

Course Name: HUMANITIES III (BUSINESS ENVIRONMENT & INDUSTRIAL LEGISLATION)

Course Code: HU 402

Credits: 4

L T P : 4-0-0

Pre Req:

Lecture Wise Breakup

No. of Lectures

- 1. INTRODUCTION (07)**
Scope of business, Characteristics of business and its forms.
- 2. BUSINESS ENVIRONMENT (07)**
Economic, Political and Technological. (07)
Ecological and Global Environment and their relevance in present scenario. (08)
- 3. SOCIAL RESPONSIBILITY OF BUSINESS (05)**
Concept, Social Responsibility toward different interest groups and Business Ethics. (05)
- 4. GLOBALIZATION (07)**
Meaning, Rationale for globalization, features of current globalization, Pros and Cons of globalization. (07)
- 5. WTO (07)**
Functions of WTO. WTO structure, and Implications for India. (07)
- 6. CORPORATE GOVERNANCE (05)**
Concept, Essentials of good Corporate Governance, One case study. (05)
- 7. CONTRACT ACT (05)**
Concept of Contract, types and its essentials. (05)
- 8. SALE OF GOOD ACT (05)**
Essential of sale of goods Act. (05)

BOOKS:

- 1 Francis Cherunilam, Business Environment, Himalaya Publications.
- 2 K.C.Garg, V.K.Sareen, Mukesh Sharma and R.C.Chawla, Commercial & Labour Laws, Kalyani Publishers.

REFERENCES:

1. K Aswathappa, Essential of Business Environment, Himalaya Publication.
2. S.S.Gulshan, Mercantile Law, Excel Books.
3. S.S. Gulshan & G.K. Kapoor, Business Law, New Age International (p) Ltd., Publisher.
4. S Singh, Corporate Governance – Global Concepts & Practices, Excel Books.
5. Roger Benett, International Business, Addison Wesley Longhran, Delhi.
6. Y K Bhushan, Business Organization & Management, Sultan Chand & Sons.

HU402H (Humanities III) -In addition to the contents of HU402, additional topics:

Cluster Growth Model Vs SEZ

Innovative Dynamics of the Company

Foreign Market Entry Strategies

Competition Policy and Law

Corporate Social Responsibility-Two Case Studies

Course Name: HUMANITIES III (CORPORATE FINANCE)

Course Code : HU 404

Credits-4 : L T P: 4-0-0

Pre Req:

Lecture wise breakup

No. of Lectures

- 1. INTRODUCTION (07)**
Finance, Financial Decisions, Objectives of Corporate Financial Decisions and factors influencing financial decisions.
- 2. INDIAN FINANCIAL SYSTEM (07)**
Nature and role of financial system in Indian Economy.
- 3. FINANCIAL MARKETS (08)**
Concepts, Type of markets and their relevance in present scenario.
- 4. FINANCIAL INSTRUMENTS AND FINANCIAL SERVICES (08)**
Capital and Money Market Instruments, Services.
- 5. WORKING CAPITAL (05)**
Types and factors affecting the requirements of working capital.
- 6. SOURCES OF FINANCE (05)**
Short term and long term.
- 7. TIME VALUE OF MONEY AND CAPITAL BUDGETING (05)**
Concