodynamic data, sigma functions.

UNIT-IV

Claussius - Clapeyron equation: Introduction, derivation of the Claussius - Clapeyron equation for single substance, Duhriges rule for the estimation of the vapour pressures of an element, Intergration of Claussius - Clapeyron equation.

UNIT-V

DIFFUSION: Ficks law of diffusion and its application, Kirkendal effect, self-diffusion in pure metals, Temperature dependence of the diffusion coefficient, diffusion along the grain boundaries and surfaces.

UNIT-VI

ELLINGHAM DIAGRAMS: Introduction, calculation of equilibrium constants from standard free energy changes, general description of Ellingham diagrams, Interpretation of two or more free energy change Vs. temperature lines taken together, derivation and uses of the oxygen nomographic scale in Richardsons diagrams.

UNIT-VII

SOLUTIONS: Composition, partial molal quantities, ideal solutions, Raoult's Law, actual (Nonideal) solutions, Sieverts law, Gibbs's - Duhem equation, integration of Gibbs' - Duhem equation, Excess thermodynamics quantities

UNIT-VIII

Kinetics: Kinetics of chemical process, Molecularity and order of a reaction, zero order reactions, first order, second order reactions, Determination of order of reaction, collision theory, theory of absolute reaction rates, consecutive and simultaneous reactions, catalysis in chemical reactions.

TEXT BOOK:

1. Introduction to Metallurgical Thermodynamics - D.R. Gaskell

REFERENCES:

1. Physical chemistry for Metallurgists - J. Mackowick
2. Thermodynamics of solids-R.S. Swalin
3. Physical chemistry of metals-L.S. Darken & Gurry
4. Physical Metallurgy Principles - RH Reed hill.
5. Fundamentals of thermodynamics-Sonnntag et al
6. An Introduction to thermodynamics-Y.V.C.Rao
7. Fundamentals of Engineering- M.J.Morax & H.N.Shapiro.
8. Text Book of Materials and Metallurgical Thermodynamics: Ahindra Ghosh (PHI)

II Year B.Tech. MMT I Sem

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(07A31891) JAVA LAB

1. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminant $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.
2. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.
3. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
4. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
5. Write a Java program for sorting a given list of names in ascending order.
6. Write a Java program to multiply two given matrices.
7. Write a Java Program that reads a line of integers, and then displays each integers, and the sum of all the integers (use StringTokenizer class).
8. Write a Java program that reads a file name from the user then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
9. Write a Java program that reads a file and displays a file and displays the file on the screen, with a line number before each line.
10. Write a Java program that displays the number of characters, lines and words in a text file.
11. Write a Java program that:
 - a) Implements stack ADT.
 - b) Converts infix expression into Postfix form.
12. Write an applet that displays a simple message.
13. Write an applet that computes the payment of a loan based on the amount of the loan, the interest rate and the number of months. It takes one parameter from the browser: Monthly rate; if true, the interest rate is per month; otherwise the interest rate is annual.
14. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the + - X % operations. Add a text field to display the result.
15. Write a Java program for handling mouse events.
16. Write a Java program for creating multiple threads.
17. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
18. Write a Java program that lets users create Pie charts. Design your own user interface
(with swing & AWT)
19. Write a Java program that allows the user to draw lines, rectangles and Ovals.
20. Write a Java program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle, and the result produced by the server is the area of the circle.
21. Write a Java program that illustrates how run time polymorphism is achieved.

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(07A31892) PHYSICAL METALLURGY LAB

LIST OF EXPERIMENTS

1. Preparation and study of Crystal models.
2. Study of Specimen cutting machine Specimen mounting press Grinding and polishing equipment
3. Study of various Metallurgical Microscopes and use of leveling press
4. Metallographic preparation of ferrous specimen for Microscopic examination
5. Preparation of non-ferrous specimen for Metallographic examination
6. Preparation and Metallographic study of pure metals like Iron, Copper and Aluminium.
7. Measurement of lattice parameters of various crystal structures and calculation of packing factors and size of vacancies.
8. Drawing of the Binary phase diagrams of Isomorphous simple Eutectic and partial solubility diagram with interpretation.
9. Drawing of complex binary phase diagrams and identification of points, lines and areas in them.
10. Identification of Microstructures of steels
11. Estimation of Carbon content of steels using metallurgical microscope and Spark test.

Equipment:

1. Specimen Cutting Machine
2. Specimen Mounting Press
3. Belt Grinding Machine
4. Disc Polishing Machine
5. Metallurgical Microscopes
6. Spark Testing apparatus
7. Specimen Leveller.

II Year B.Tech. MMT II-Sem

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(07A4BS02) MATHEMATICS III

UNIT - I

Special functions: Gamma and Beta Functions - Their properties - evaluation of improper integrals. Bessel functions - properties - Recurrence relations - Orthogonality. Legendre polynomials - Properties - Rodrigue's formula - Recurrence relations - Orthogonality.

UNIT-II

Functions of a complex variable - Continuity - Differentiability - Analyticity - Properties - Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions - Milne - Thompson method.

UNIT-III

Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties - General power Z^c (c is complex), principal value.

UNIT-IV

Complex integration: Line integral - evaluation along a path and by indefinite integration - Cauchy's integral theorem - Cauchy's integral formula - Generalized integral formula.

UNIT-V

Complex power series: Radius of convergence - Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point - Isolated singular point - pole of order m - essential singularity.

UNIT-VI

Residue - Evaluation of residue by formula and by Laurent series - Residue theorem. Evaluation of integrals of the type

- | | |
|--|---|
| (a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ | (b) $\int_{-\infty}^{+\infty} f(\cos \theta, \sin \theta)d\theta$ |
| (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ | (d) Integrals by induction. |

UNIT-VII

Argument principle - Rouche's theorem - determination of number of zeros of complex polynomials - Maximum Modulus principle - Fundamental theorem of Algebra, Liouville's Theorem.

UNIT-VIII

Conformal mapping. Transformation by e^z , $\ln z$, z^n , z^n (n positive integer), $\sin z$, $\cos z$, $z + a/z$. Translation, rotation, inversion and bilinear transformation - fixed point - cross ratio - properties - invariance of circles and cross ratio - determination of bilinear transformation mapping 3 given points.

Text Books:

1. A text Book of Engineering Mathematics, Vol-III T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
3. A text Book of Engineering Mathematics, Shahnaz Bathul, Prentice Hall of India.
4. A text Book of Engineering Mathematics, P. Nageswara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

References:

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thomson Book Collection.

UNIT I

Fluid Properties And Fluid Statics: Density, Specific weight, Specific gravity, viscosity, Vapour pressure, compressibility, Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Hydrostatic law, Piezometer, Simple and differential manometers, pressure gauges, total pressure and center of pressure plane, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT II

Fluid Kinematics: Stream line, path line, streak line, stream tube, classification of flows, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational, irrotational flows, one, two and three dimensional flows Continuity equation in 3D flow, stream function, velocity potential function.

UNIT III

Fluid Dynamics: Surface and Body forces Euler's and Bernoulli's equation derivation, Navier - stokes equation (explanation only) Momentum equation - applications, vortex Free and Forced. Forced vortex with free surface.

UNIT IV

Similitude and Flow Measurement Similarly laws, distorted models. Flow through Venturiometers and Orificemeter, flow through notches and weirs, Viscometers, Hotwire Anemometers, Pitot tube, Flow through nozzles.

UNIT V

Approximate solutions of N.S. Equations - Boundary layer- concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate Von-karman's momentum integral equation (No derivation), laminar and turbulent Boundary layers, BL in transition, separation of BL, control of BL separation, flow around submerged objects, Drag and lift types of drag magnus effect.

UNIT VI

Closed Conduit Flow: Characteristics of real fluids Reynolds experiment Darcy's equation, Minor losses pipes in series pipes in parallel Total energy line and hydraulic gradient line.

UNIT VII

Exact Solutions of Navier Stokes Equations. Flow between parallel plates, flow through long tubes - Flow through inclined tubes, Turbulent flow, variation of friction factor with Reynold's Number Mody's chart.

UNIT VIII

Flow of Compressible Fluid: Introduction, Thermodynamic relations, basic equations of compressible flow, velocity of sound wave in a fluid for isothermal and adiabatic process, mach number and its applications, mach angle, Propagation of Pressure waves and stagnation properties

TEXT BOOKS:

1. Fluid Mechanics Hydraulics and Hydraulics Machines Modi & Seth, Standard publications, New Delhi.
2. Engineering Fluid Mechanics by K.L.Kumar, S.Chand & Co.

REFERENCES:

1. Fluid Mechanics Frnk in white Mc-Grawhill.
2. Fluid Mechanics - John F.Dauglas, Pearson Educations publishers.
3. Fluid Mechanics & Hydraulic Machines - D. Ramadurgaiah, Newage Publishers 2005.

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance - Need for Public Awareness.

UNIT - II

Natural Resources : Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over - exploitation, deforestation, case studies - Timber extraction - Mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water - Floods, drought, conflicts over water, dams - benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

Ecosystems : Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - IV

Biodiversity and its conservation : Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels. - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - V

Environmental Pollution : Definition, Cause, effects and control measures of :

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid waste Management : Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

2007-2008

UNIT - VI

Social Issues and the Environment : From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion; nuclear accidents and holocaust: Case Studies. -Wasteland reclamation. -Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT - VII

Human Population and the Environment : Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. -Case Studies.

UNIT - VIII

Field work : Visit to a local area to document environmental assets River /forest/ grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds. -Study of simple ecosystems pond, river, hill slopes, etc.

TEXT BOOK:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE:

1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

2007-2008

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II Year B.Tech. MMT II-Sem

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(07A40602) FUELS, FURNACES AND REFRactories**UNIT I**

Introduction to Fuels technology Classification of fuels Origin and classification of coal Analysis of Coal Proximate and ultimate analysis.

UNIT II

Pulverized fuels Principle of Carbonization Manufacture of Metallurgical coke Properties of Metallurgical Coke Testing of Coke.

UNIT III

Principles of production of fuel oils from crude. Manufacture, properties and uses of a) Producer gas

b) Water gas Properties and uses of Blast furnace gas and coke oven gas; cleaning of Blast furnace gas.

UNIT IV

Steady State Heat Transfer: Importance of Heat transfer, conduction through plane, cylindrical, Spherical and compound walls, shape factor and effect of variable thermal conductivity

UNIT V

Furnaces: Characteristic features of vertical shaft furnaces, reverberatory furnaces, Arc and Induction furnaces. Tube and muffle type resistance furnaces, continuous furnaces. Sources of heat losses in furnaces and heat balance.

UNIT VI

Pyrometry: Thermo electric pyrometry- peltier and Thomas e.m.f's . Thermo-electric power of thermocouples. Required properties of thermocouples. Noble and base metal thermocouples. Thermo-pile. Measurement of e.m.f by Milli-voltmeters and potentiometers Thermometer, optical and radiation pyrometer.

UNIT VII

Refractories: Desirable properties of Refractories. Methods of classification. Modes of failure of refractories in service and their prevention. Manufacturing methods and properties of Fireclay, Silica Magnesite and Chrome-Refractories.

UNIT-VIII

Testing of Refractories. Applications of refractories in the metallurgical industries.

TEXTBOOK:

1. Furnaces, Fuels and refractories O.P.Gupta,Khanna Publishers.

REFERENCES:

1. Elements of fuel technology -HIMUS
2. Refractories Norton
3. Refractories-R.Chisti.
4. Furnaces-J.D.Gilchrist
5. Pyrometry-W.P.wood& J.M.corck
6. Fuels Furnaces, Refractories & Pyrometry-A. V.K.Surya Narayana.
7. Elements of heat transfer- Jakob&Hawkins.
8. Elements of thermodynamics& heat transfer- Obert & Young.
9. Control systems & Instrumentation S.Bhasker.

II Year B.Tech. MMT II-Sem

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(07A40405) BASIC ELECTRONICS

UNIT I

Semiconductor materials and Junction diodes Classification of solids, energy levels, intrinsic and extrinsic semiconductor, conduction in metals and semiconductors. Semiconductor diodes : Diode under forward bias condition, diode under reverse bias condition, current-voltage characteristics of PN junction diode, Diode as a switch, as a rectifier, Half wave rectifier, Full wave rectifier, Rectifier with filters.

UNIT II

BJT and FETs Bipolar Junction Transistor structure, principle of operation of npn and pnp transistor, Transistor (BJT) configurations CB, CE, CC. Relation between IC, IB and IE currents - Input and output characteristics of BJT - Junction Field Effect Transistor : Physical structure, principle of operation, current-voltage characteristics, JFET configuration as CS, CD & CG.

UNIT III

SCR and Thyristor Principles of operation and characteristics of SCR, Triggering of SCR, Diac and Triac, Thyristor characteristics, phase controlled half and full wave rectification.

UNIT IV

Feedback Amplifiers Feedback principles, advantages of negative feedback amplifier, feedback amplifier topologies, analysis, effect of negative feedback on Ri, Ro, Av and Al of an amplifier.

UNIT V

Oscillators Classification of oscillators, principle of feedback oscillator, Barkhausen's criterion, RC phase shift oscillator, Hartley and Colpits oscillators.

UNIT VI

Basic Timer Circuits, Applications, welding control, Resistance welding, Energy storage welding.

UNIT VII

Induction and Dielectric heating, Ultrasonic generators and applications, Cathode Ray tube of CRO, simple applications.

UNIT VIII

8085 Microprocessors Brief overview of 8085's architecture, A to D and D to A converter circuits and applications.

TEXT BOOKS:

1. Electronic Devices and Circuits - J. Millman and C.C. Halkias, TMH, 1998.
2. Industrial Electronics - G.K. Mital, Khanna Publications, 19th Edn., 2003.

REFERENCES:

1. Electronic Devices and Circuits - K. Lal Kishore, B.S. Publications, 2nd edition, 2005.
2. Basic Electronics - Sedha and Mital, S. Chand & Co.
3. Thyristors and Applications - M. Ram Murthy, East-West Press, 1977.
4. 8085 Microprocessors and Interfacing - R.S. Goankar.

II Year B.Tech. MMT II-Sem

T	P	C
4+1*	0	4

(07A4EC16) MINERAL DRESSING

UNIT I

Scope and objectives of ore dressing. Sampling of ores by different methods. Theory of liberation of minerals. Crushers: -Jaw, Gyratory, Cone, Rolls and toothed roll crushers.

UNIT II

Types of grinding operations like batch and continuous dry and wet grinding, open circuit and closed circuit grinding. Grinding Mills: Ball mills, theory of ball mill operation, rod and tube mills. Comminution laws: - Rittinger's laws, Kick's law and Bond's law.

UNIT III

Sizing: Study of laboratory sizing techniques and reporting of sizing data. Industrial sizing units: Types of screen surfaces. Grizzlies, trommels, vibrating and shaking screens. Movement of solids in fluids: Stokes and Newton's laws. Terminal velocity and its relation with size. Relation between time and velocity. Relation between distance traveled and velocity. Equal settling ratio, Free and hindered settling ratios. Quantifying concentrating operations: Ratio of concentration, recovery, selectivity index and economic recovery.

UNIT IV

Classification of classifiers, study of settling cones, rake classifier, spiral classifier and cyclones.

UNIT V

Heavy media separation: Principles, flow chart, different media used. Heavy media separation using heavy liquids and heavy suspensions. Washability curves for easy, normal and difficult coal.

UNIT VI

Jigging: Theory of jigging. Jigging machines: hand jig, harz jig, denner jig baum jig, Hancock jig, James coal jig and halkyn jig. Design considerations in a jig. Tabling: - study of stratification on a table. Shaking tables, wilfley table. Humphrey's spiral classifier.

UNIT VII

Flotation: Principles of flotation. Factors affecting flotation. Classification of collectors and frothers. Regulators factors affecting their efficiency. Flotation machines: - Pneumatic and mechanical flotation cells. Application of flotation process for Cu,Pb and Zn ores.

UNIT VIII

Magnetic separation processes and electrostatic separation process.

TEXT BOOK:

1. Principles of Mineral Dressing by A.M. Gaudin.

REFERENCES:

1. Elements of Ore Dressing by A.F. Taggart
2. Mineral processing technology- A. Wills
3. Ore dressing practices-S.K.Jain.

II Year B.Tech. MMT II-Sem

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(07A41891) FUELS, FURNACES AND REFRactories LAB

1. To conduct proximate analysis of Coal
2. To conduct ultimate analysis of Coal
3. To find the Flash and Fire points of fuel oil by "PENSKY MARTINS" open and closed cup apparatus.
4. To find the flash and points of fuel oil by ABEL's Flash point apparatus
5. To find the viscosity of lubricant oil by using
 - a. Red-wood-I Viscometer
 - b. Red-wood-II Viscometer
 - c. Saybolt Viscometer
6. To find the calorific value of solid and liquid fuels by using "Bomb Calorimeter"
7. To find the calorific value of gaseous fuels by using "Junker's Gas Calorimeter"
8. To study various types of refractories and find their densities, Hardness and slag penetration.

Equipment:

1. Muffle Furnace (1000° c) - 2 No's
2. Pensky Martins Apparatus
3. Abels Flash Point Apparatus
4. Red - wood - I Viscometer
5. Red - wood - II Viscometer
5. Say bolt Viscometer
6. Bomb Calorimeter
7. Junkers Gas Calorimeter
8. Compression testing Machine
9. Digital Electronic Balance

II Year B.Tech. MMT II-Sem

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(07A41892) MINERAL DRESSING LAB

List of Experiments

1. Sampling of an ore from the bulk by
 - i) Coning and quartering method
 - ii) Riffle sampler methods
2. Sizing by Sieve analysis of crushed ore
3. Verification of Stoke's Law.
4. Determining the reduction ratio of a jaw crusher.
5. Study of the variation of reduction ratio with process variables in Rolls crusher.
6. Study of the process variables on reduction ratio and particle size distribution in ball mill.
7. To find the grindability index of ores.
8. Verification of Laws of Communion.
9. Determination of the efficiency of a magnetic separator.
10. Determination of the efficiency of a jig.
11. Study of the particle separation by fluid flow using wilfley table.
12. Determination of the efficiency of a pneumatic separator.
13. To study the concentration of metallic and non-metallic ores by Froth-Flotation process.

Equipment:

1. Riffle Sampler
2. Sieve Shaker with Sieves
3. Stokes' Apparatus
4. Jaw Crusher
5. Roll Crusher
6. Ball Mill
7. Grindability Index Apparatus
8. Magnetic Separator
9. Jig
10. Wilfley's Table
11. Pneumatic Separator
12. Froth - Flotation Equipment
13. Balances

III. B.Tech. MMT I Semester

T	P	C
4+1*	0	4

(07A5BS01) PROBABILITY AND STATISTICS

UNIT-I

Probability: Sample space and events - Probability - The axioms of probability - Some Elementary theorems - Conditional probability - Baye's theorem.

UNIT-II

Random variables - Discrete and continuous - Distribution - Distribution function. Distribution

UNIT-III

Binomial and poison distributions Normal distribution - related properties.

UNIT-IV

Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) proportions, sums and differences.

UNIT-V

Estimation: Point estimation - interval estimation - Bayesian estimation.

UNIT-VI

Test of Hypothesis - Means- Hypothesis concerning one and two means- Type I and Type II errors. One tail, two-tail tests.

UNIT-VII

Tests of significance - Student's t-test, F-test, χ^2 test. Estimation of proportions.

UNIT-VIII

Queuing Theory: Pure Birth and Death Process M/M/1 Model and Simple Problems.

Text Books:

1. Probability & Statistics, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text book of Probability & Statistics, Shahnaz Bathul, V. G. S. Book Links.

References:

1. Probability & Statistics, Arnold O. Allen, Academic Press.
2. Probability & Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
3. Probability & Statistics, Menden Hall, Beaver Thomson Publishers.
4. Probability & Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.

III. B.Tech. MMT I Semester

T	P	C
4+1*	0	4

(07A5HS01) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit I Introduction to Managerial Economics:

Definition, Nature and Scope of Managerial Economics-Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Unit II Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

Unit III Theory of Production and Cost Analysis: Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

Unit IV Introduction to Markets & Pricing Policies:

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

Unit V Business & New Economic Environment: Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

Unit VI Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

Unit VII Introduction to Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Unit VIII Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure

Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Dominick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting-A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics & Financial Analysis, Scitech.
9. S. N. Maheswari & S. K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley.
11. Dwivedi: Managerial Economics, 6th Ed., Vikas.

Prerequisites: Nil

Objective: To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

Codes/Tables: Present Value Tables need to be permitted into the examinations Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions.
Each question should not have more than 3 bits.

UNIT-I

Metallurgical Fundamentals: Critical resolved shear stress. Defects in crystalline materials Point defects and line defects. The concept of dislocation - Edge dislocation and screw dislocation. Interaction between dislocations, sessile dislocation, glissile dislocation, Energy of a dislocation, dislocation climb, Jogs, Forces on dislocations. Frank Reed source, slip and twinning.

UNIT-II

Hardness Test: Methods of hardness testing Brinell, Vickers, Rockwell, Rockwell superficial, Shore and Poldi methods. Microhardness test, relationship between hardness and other mechanical properties.

UNIT III

Fracture: Elementary theories of fracture, Griffiths theory of brittle fracture, Ductile Fracture, Notch sensitivity.

UNIT IV

The Tension Test: Mechanism of elastic action, linear elastic properties. Engineering stressstrain and True stress-strain curve. Tensile properties, conditions for necking, effect of temperature and strain rate on tensile properties.

UNIT V

The Compression Test: Elastic and in-elastic action in compression, elastic and in-elastic properties in compression. compression Test.

UNIT VI

The Impact Test: Notched bar impact test and its significance, Charpy and Izod Tests, fracture toughness testing - COD and CTOD tests, significance of transition temperature curve, Metallurgical factors affecting on transition temperature, temper embrittlement.

UNIT-VII

Fatigue Test: Introduction, Stress cycles, S-N Curve, Effect of mean stress, Mechanism of fatigue failure, effect of stress concentration, size, surface condition and environments on fatigue. Effect of metallurgical variables on fatigue. Low cycle fatigue - High cycle fatigue.

UNIT-VIII

Creep and Stress Rupture: Introduction, The creep curve, Stress-rupture test, Structural changes during creep, Mechanism of creep deformation, theories of creep. Fracture at elevated temperature, Effect of Metallurgical variables on creep.

TEXT BOOK:

1. Mechanical Metallurgy - GE Dieter

REFERENCES:

1. Engineering Materials Science - CW Richards
2. Mechanical behavior of material-A.H.Courteny
3. Mechanical behavior-Ed.Wulf.
4. Mechanical Metallurgy White & LeMay.

III. B.Tech. MMT I Semester

T	P	C
4+1*	0	4

(07A5EC14) HEAT TREATMENT TECHNOLOGY

UNIT-I

PRINCIPLES OF HEAT TREATMENT: Austenitic Transformation, Pearlitic Transformation, Bainitic Transformation, Martensitic Transformation, Annealing, Normalizing, Hardening, mechanism of heat removal during quenching, quenching media, size and mass effect, hardenability, tempering, austempering, manufacturing, deep freezing.

UNIT-II

Surface heat treatment, carburizing, cyaniding, flame and induction hardening, residual stresses, deep freezing, thermo mechanical treatments: HTMT, LTMT, Ausforming, Isoforming, Cryoformy.

UNIT-III

EFFECT OF ALLOY ELEMENTS: Purpose of alloying, effect of alloying elements on ferrite, cementite, Fe-Fe₃C system, tempering and TTT Curves.

UNIT-IV

ALLOY STEELS: Structural and constructional steels, maraging steels, tool and die steels.

UNIT-V

Corrosion and heat resistant steels, Hadfield steels, magnetic steels and alloys, free machining steels.

UNIT-VI

CAST IRONS: White cast iron, grey cast iron, spheroidal graphite iron, malleable cast iron, alloy cast iron.

UNIT-VII

NON-FERROUS METALS AND ALLOYS: Precipitation hardening, aging treatment, study of copper and its alloys, aluminum and its alloys, nickel and its alloys.

UNIT-VIII

Heat treatment furnaces and their design, atmosphere control vacuum heat treatment etc.

TEXT BOOK:

1. Heat Treatment Principle and Techniques-Rajan & Sharma

REFERENCES:

1. Physical Metallurgy I. Lakhtin-Mir Publishers
2. Physical Metallurgy - Clark and Varney
3. Physical Metallurgy Principles - Reed Hill
4. Physical metallurgy-Ragavan
5. Heat Treatment of metals-Zakharov-Mir Publishers

III. B.Tech. MMT I Semester

T	P	C
4+1*	0	4

(07A50605) IRON PRODUCTION

UNIT-I

Development of iron making: Bloomery-stacks-catalan forge-stukofen-B.F. Occurrence and distribution of iron ores in India and in the world. Preparation of iron ores.

UNIT-II

Sintering: Principles, raw materials and DL machine. Mechanism of sintering, sintering bonds. Factors affecting sintering efficiency. **Pelletisation:** Theory of pelletisation, Water-particles system. Production of green pellets: disk and drum pelletisers, Induartion of pellets: Shaft, traveling grate.

UNIT-III

Blast furnace coke: Functions, properties and uses. B.F. profile and designs considerations. Furnace lining. Furnace cooling system. Hoisting equipment. B.F. Stoves. BF gas cleaning system and gas uses.

UNIT-IV

Physical chemistry of reduction of iron ores: Physical and chemical factors affecting reduction of ores. Relevant CO/CO₂ and H₂/H₂O diagram. Controls of C, Si, S, P in metals and slags.

UNIT-V

Blast furnace slags: Its constitution. Effect of CaO, SiO₂, Al₂O₃ and MgO on fluidity of slags. Uses of slags.

UNIT-VI

Blast furnace operation: Blowing in, blowing out, fanning and draughting. BF irregularities and their control/remedies. Development of BF: HTP, humidification of blast, O₂ enrichment, hot blast temperature, BF additives, and top charging systems.

UNIT-VII

Burden calculations: Raceways parameters. Factors affecting it. Alternative routes of iron making: Electric pig iron smelting, low shaft and small shaft BF. Classification of sponge iron making: HYL, Kiln Krupp-Renn, Midrex process.

UNIT-VIII

Production of wrought iron.

TEXT BOOK:

1. Modern Iron making Dr. R.H. Tupkary

REFERENCES:

1. Blast furnace theory and practice Vol. 1 and 2 edited by Julius H. Strassburger.
2. Principles of blast furnace Iron Making A.K. Biswas.
3. Making, shaping and treating of steels by United Steel Corporation, Pittsburgh
4. Manufacture of Iron & steel Vol-I-G.R. Bashforth.

T P C
4+1* 0 4
(07A5EC22) WELDING TECHNOLOGY

UNIT I

The principles and theory, mechanism and key variables of different welding processes, types of tooling and equipment.

UNIT II

Microstructure of fusion and heat affected zone, welding stresses, pre and post treatments.

UNIT-III

Advantages, disadvantages and field of application of the welding with reference to the following welding processes, Gas welding, Arc welding, submerged arc welding, TIG, MIG, Plasma arc welding.

UNIT IV

Electron Beam welding (including EMPOR) spot-welding, Laser welding, diffusion welding.

UNIT-V

Welding of structural steel, welding of cast iron, welding of stainless steel and other high-alloyed steels.

UNIT-VI

Welding of copper and its alloys, welding of aluminum and its alloys, joining of dissimilar alloys.

UNIT VII

Welding defects and remedies.

UNIT VIII

Mechanism, Techniques and scope of brazing, soldering and adhesive bonding processes.

TEXT BOOK:

1. Welding Technology-R.S.Parmar.

REFERENCES:

1. JF Lancaster: Welding Metallurgy
2. Little : Welding and Welding Technology
3. Agarwal Manghmani: Welding Engineering
4. BE Rossi: Welding Engineering

T P C
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(07A51891) MECHANICAL METALLURGY LAB

List of Experiments:

1. Hardness Test: to determine the Brinell Hardness Values of values of ferrous and non-ferrous samples.
 2. Tension Test: - To determine the elastic modulus, ultimate tensile strength, breaking stress, Percentage elongation percentage reduction in area of the given specimen.
- To determine the strain distribution along the gauge length.
 3. Torsion Test: -To determine the modulus of rigidity of given material.
 4. Impact Testing: - To determine the Charpy and Izod (V & U Groove notch) values of a given material at room temperature. - To establish the ductile - brittle transition temperature of the material.
 5. Fatigue Test: - To determine the number of cycles to failure of a given material at a given stress.
 6. Magnetic flaw detector:- To inspect a given material for cracks.
 7. Liquid penetrant Test:- To detect the surface flaws in a given materials by die penetrant.
 8. Ultrasonic flaw detection: - To inspect a given material for locating cracks
 9. To detect the surface flaws in steel by fluorescent penetrant method
 10. To determine the Rockwell hardness values of heat treated steels.
 11. To find the microhardness of phases by using vickers hardness tester.
 12. To study the radiographs of weldments.
 13. To Conduct Erichson cupping test.
- Equipment:**
1. Brinell Hardness Machine
 2. Vickers Hardness Machine
 3. Rockwell Hardness Machine
 4. VTM
 5. Torsion Testing Machine
 6. Impact Testing Machine
 7. Fatigue Test Machine
 8. Magnetic Flaw Detector
 9. Liquid Penetrant Set
 10. Ultrasonic Flaw Detector
 11. Erichson Cupping Test

III. B.Tech. MMT I Semester

T	P	C
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(07A51892) HEAT TREATMENT TECHNOLOGY LAB

List of Experiments:

1. Annealing of medium carbon steel and observation of microstructure.
2. Normalizing of medium carbon steel and observation of microstructure.
3. Hardening of medium carbon steel and observation of microstructure.
4. Study of tempering characteristics of water quenched steel.
5. Study of age hardening phenomena in duralumin.
6. Spheroidizing of a given high carbon steel.
7. Determination of hardenability of medium carbon steel by Jominy end Quench Test.
8. To conduct Re-crystallization studies on cold worked copper.

Equipment:

1. Muffle Furnaces 1000°C - 2 No's
2. Muffle Furnaces 300°C - 2 No's
3. Muffle Furnaces 120°C - 1 No's
4. Hardenability Apparatus
5. Micro Scopes
6. Vickers Hardness Tester

III. B.Tech. MMT II Sem

T	P	C
4+1*	0	4

(07A6HS01) MANAGEMENT SCIENCE

Unit I: *Introduction to Management:* Concepts of Management and organization- Nature and Importance of Management, Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

Unit II: *Designing Organisational Structures:* Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

Unit III: *Operations Management:* Principles and Types of Plant Layout- Methods of production (Job, batch and Mass Production), Work Study - Basic procedure involved in Method Study and Work Measurement- Statistical Quality Control: \bar{X} chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

Unit IV: *A) Materials Management:* Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records - Supply Chain Management
B) Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle., Channels of distribution.

Unit V: *Human Resources Management (HRM):* Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

Unit VI: *Project Management (PERT/CPM):* Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

Unit VII: *Strategic Management:* Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

Unit VIII: *Contemporary Management Practices:* Basic concepts of Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability

Maturity Model (CMM) Levels, Value Chain Analysis, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Text Book:

1. Aryasri: *Management Science*, TMH, New Delhi.

Reference Books:

1. Kotler Philip & Keller Kevin Lane: *Marketing Management* 12/e, PHI, 2007
2. Koontz & Weihrich: *Essentials of Management*, 6/e, TMH, 2007
3. Thomas N.Duening & John M.Ivancevich: *Management-Principles and Guidelines*, Biztantra,2007.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2007.
5. Memoria & S.V.Ganker, *Personnel Management*, Himalaya, 25/e, 2007
6. Schermerhorn: *Management*, Wiley, 2007.
7. Parnell: *Strategic Management*, Biztantra,20073.
8. L.S.Srinath: *PERT/CPM*,Affiliated East-West Press, 2007.

Pre-requisites: Managerial Economics

Objective: To familiarize with the process of management and to provide basic insights into select contemporary management practices.

Codes/Tables: Normal Distribution Function Table need to be permitted into the examination Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions.

Each question should not have more than 3 bits.

Unit VIII will have only short questions, not essay questions.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

III. B.Tech. MMT II Sem

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(07A6EC10) NONFERROUS EXTRACTIVE METALLURGY**UNIT I**

COPPER: Principal Ore and Minerals; Matte smelting - Blast furnace, Reverberatory, Electric furnace, Flash; Converting, Continuous production of blister Copper; Fire refining, Electrolytic refining; Hydro-Metallurgical copper extraction; Leaching processes, Recovery of copper from leach solutions; Electro-winning.

UNIT II

ZINC: General Principles: Horizontal and vertical retort processes; Production in a Blast furnace; Leaching purification; Electrolysis, Refining.

UNIT III

LEAD: Blast furnace smelting, Refining of lead bullion

UNIT IV:

ALUMINIUM: Bayer process, Hall - Heroult process, Anode effect; Efficiency of the process, Refining, Alternative processes of aluminium production.

UNIT V:

MAGNESIUM: Production of a hydrous Magnesium chloride from sea water and magnesite. Electro-winning practice and problem, refining, Pidgeon and Hansgrig processes.

UNIT-VI

TITANIUM: Upgrading of ilmenite, chlorination of titania, Kroll's process. Refining.

UNIT VII:

URANIUM: Acid and alkali processes for digestion of uranium ores, Purification of crude salt, Production of reactor grade UO₂ and uranium.

UNIT-VIII

Simplified flow sheets for the extraction of nickel, tungsten and gold. Review of non-ferrous metal industries in India.

TEXT BOOKS:

1. Extraction of Non-Ferrous Metals - HS Ray, KP Abraham and R. Sridhar
2. Metallurgy of Non-Ferrous Metals - WH Dennis

REFERENCES:

1. Rare Metals Hand book - C.A. Hampel
2. Nuclear Reacto General Metallurgy - N. Sevryukov, B. Kuzmin and Y. helishchevr
3. Engineering - S. Glass Stone and A. Sesonske.
4. Nuclear Chemical Engineering - Manstion Bendict and Thomas H. Pigford

III. B.Tech. MMT II Sem

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(07A60604) MECHANICAL WORKING OF METALS

UNIT I:

STRESS AND STRAIN RELATIONSHIP FOR ELASTIC BEHAVIOUR: Description of stress at a point. State of stress in two dimensions. Mohrs circle of stress in two dimensions, state of stress in three dimensions. Mohrs circle of stress in three dimensions. Description of strain at point.

UNIT II:

ELEMENTS OF THEORY OF PLASTICITY: The flow curve. True stress and true strain. Von Mises distortion energy criterion, maximum shear stress or Tresca criterion. Octahedral shear stress and shear strain. Basics of the theories of plasticity.

UNIT III:

FUNDAMENTALS OF METAL WORKING: Classification of forming processes, Mechanics of metal working for slab method and uniform deformation energy method. Cold working, Recovery, recrystallisation and grain growth, hot working, Strain-Rate effects, Work of plastic deformation.

UNIT IV:

FORGING: Classification of forging processes, forging equipment. Forging in plane strain. Open-die forging, closed-die forging, Forging of a cylinder in plane-strain. Forging defects, powder metallurgy forging.

UNIT V:

ROLLING OF METALS: Classification of rolling process, rolling mills. Hot rolling, cold rolling, rolling of bars and shapes, forging and geometrical relationships in rolling.

UNIT VI:

Simplified analysis of rolling load, rolling variables, problems and defects in rolled products. Theories of hot rolling, torque and horsepower, theories of cold rolling, torque and horsepower.

UNIT VII:

EXTRUSION: Classification of extrusion processes, extrusion equipment. Hot extrusion. Deformation and defects in extrusion. Analysis of the extrusion process. Cold extrusion. Extrusion of tubing and production of seamless pipe and tubing.

UNIT VIII:

DRAWING OF RODS, WIRES AND TUBE: Rod and wire drawing, tube drawing processes, residual stresses in rod, wire and tubes.

TEXT BOOK:

1. Mechanical Metallurgy by GE Dieter (3rd edition)

REFERENCES:

1. Mechanical working of metals-Avitzur.
2. Engineering Metallurgy-Part II-Higgins.

III. B.Tech. MMT II Sem

T	P	C
3+1*	0	3

(07A6EC11) FOUNDRY TECHNOLOGY

UNIT I

Scope and development of Foundry. Types of foundries. **PATTERNS:** Materials for patterns, types of patterns; functions and pattern allowance. **MOULDING MATERIALS:** Moulding sands, properties and selection of materials and additives used.

UNIT II

CASTING PROCESSES AND EQUIPMENT: Green and dry sand moulding; shell moulding, CO₂ moulding. Core moulds and cores. Plaster mould casting, composite mould casting, Investment casting.

UNIT III:

Permanent mould casting, pressure die-casting, Gravity die-casting and centrifugal casting, Types of moulding equipment.

UNIT IV:

GATING AND RISERING: Gate nomenclature, gate types and types of risers.

UNIT V:

SOLIDIFICATION OF METALS: Nucleation crystal growth. Freezing of metals and alloys. Dendritic freezing. Coring and segregation, ingot defects, Flow of metals in moulds.

UNIT VI:

MELTING OF FERROUS ALLOYS: Melting of Gray iron and cupola. Cupola operation and control. Effect on chemical composition, carbon equivalent and effect of alloying elements on foundry characteristics. Melting of non-ferrous alloys: Melting of Aluminium and copper alloys production processes: Production of Gray Iron, ductile iron. Malleable iron castings.

UNIT VII

MODERN DEVELOPMENTS: Recently developed processes - v-forming full mould process - Furon-no-bake sand moulds and cores. Continuous casting. Cold setting and self-setting processes.

UNIT VIII

CASTING DEFECTS: Casting defects arising due to moulding, coring melting and poring practice.

TEXT BOOKS:

1. Principles of Metal casting by Heine, Loper and Rosenthal.
2. Foundry Technology - Dhuvendra Kumar & S.K.Jain

REFERENCES:

1. Metals Handbook Vol. 5 published by ASM, Ohio.
2. Foundry Technology-Jain
3. Foundry Technology Principle-T.V.Rama Rao

III. B.Tech. MMT II Sem

T	P	C
3+1*	0	3

(07A60605) STEEL MAKING

UNIT-I

Classification of Steel making Processes. Early steel making processes: Cementation and crucible processes. Raw materials for steel making. Factors affecting efficiency of steel making.

UNIT-II

Principles of Steel making:- Decarburisation, desiliconization. Dephosphorisation and desulphurisation. Principles of deoxidation. Types of deoxidation: Precipitation, diffusion and treatment with synthetic slags, molecular and ionic theory of slags.

UNIT-III

Construction and process details in acid and basic Bessemer convertors and openhearth furnace. Improvement and modification of the above process.

UNIT-IV

Construction and process details in LD, LD-AC, Kaldo and rotor steel making processes. Bottom blown O₂ processes. Combined blow processes. Continuous steel making process: - BISRA, IRSID & WORCRA Process.

UNIT-V

Construction details of electric arc furnace; production of steel. Induction furnace for steel making.

UNIT-VI

Teeming Practices: - Direct, bottom and uphill Teeming methods. Casting pit side practice.

UNIT-VII

Solidification of steels. Ingot defects and remedies; secondary steel making processes. Vacuum treatment of steels.

UNIT-VIII

Continuous casting of steels. Electro slag refining process. Vacuum arc remelting process. Brief outline of manufacture of alloy steels.

TEXT BOOK:

1. Modern Steelmaking - Dr. R.H. Tupkary and V.H. Tupkary

REFERENCES:

1. Making Shaping and Treating of Steels by United States Steel Corporation, Pittsburgh.
2. Open Hearth furnace practice - Bornatsky,
3. Manufacture of Iron and Steel, Vol. II by Gr Bashforth
4. Steel Making : A. K. Chakrabarti (PHI)

III. B.Tech. MMT II Sem

T	P	C
4+1*	0	4

(07A61801) POLYMERIC MATERIALS

UNIT-I

Introduction to polymers and plastics: Conception of polymers, formation of polymers, types of polymers reactions such as addition and condensation, Mechanism of polymerization - Thermoplastic and Thermosetting materials methods of polymerization.

UNIT-II

Polymeric structure, raw materials and properties: Classification of polymers, raw materials for polymers and their sources. Brief study of structure of polymers and properties. Glass transition temperature and its significance. Crystallinity of polymeric materials, effect of time, temperature, catalysts and solvents on polymer properties, molecular weight of polymers.

UNIT- III

Compounding and fabrication of plastics, calendering and casting.

UNIT - IV

Functions of the following types of additives used in Polymers. 1. Fillers 2. Lubricants 3. Reinforcing agents 4. Plasticizers 5. Stabilizers 6. Antioxidants 7. Inhibitors 8. Promoters 9. Catalysts 10. Retarders 11. Limitators 12. Colorants 13. Cross-linking 14. Blowing agents 15. Photo degradants 16. Bio-degradants, laminated polymers.

UNIT- V

Thermoplastics: Methods of addition polymerization, raw materials, manufacturing methods, properties and uses of the following ethenoid polymers: Polyethene (LDPE and HDPE), Polypropylene, Poly Vinyl Chloride, Polystyrene, Expanded polystyrene, Polytetra fluoroethylene.

UNIT - VI

Thermosetting resins: Introduction of thermosetting polymers, methods of condensation polymerization, raw materials, manufacturing method, properties and uses of Phenol-Formaldehyde resin, Urea-formaldehyde resins, alkyl resins.

UNIT - VII

Raw materials, manufacturing methods, properties and uses of the following plastics Acetals, Nylons, Polymethyl, Methacrylate (PMMA), Saturated polyesters - PETP and PC, Cellulose acetate and viscose rayon.

UNIT - VIII

Introduction of natural rubbers and synthetic rubbers like Buna-S, Buna-N, Thiokol, Polyurethane rubber and Silicon rubber.

TEXTBOOK:

1. Polymer science - Gowrikar

REFERENCES:

1. Polymer Science & technology-Joel fried

2. Material Science -V.D.Kodgire.

3. Introduction to materials science & engineering-courtney & Hall

III. B.Tech. MMT II Sem

T	P	C
0	3	2

(07A61891) ADVANCED ENGLISH COMMUNICATION SKILLS LAB**1. Introduction**

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

- Gather ideas and information, to organise ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

2. Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

- Functional English - starting a conversation - responding appropriately and relevantly - using the right body language - role play in different situations.
- Vocabulary building - synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.
- Group Discussion - dynamics of group discussion , intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Interview Skills - concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
- Resume writing - structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.
- Reading comprehension - reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading.
- Technical Report writing - Types of formats and styles, subject matter - organization, clarity, coherence and style, planning, data-collection, tools, analysis.

4. Minimum Requirement:

The English Language Lab shall have two parts:

- i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
- ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T.V., a digital stereo -audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

- iii) P - IV Processor
- a) Speed - 2.8 GHZ
- b) RAM - 512 MB Minimum
- c) Hard Disk - 80 GB
- iv) Headphones of High quality

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- Clarity Pronunciation Power - part II.
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from 'train2success.com'-
 - Preparing for being Interviewed,
 - Positive Thinking,
 - Interviewing Skills,
 - Telephone Skills,
 - Time Management
 - Team Building,
 - Decision making
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. Books Recommended:

1. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. A Course in English communication by Madhavi Apte, Prentice-Hall of India, 2007.
3. Communication Skills by Leena Sen, Prentice-Hall of India, 2005.
4. Academic Writing- A Practical guide for students by Stephen Bailey, Routledge Falmer, London & New York, 2004.
5. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai.
6. Body Language- Your Success Mantra by Dr. Shalini Verma, S. Chand, 2006.
7. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi.

8. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup
9. IELTS series with CDs by Cambridge University Press.
10. Technical Report Writing Today by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.
11. Basic Communication Skills for Technology by Andra J. Rutherford, 2nd Edition, Pearson Education, 2007.
12. Communication Skills for Engineers by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.
13. Objective English by Edgar Thorpe & Showick Thorpe, 2nd edition, Pearson Education, 2007.
14. Cambridge Preparation for the TOEFL Test by Jolene Gear & Robert Gear, 4th Edition.
15. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.

DISTRIBUTION AND WEIGHTAGE OF MARKS:***Advanced Communication Skills Lab Practicals:***

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

III. B.Tech. MMT II Sem

T	P	C
0	3	2

(07A61892) MECHANICAL WORKING OF METALS LAB**LIST OF EXPERIMENTS:**

1. Determination of forming limit diagram
2. To study the kinetics of static recrystallization in a cold worked metal.
3. To conduct rosette analysis to determine the stress components.
4. To grow single crystals by Strain annealing technique.
5. To verify Hall-Petch relation in mild steel specimens.
6. To study the work hardening and strain rate sensitivity of a metal.
7. To study the effect of plastic anisotropy on the deformation behaviour.
8. To study the effect of rolling variables on the mechanical properties of metals.
9. To study the forging operations in the production of a hook.
10. To conduct the ring compression test to determine the friction coefficient.
11. To study the flow pattern in plasticine clay when extruded through a die.
12. To study defects produced in rolled and forged products.

III. B.Tech. MMT II Sem

T	P	C
0	3	2

(07A61893) FOUNDRY TECHNOLOGY LAB

LIST OF EXPERIMENTS:

1. Preparation of gating system using green sand.
2. Study of particle size distribution of the sand.
3. Study of the variation of permeability of the green sand with clay and water.
4. Determination of the variation of sand properties like green hardness, green compact strength with additives in sands.
5. Determination of the variation of hot compact hardness and hot shear strength with additives in sands.
6. Determination of clay content in sand.
7. Determination of the shatter index of green sand.
8. Founding of Al and Cu alloys in a pit furnace and casting into light components.
9. Study Charge calculations and melting practice of cast iron in a cupola.
10. Preparation of a shell-by-shell moulding process.
11. Non-destructive testing of a few cast iron components.

Equipment:

1. Mould Boxes, Patterns, Cove Boxes, Tool Boxes.
2. Rotap Sieve Shaker with Sieves
3. Permeability Apparatus.
4. Universal Sand testing Machine with Accessories.
5. Sand Hardness tester.
6. Clay Content Apparatus
7. Shatter Index test.
8. For Melting : Pit Furnace
Electric Furnace
9. Shell Moulding Machine
10. Centrifugal Casting Machine
11. Ultra Sonic Tester
12. Ladles, Crucibles and other Accessories
13. Muffle Furnace 1000°C

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

(07A7EC26) ELECTRO METALLURGY AND CORROSION

UNIT-I

Applied electrochemistry - electrochemical methods of analysis estimation by electrolysis.

UNIT-II

Electrophoresis-measuring instruments for experimental study of electro-chemistry.

UNIT-III

Review of electrochemical Principles. Faradays laws-Electrode potentials-Cathodic and anodic reactions- polarization over voltage.

UNIT-IV

General discussion on the electro winning of metals eg. Cu, Zn, metallic clouds, anode effect. Differences between electro winning and electro refining.

UNIT-V

Current efficiency, throwing power, electro plating of Cu, Ni, Cr, Zn and alloy Plating. Testing methods of electro deposits.

UNIT-VI

Introduction, classification, forms of corrosion. Uniform corrosion, galvanic corrosion and galvanic series. Beneficial applications of galvanic corrosion; Pitting corrosion, season cracking, dezincification, Crevice corrosion, stress corrosion cracking, Intergranular corrosion, weld decay, Knife-line attack, Erosion corrosion, fretting corrosion.

UNIT-VII

Corrosion protection methods, selection of materials for corrosion services, selection of environment-use of inhibitors, surface protection methods including painting, metallic coating.

UNIT-VIII

Cathodic protection, sacrificial anode. Difference between cathodic and anodic protection.

TEXT BOOKS:

1. Introduction to Electrometallurgy & Corrosion by R.Sharan S.Narain-Standard Publishers.
2. Corrosion Engineering-Mars G.Fontana

REFERENCES:

1. Electro metallurgy-Blum.
2. Material science- Van Vlack
3. Elements of Physical Metallurgy-A.Guy.

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

(07A71801) CERAMIC SCIENCE AND TECHNOLOGY

UNIT - I

Introduction: Definition - Classification of Ceramics - Traditional Ceramics - Structural Ceramics - Fine Ceramics - Bio ceramics - Ceramic super conductors.

UNIT - II

Structure of Ceramic Crystals: Atomic structure - Interatomic bonds - Atomic bonding in Solids - Crystal structures - Grouping of Ions and Pouling's rules - Oxide structures - Silicate structures - Glass formation - Models of glass structure Types of glasses.

UNIT - III

Ceramic Phase - Equilibrium Diagrams: Two component systems

- a) Al₂O₃ - SiO₂ b) BaO - TiO₂

UNIT - IV

Three component systems MgO - Al₂O₃ - SiO₂

UNIT - V

Powder Preparation Techniques:

Preparation of Al₂O₃, ZrO₂, SiC, Si₃N₄ BN & B₄C Powder by various Techniques.

UNIT - VI

Powder Preparation Techniques: Sol-gel technology - Precipitation, Coprecipitation- Hydrothermal precipitation.

UNIT - VII

Ceramic Processing Techniques: Hot Pressing - Hot Isostatic Pressing - (HIP).

UNIT - VIII

Sintering - Sinter / HIP - Injection moulding - Slip casting - Tape casting - Gel casting - Extrusion

TEXTBOOKS:

1. Introduction to Ceramics - W.D. Kingery et al - John Wikey
2. FINCER proceedings of workshop on fine ceramics synthesis, properties and applications - T.R. Rammohan et al.

REFERENCE:

1. Hand Book of Fibre-reinforced composite materials - Ed. Lubin.

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

(07A7EC31) POWDER METALLURGY

UNIT - I

Introduction: Emergence and importance of powder metallurgy: Comparision of powder metallurgy with other fabrication techniques, its scope and limitations.

UNIT - II

Characterization and production of powders: General characteristics of metal powders, particle shape flow rate, apparent density, and specific surface area, particle size distribution.

UNIT - III

Determination of powder characteristics; different methods of production of metal powders: influence of manufacturing process on powder characteristics.

UNIT - IV

Consolidation of Metal Powders I: Compaction: Theory of consolidation: Pressure transmission in powders; compressibility and compactibility of powders; Green strength; Hot isostatic pressing; Powder rolling.

UNIT - V

Consolidation of Metal Powders II: Sintering: Mechanisms of Sintering; Factors affecting sintering, Activated sintering; Liquid phase sintering; Sintering atmospheres; Properties of sintered parts.

UNIT - VI

Applications: Porous parts: Self-lubricating bearings, filters: Dispersion strengthened materials: Cu / Al₂O₃, Sintered Aluminum Powder.

UNIT - VII

Electrical and Magnetic materials, Tungsten lamp filaments, electrical contacts, welding electrodes.

UNIT - VIII

Soft magnetic materials (Fe, Fe-N); Permanent magnets (Alnico, SnCo₅), Cemented carbides; Cermets.

TEXTBOOK:

1. Powder metallurgy - A.K. Sinha

REFERENCES:

1. Introduction to powder metallurgy - J.S. Hirshhorn
2. Treatise on Powder metallurgy - C. Goetzel Vol 1 & II
3. Powder Metallurgy principles - F.V. Lenel

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

(07A70606) X-RAY METALLOGRAPHY

UNIT-I

Introduction - Production and properties of x-rays. Stereographic projection Bragg's law of diffraction. Diffraction directions and diffraction methods.

UNIT-II

Intensity of Diffracted beams - Scattering by an electron by an atom; by a unit cell, structure-factor calculations: factors to be considered in calculating the intensities.

UNIT- III

Experimental Methods - Laue Photographs: Powder photographic methods, Debye-Scherrer methods, focussing cameras, pinhole photographs. Diffractometer measurements.

UNIT - IV

Applications - Orientation of single crystals, Laue method, Diffractometer method, effect of plastic deformation, the structure of polycrystalline Aggregates, crystal size, crystal perfection, crystal orientations.

UNIT-V

Determination of crystal structure, precise lattice parameter measurements.

UNIT - VI

Applications - phase - diagram determination.

UNIT-VII

Order-disorder transformation: chemical analysis by Diffraction.

UNIT-VIII

Qualitative analysis, quantitative analysis, stress measurement.

TEXTBOOK:

- Elements of X-ray diffraction by BD Cullity

REFERENCES:

- Structure of Metals - GS Barrett and TB Masalski. 2nd Edition.
- X-ray diffraction methods - EW Nuffield.

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

(07A7EC27) SEMI CONDUCTORS AND MAGNETIC MATERIALS
(ELECTIVE-I)**UNIT-I**

Review of electron theory of metals; Electrical and thermal conductivity - Classical approach and quantum mechanical considerations; Resistivity of pure metals and alloys, and ordered alloys; thermoelectric phenomena.

UNIT-II

Semiconductors: Band structures, intrinsic semiconductors, extrinsic semiconductors; Hall effect; Elemental and compound Semiconductors and their application; Super conductivity; super conducting materials; Structure and application.

UNIT-III

Ferromagnetism: Ferromagnetic domains; Hysteresis loops, magnetostriction and magnetoelectricity, origin of Hysteresis due to domain wall movement; soft magnetic alloys.

UNIT-IV

Factors determining the permeability of metals and alloys; Effect of fundamental properties on permeability, Ni-Fe alloys, Fe-Co alloys, high permeability of iron and ferritic iron, Si- Fe alloys and Cu- Ni alloys.

UNIT-V

Amorphous ferromagnetic alloys and Ferro fluids: Preparation and structure of amorphous ferromagnetic and its application; Ferro fluids;

UNIT-VI

Ferri magnetic material; Spiral structure; Theory of ferrimagnetisms; magnetic structures of ferrites; permeability of ferrites; stress-induced anisotropy in ferrites; Applications of soft ferrites.

UNIT-VII

Permanent magnetic materials: Energy product of a permanent magnet material; Behavior of permanent magnets under dynamic or recoil conditions; Alnico; Fe- Cr-Co alloys.

UNIT-VIII

Cu-Ni-Fe and Cu-Ni-Co alloys; Fe-Co-Mo alloys, Pt-Co alloys; Permagnent, magnets based on the intermetallic compound Sm₂Ca₁₇Co₁₂ Coercivity mechanisms; Applications of permanent magnetic; Temperature dependence of magnetic properties of permanent magnets;

TEXT BOOKS:

- R.E. Hummel: Electronic Properties of materials.
- R.A. Macurie: Ferromagnetic Materials structure and properties.

REFERENCE:

- An Introduction to Materials science-H.L.Mancini.

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

(07A70607) NON DESTRUCTIVE TESTING
(ELECTIVE-I)

UNIT-I

INTRODUCTION: VISUAL METHODS: Optical aids, In-situ metallography, Optical holographic methods, Dynamic inspection.

UNIT-II

PENETRANT FLAW DETECTION: Principles: Process: Penetrant systems: Liquid penetrant materials: Emulsifiers: cleaners developers: sensitivity: Advantages: Limitations: Applications.

UNIT-III

RADIOGRAPHIC METHODS: Limitations: Principles of radiography: sources of radiation, Ionising radiation - X-rays sources, gamma-rays sources Recording of radiation: Radiographic sensitivity: Fluoroscopic methods: special techniques: Radiation safety.

UNIT-IV

ULTRASONIC TESTING OF MATERIALS: Advantages, disadvantages, Applications, Generation of Ultrasonic waves, general characteristics of ultrasonic waves: methods and instruments for ultrasonic materials testing: special techniques.

UNIT-V

MAGNETIC METHODS: Advantages, Limitations, Methods of generating fields: magnetic particles and suspending liquids Magnetography, field sensitive probes: applications. Measurement of metal properties.

UNIT-VI

ELECTRICAL METHODS: Eddy current methods: potential-drop methods, applications.

UNIT-VII

ELECTROMAGNETIC TESTING: Magnetism: Magnetic domains: Magnetization curves: Magnetic Hysteresis: Hysteresis-loop tests: comparator - bridge tests Absolute single-coil system: applications.

UNIT-VIII

OTHER METHODS: Acoustic Emission methods, Acoustic methods: Leak detection: Thermal inspection.

TEXT BOOK:

1. Non-Destructive Testing by P. Halmshaw

REFERENCE:

1. Metals Handbook Vol.II, Nondestructive inspection and quality contr

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

(07A7EC02) NON CONVENTIONAL SOURCES OF ENERGY
(ELECTIVE-I)

UNIT - I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power - Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, Solar radiation on tilted surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT - II

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT - III

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications - solar heating/ cooling techniques, solar distillation and drying, Photovoltaic energy conversion.

UNIT - IV

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT - V

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation, and economic aspects.

UNIT - VI

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy potential in India.

UNIT - VII

OCEAN ENERGY - OTEC: Principles, utilization, setting of OTEC plants, thermodynamic cycles. Tidal and Wave energy: Potential and conversion techniques, mini-hydel power plants, their economics.

UNIT - VIII

DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, Principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principle, faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Renewable Energy Resources / Tiwari and Ghosal / Narosa
2. Non-conventional Energy Sources / G.D. Rai

REFERENCES:

1. Renewable Energy Sources / Twidell & Weir
2. Solar Energy / Sukhatme
3. Solar Power Engineering / B.S. Magai Frank Kreith & J.F. Kreith
4. Principles of Solar Energy / Frank Kreith & John F Kreider
5. Non-Conventional Energy / Ashok V Desai / Wiley Eastern
6. Non-Conventional Energy Systems / K Mittal / Wheeler
7. Renewable Energy Technologies / Ramesh & Kumar / Narosa
8. Energy Technology - S Rao and B B Parulkar

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

**(07A7EC28) COMPUTER GRAPHICS
(ELECTIVE-I)****UNIT-I**

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, and raster-scan systems, random scan systems, graphics monitors and workstations and input devices (p.nos 22-90 of text book-1).

UNIT-II

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundaryfill and flood-fill algorithms (p.nos 103-123,137-145,147-150,164-171 of text book- 1, p.nos. 72-99 of text book-2).

UNIT-III

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems (p.nos 204-227 of text book-1).

UNIT-IV

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland -Hodgeman polygon clipping algorithm (p.nos 237-249,257-261 of text book -1, p.nos. 111-126 of text book-2).

UNIT-V

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon-rendering methods. (p.nos 324-331,340-342, 347-364, 516-531, 542-546 of text book-1, p.nos 473-529,721-739 of text book-2).

UNIT-VI

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations. 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping (p.nos 427-443, 452-481 of text book -1).

UNIT-VII

Visible surface detection methods: Classification, back-face detection, depthbuffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods(p.nos 489-505 of text book -1, Chapter 15 of of text book-2).

UNIT-VIII:

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.(p.nos 604-616 of text book -1, chapter 21 of text book-2)

1. "Computer Graphics C version", Donald Hearn and M.Pauline Baker, Pearson Education
 2. "Computer Graphics Principles & practice", second edition in C by James D. Foley, Feiner and Hughes, Pearson Education.

REFERENCES:

1. "Computer Graphics", second Edition, Donald Hearn and M. Pauline Baker, TMH/ Pearson Education.
2. "Computer Graphics Second edition", Zhigang xiang, Roy Ptaszek, Schaum's outlines, Tata Mc-Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pal, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH.

IV. B.Tech. MMT I-Sem

T	P	C
4+1*	0	4

**(07A7EC29) CAD/CAM
(ELECTIVE-II)**

UNIT- I

Computers in Industrial Manufacturing, Product cycle, CAD / CAM Hardware, Basic structure, CPU, Memory types, input devices, display devices, hard copy devices, storage devices.

UNIT- II

Computer Graphics: Raster scans graphics coordinate system, database structure for graphics modeling, transformation of geometry, 3D transformations, mathematics of projections, clipping, hidden surface removal.

UNIT- III

Geometric modeling: Requirements, geometric models, geometric construction models, curve representation methods, surface representation methods, modeling facilities desired.

UNIT- IV

Drafting and Modeling systems: Basic geometric commands, layers, display control commands, editing, dimensioning, solid modeling, constraint based modeling.

UNIT - V

Numerical control: NC, NC modes, NC elements, NC machine tools, structure of CNC machine tools, features of Machining center, turning center, CNC Part Programming: fundamentals, manual part programming methods, Computer Aided Part Programming.

UNIT - VI

Group Tech: Part family, coding and classification, production flow analysis, advantages and limitations, Computer Aided Processes Planning, Retrieval type and Generative type.

UNIT - VII

Material requirement planning, manufacturing resources planning, DNC, AGV, ASRS, Flexible manufacturing systems - FMS equipment, system layouts, FMS control.

UNIT - VIII

CIM: Integration, CIM implementation, major functions in CIM, Benefits of CIM, Lean manufacturing, Just-in-time.

TEXT BOOK:

1. CAD / CAM Principles and Applications - 2nd edition, P.N. Rao, Tata Mc. Graw Hill

REFERENCES:

1. CAD / CAM Theory and Practice / Ibrahim Zeid / TMH
2. CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age
3. Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson
4. Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

IV. B.Tech. MMT I-Sem

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4+1*	0	4

**(07A70608) LIGHT METALS AND ALLOYS
(ELECTIVE-II)**

UNIT-I

Aluminum and its alloys: Extraction - Properties - Applications .

UNIT-II

Wrought and Casting Alloys (Al-Cu, Al-Mn, Al-Si, Al-Mg, Al-Si-Mg, Al-Zn, Al-Li) - Corrosion resistance of Al alloys.

UNIT - III

Properties of light metals - Extraction of Beryllium.

UNIT-IV

Extraction of Ti - Properties - Applications.

UNIT - V

Titanium and its alloys.

UNIT-VI

Magnesium - Classification - Casting alloys - Wrought alloys-properties and applications of Mg alloys.

UNIT-VII

Zinc and its alloys.

UNIT-VIII

Zirconium and its alloys.

TEXT BOOK:

1. Materials in Industry - W. J. Patton

REFERENCES:

1. Introduction to Physical Metallurgy - S.H. Avner
2. Engineering Physical Metallurgy - Lakhtin
3. ASM Metals Handbook Vol-1 & 2

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(07A71802) NANO MATERIALS
(ELECTIVE-II)**Unit - 1****Introduction**

What is Nano - Why Nano - Properties at Nano Scales, Advantages & Disadvantages, Application in comparison with bulk materials (Nano structure, nano wires, tubes, nano composites) State-of-art present nano - advanced - topic delivered by a student.

Unit - II**Nano Particles**

Introduction - Synthesis procedures - wet chemical approach & physical vapor synthesis approach etc - size effect & shape change and their properties - examples of systems involved - characterization techniques - properties & their applications (biological etc.)

Unit - III**Nano Wires:**

Introduction - various synthesis procedures (template assisted method, VLS method and other synthesis methods) - properties of nano wires - characterization procedures & principles involved. Application of Nano wires.

Unit - IV**Nano tubes:**

Introduction - Different systems involved in nano tubes - single walled, multi-walled, Carbon based, metal incorporated tubes. Synthesis procedures (Solid & gaseous carbon source based production techniques etc.) Growth mechanism of carbon nano tubes - properties of carbon nano tubes - characterization - applications.

Unit - V**Nano Composites:**

Introduction-Synthesis procedures-various systems (metal-polymer, metal-ceramics and polymer-Ceramics). Characterization - procedures - Applications.

Unit - VI**Micro/Nano Fabrication Techniques:**

Introduction-Basic fabrication techniques (lithography, thin film deposition and doping) MEMS fabrication techniques-Nano fabrication techniques (E-Beam nano-imprint fabrication, Epitaxy and strain engineering. Scanned probe techniques)

Unit - VII**Materials of Nano Technology:**

Introduction - Si based Materials- Ge-based materials-metals - Ferro electric materials - Polymer materials-GaAs & InP (III - V) Group materials, Nano tribology and materials-characterization using Scanning Probe Microscope, AFM, FFM.

Unit - VIII**Nano Biomaterials:**

Introduction-Biocompatibility - anti bacterial activity - principles involved - Applications.

Reference:

1. Springer Handbook of Nanotechnology
2. The Guest for new materials Author S.T.Lakshmi Kumar, Published by Vigyan Prasar.
3. Nano- The Essentials C - Pradeep (IICUE Professor) , MC - Graw Hill.

TEXT BOOKS:

1. Nano Materials A.K. Bandyopadhyay/ New age Publications
2. Nano Essentials T Pradeep / TMH
- 3 Nano Materials Synthesis, Properties and applications, 1996 Edlstein and Cammerata.

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(07A7EC30) METALLURGICAL INSTRUMENTATION
(ELECTIVE-II)**UNIT - I**

HIGH TEMPERATURE INSTRUMENTATION: Methods of obtaining high temperatures - resistance furnace calculation of wire size and length, oil metal and salt baths furnace for temperatures above 1000°C, Refractories for laboratory furnace and other methods of heating.

UNIT - II

Temperature measuring instruments like thermal expansion thermometers, thermocouples, pyrometric millivoltmeters, potentiometers, and Resistance thermometers, Radiation Pyrometers.

UNIT - III

Automatic control of temperature - control of furnace power, position controllers, on-off control, proportion controls anticipating devices, proportional plus derivative control Temperature programming.

UNIT - IV

Vacuum Instrumentation: Pumps and systems like Rotary mechanical pumps, Roots pump, Gaddee molecular pump, vapor pumps, getter-ion pumps, and choice of pumps.

UNIT - V

Measuring gauges for low pressures - Discharge tubes, Melody gauge, Heat conductivity, manometers, ionization vacuum gauges. Beyard-Alpert gauge, leak detection.

UNIT - VI

Instrumentation for calorimetry: Instruments used for the measurement of enthalpy, specific heat, heat measurement, pulse method for specific heat, liquid metal solution calorimeter.

UNIT - VII

Electrical instrumentation: Measuring instruments - potentiometers, Bridges, DC voltmeters and Ammeters

UNIT - VIII

Automation in measurements of internal friction and elastic modulus: Automatic counters for torsional pendulum, precise frequency measurement in torsional pendulum, Automatic measurement of Q-1 activation energy measurement, Measurement of concentration in solid solutions, studies of the viscous behavior of grain boundaries

TEXT BOOK:

1. Experimental techniques in metallurgy-Cherapin & mallik

REFERENCES:

1. Control Systems & Instruments - S. Bhaskar.
2. Pyrometry - W.P. wood & J.M. Cork.
3. Refractories - Norton.

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(07A71891) ELECTRO METALLURGY AND CORROSION LAB

LIST OF EXPERIMENTS:

1. Electroplating of copper on brass and to study the influence of current density on current efficiency.
2. Electroplating of Nickel using watt's bath and to study the influence of current density on current efficiency.
3. To anodise the given aluminium sample and to colour with a dye and to measure the thickness of the oxide film.
4. To determine the throwing power of electroplating bath.
5. Electroplating of chromium on mild steel and to study the influence of current density on current efficiency.
6. To understand the principles in galvanic cell corrosion using "Ferroxyl" indicating test solution.
7. To study the effect of inhibitors on corrosion of mild steel in an acidic solution.
8. To construct pourbiax diagrams using electro chemical thermodynamic data.
9. To study the pitting corrosion of aluminium, stainless steel in suitable environments.
10. To conduct electropolishing of stainless steel using Nitric acid batch.
11. To conduct electroless plating of tin on glass.
12. To conduct electroforming on hard plastics.

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(07A71892) METALLURGICAL COMPUTATIONS LAB

LIST OF EXPERIMENTS:

1. Simulation of Phase diagram
2. Programming to solve the problems on conduction, convection and Radiation
3. Computing heat and mass calculations of chemical reactions
4. Programming to test a thermodynamically feasible process
5. Determination of Crystal structures using computer principles
6. Simulation of Gating and Risering
7. Computer plotting of Sieve analysis data
8. Computer programs to determine charge input to get the required output of product in a blast furnace.

TEXTBOOKS:

1. Computer oriented Numerical methods - V. Rajaraman (PHI Publications)
2. Computer programming and Numerical methods - S. Saran

REFERENCES

1. Numerical methods in engineering - Mario G. Salvadori and Melvin L. Baron Matrix operation on Computer - L.L. Brirud (LCUE Publication)

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(07A81801) COMPOSITE MATERIALS

UNIT -I

INTRODUCTION: Definition - Classification of Composite materials based on structure - based on matrix.

UNIT -II

Advantages of composites - application of composites - functional requirements of reinforcement and matrix.

UNIT - III

FIBERS: Preparation, properties and applications of glass fibers, carbon fibers, Kevlar fibers and metal fibers - properties and applications of whiskers, particle reinforcements.

UNIT - IV

MANUFACTURING OF ADVANCED COMPOSITES: Polymer matrix composites: Preparation of Moulding compounds and prepgres - hand lay up method - Autoclave method - Filament winding method - Compression moulding - Reaction injection moulding.

UNIT -V

Manufacturing of Metal Matrix Composites: Casting - Solid State diffusion technique, Cladding - Hot isostatic pressing.

UNIT -VI

Manufacturing of Ceramic Matrix Composites: Liquid Metal infiltration - Liquid phase sintering.

UNIT -VII

Manufacturing of Carbon - Carbon composites: Knitting, Braiding, Weaving.

UNIT - VIII

RESPONSE OF COMPOSITES TO STRESS: (a) Iso Strain condition (b) Iso Stress condition (c) Load friction shared by the fibers.

TEXT BOOKS:

1. Material Science and Technology - Vol 13 - Composites by Cahn - VCH, West Germany
2. Composite Materials - K.K.Chawla

REFERENCE:

1. Hand Book of Composite Materials-ed-Lubin

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(07A80604) SUPER ALLOYS
(ELECTIVE-III)**UNIT -I**

INTRODUCTION: Introduction to super alloys, Guide to selection of super alloys, Wrought super alloys, Heat Resistant castings.

UNIT -II

PHYSICAL METALLURGY: Microstructure of wrought Heat-Resisting Alloys, Microstructure of Ni-base & Co-base heat-resistant casting alloys. Temperature and Time-dependent Transformation. Application to Heat Treatment of High Temperature Alloys.

UNIT -III

Relationship of properties to Microstructure in super alloys. Fracture properties of super alloys. High temperature corrosion and use of castings for protection.

UNIT -IV

Effect of Physical Metallurgy and process variables on the microstructure of wrought super alloys. Process and Metallurgical factors affecting on superalloys and other high temperature materials.

UNIT -V

MELTING PROCESS: Melting of Super alloys: Principles and practices of vacuum Induction Melting and Vacuum Arc melting.

UNIT -VI

FORMING METHODS: Forming and Fabrication of super alloys: Recent developments in P/M of super alloys-Production of components by Hot-Isostatic Pressing.

UNIT -VII

Casting methods - Improving turbine blade performance by solidification control-The development of single crystal turbine blades.

UNIT -VIII

Quality of super alloy castings: Heat Treating of Heat resistant alloys.

TEXT BOOKS:

1. Super alloys: Source book: Mathew J. Donachie. Jr. editor : 1984.
2. The super alloys: edited by Chester T. Sims and William C Haagel: 1972.

REFERENCE:

1. Campbell IE High temperature MATERIALS, John wiley and sons Inc.,1956

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T	P	C
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(07A8EC16) FERRO ALLOY TECHNOLOGY
(ELECTIVE-III)**UNIT-I**

Introduction: Types of Ferro alloys and their uses: Present status of ferroalloy industry in India. Future plans and developments.

UNIT-II

Principles: Physicochemical aspects of ferroalloys. Production by various methods.

UNIT-III

Furnace types and its design, refractories.

UNIT-IV

Mechanical equipment, auxiliaries, electric power in to heat. Furnace power supply. Working voltage, power factor and efficiency.

UNIT-V

Production: Production of ferro-silicon-calcium, ferromanganese (high and low carbon).

UNIT-VI

Ferro-chrome (high and low carbon), Ferro-molybdenum.

UNIT-VII

Ferro-tungsten, ferro-titanium, ferro-vanadium.

UNIT-VIII

Lay out: Lay out of a ferro alloy plant and its production economics.

TEXT BOOKS:

1. Riss M. And Khodorovsky V-Production ferroalloys Mir Publishers, Moscow 1967.
2. Symposium on ferro alloys NML Technical J.Feb 1962. World ferrochrome producers: Met bull.

REFERENCES:

1. Manufacture of Iron and Steel. -Vol-1 G. R. Bashforth.
2. Making, Shaping and treating of Steel by United Steel Corporations, Pittsburgh.

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(07A8EC15) SIMULATION AND DATA PROCESSING
(ELECTIVE-III)**UNIT-I**

Roots of algebraic equations by Bisection method, false position method, Newton Raphson method, Secant method and quasi-Newton method.

UNIT-II

Solution of simultaneous equations by Gauss elimination method, Gauss Jordan methods Solution of simultaneous equations by Gauss elimination method, Gauss Jordan method, Doolittle (Groul's methods, Cholesky method). Numerical Integration: Trapezoidal and Simpson's rule. Doolittle (Groul's methods, Cholesky method). Least square curve fitting: Linear and Polynomial.

UNIT-III

Interpolation, extrapolation and Numerical differentiation, Linear, Newton and Lagrange methods. Solution of ordinary differential equations- Rungakutta method, Euler's method.

UNIT-IV**Metallurgical Engineering Problems:**

- a) Heat and Mass calculations of chemical Reactions.
- b) Heat Transfer

UNIT-V

- a) Physical Metallurgy and Heat Treatment b) Thermodynamics.

UNIT-VI

- a) Gating and Risering. b) Burden calculations.

UNIT-VII

- a) Determination of crystal structure. b) Sieve analysis.

UNIT-VIII

Simulation of phase diagrams and blast furnace.

Text Book:

1. Computer oriented Numerical Methods: Rajaraman(PHI Publications)

REFERENCES:

1. Computer Programming and Numerical Methods: S.Saran.
2. Numerical Methods in Engineering-Mario G.Salvadori & Melvin L.Baron(PHI publications)
3. Matrix operations on the computer -LL Bruylants(LCUE publications)

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**(07A8EC17) EXPERIMENTAL TECHNIQUES IN METALLOGRAPHY
(ELECTIVE-III)**

UNIT - I - Polishing methods; Etching methods; light sources in optical microscopy; Numerical aperture, Resolution, depth of focus.

UNIT-II - Objective and eyepiece in optical microscope; lense defects; Optical methods of enhancing contrast dark field illumination; Polarized light phase contrast; Filters.

UNIT-III - Wave nature of electrons; Electron wavelengths; Interaction of electron beams with matter; effect of crystal structure; Representation of diffraction patterns- Reciprocal lattice and Reflecting sphere.

UNIT-IV - Electron microscope: Electron gun; Electromagnetic lenses and their observations; Resolving power; Depth of field and depth of focus; Fresnels fringer; Bright and dark field; selected area diffraction; Advantage and disadvantages of electron microscope.

UNIT-V - Specimen preparation for the TEM; Replica methods; Preparation of thin foils from bulk specimens; direct formation of thin films.

UNIT-VI - Transmission electron microscopy: Brief description of CTEM; Consideration of resolution; Topographical studies; Image contrast from stacking faults; Twinning; double diffraction and kikuchi lines.

UNIT-VII - Scanning electron microscope; basic priciles; resolving power; specimen requirement for SEM; preparatory methods for SEM specimen.

UNIT-VIII - Application of SEM: Different types of modes used in SEM and their applications.

TEXT BOOKS

1. The Principles of metallography laboratory practices -George L.Khel-Eurasia publishing house(Pvt Ltd)
- 2 Transmission electron Microscopy of metals -Garet Thomas.-John wiley and sons.

REFERENCES:

1. Modern Metallographic Techniques & their application - victor phillips.
2. Physical Metallurgy, Part - I - RW Chao and P. Haasan.
3. Experimental Techniques in Physical Metallurgy - VT Cherepin and AK Malik.
4. Electron Microscopy in the study of materials -P.J.Grundy.

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**(07A8EC14) METALLURGICAL PROBLEMS
(ELECTIVE-IV)**

UNIT-I

Stoichiometric calculations. Burden calculations.

UNIT-II

Mass balance and Energy balance calculations, Problems based on Principles of Thermodynamics

UNIT-III

Problems based on Kinetics of Metallurgical Processes

UNIT-IV

Problems on Heat Transfer.

UNIT-V

Problems on theoretical flame temperature.

UNIT-VI

Problems on pyrometallurgy.

UNIT-VII

Problems based on Electro Metallurgical processes.

UNIT-VIII

Problems of Hydro Metallurgical processes.

TEXT BOOK

1. Metallurgical problems-Butts

REFERENCES:

1. Non-Ferrous Extractive Metallurgy-Bray.
2. Elements of Heat transfer. -Jakob & Hawkins.

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(07A80605) ADVANCED MATERIALS
(ELECTIVE-IV)

UNIT-I

Introduction - Classification of Advanced Materials

Unit - 2: Carbon - Carbon Composites

Introduction - preparation of carbon fibers - reinforcement performs - knitting - braiding - weaving - filament winding - helical winding - polar winding - making of carbon - carbon composites - advantages and disadvantages - properties and application

Unit - 3: Intermetallic Compounds

Introduction - Types of intermetallic compounds - Ni - Al system, Fe-Al, Ti-Al system, Preparations and properties and application of intermetallic compounds.

Unit - 4: High Temperature ceramics

1. Oxides - properties of high purity refractory oxides - fabrication methods - mechanical properties
2. Carbides - Introduction - B_4C , SiC, WC, etc. preparation and properties
3. Borides - Preparation and properties of Ti, W, Ta, Nb, borides
4. Silicides and Sulphides - introduction - preparation, properties and applications.

Unit - 5: Functionality Graded Materials (FGMS)

Types of FGMS - classification - different systems - preparations - properties and applications of FGMS.

Unit - 6: Cermets

Introduction - classification - fabrication techniques - bonding and microstructure - oxide cermets - carbide and carbonitride cermets - steel bounded cermets - properties and applications.

Unit - 7: Shape Memory Alloys (SMAs)

Introduction - shape memory effect - classification of shape memory alloys - composition - properties and application of shape memory alloys (SMA)

Unit - 8: Refractory Metals and Alloys

Introduction - Manufacturing - Preparations - Properties and Application of Nb, Ta, W, Mo, Re.

Text Books:

1. Materials Science and Technology - cahan

References:

1. High Temperature Materials by J E Campbell
2. ASM Metals Hand Book Vol 1 & Vol 2

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(07A8EC13) OPERATIONS RESEARCH
(ELECTIVE-IV)

UNIT - I

Development - Definition- Characteristics and Phases - Types of models - operation Research models - applications.

ALLOCATION: Linear Programming Problem Formulation - Graphical solution - Simplex method - Artificial variables techniques - Two-phase method, Big-M method - Duality Principle.

UNIT - II

TRANSPORTATION PROBLEM - Formulation - Optimal solution, unbalanced transportation problem - Degeneracy. Assignment problem - Formulation - Optimal solution - Variants of Assignment Problem- Traveling Salesman problem. **SEQUENCING** - Introduction - Flow -Shop sequencing - n jobs through two machines - n jobs through three machines - Job shop sequencing - two jobs through 'm' machines.

UNIT - III

REPLACEMENT: Introduction - Replacement of items that deteriorate with time - when money value is not counted and counted - Replacement of items that fail completely, group replacement.

UNIT - IV

THEORY OF GAMES: Introduction - Minimax (maximin) - Criterion and optimal strategy - Solution of games with saddle points - Rectangular games without saddle points - 2 X 2 games - dominance principle - m X 2 & 2 X n games - graphical method.

UNIT - V

WAITING LINES: Introduction - Single Channel - Poisson arrivals - exponential service times - with infinite population and finite population models- Multichannel - Poisson arrivals - exponential service times with infinite population single channel Poisson arrivals.

UNIT - VI

INVENTORY: Introduction - Single item - Deterministic models - Purchase inventory models with one price break and multiple price breaks - shortages are not allowed - Stochastic models - demand may be discrete variable or continuous variable - Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT - VII

DYNAMIC PROGRAMMING: Introduction - Bellman's Principle of optimality - Applications of dynamic programming- capital budgeting problem - shortest path problem - linear programming problem.

UNIT - VIII

SIMULATION: Definition - Types of simulation models - phases of simulation- applications of simulation - Inventory and Queuing problems - Advantages and Disadvantages - Simulation Languages.

1. Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson Education.
 2. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspan and Lawrence Friedman
 3. Operations Research / R.Pannarselvam,PHI Publications.
 4. Operations Research / Wagner/ PHI Publications.
 5. Operation Research /J.K.Sharma/MacMilan.
 6. Introduction to O.R/Hiller & Libermann (TMH).
 7. O.R/Wayne L.Winston/Thomson Brooks/cole
 8. Introduction to O.R /Taha/PHI

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**(07A81802) NUCLEAR METALLURGY
(ELECTIVE-IV)**

UNIT - I - ELEMENTARY NUCLEAR PHYSICS AND CHEMISTRY: Structure of nucleus, radioactivity, binding energy; nuclear interaction; fission and fusion: nuclear reaction; energy release and chain reactions; neutron cross-section; multiplication and criticality concepts and factors.

UNIT - II - Mechanisms of moderation, radiation detection, radiation effects on fissile and non fissile materials; radiation damage and radiation growth; thermal cycling; protection against radiations.

UNIT - III - Rector components: Types of reactors and classification

UNIT - IV - Materials for nuclear reactors: Considerations in selection and properties of common materials used as fuels, their physical and chemical properties; canning materials; coolants; control rods; reflectors and shielding materials.

UNIT -V - Production of reactor materials:Occurrence and general characteristics of nuclear minerals and their production.

UNIT - VI - Indian resources: Flow sheets of processing of nuclear minerals for the production of nuclear grade uranium, thorium, beryllium and zirconium with emphasis on basic scientific principles involved; production and enriched uranium and fabrication of fuel elements.

UNIT - VII - Processing of irradiated fuel for recovery of Plutonium

UNIT - VIII - Nuclear power production in India and its economics

TEXT BOOK

Wright JC - Metallurgy in Nuclear Power Technology: Iliffe Book Ltd., 1962

REFERENCES

1. Wilkinson WD and Mrphy WF Nuclear Reactor Metallurgy Van Nostrand 1958
 2. Symposium on Rare materials: Indian Institute of Metals.
 3. Glasstone S and Snesonkske A; Pncipales of Nuclear Reactor Engineering: Macmillan, London.
 4. Grainger L Uranium and Thorium: George Newnes Ltd., London.
 5. Gurinsky DH and Dienes JL Nuclears Fuels, Macmillan.
 6. US Atomic Energy Commission, Reactor Hand book Material Mc. Graw Hill Book Co. 1955
 7. Proceedings of the symposium on Nuclear Science and Engineering - Bhabha Atomic Research Centre, Bombay.

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(07A81891) INDUSTRY ORIENTED MINI PROJECT

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(07A81892) SEMINAR

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(07A81893) PROJECT WORK

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(07A81894) COMPREHENSIVE VIVA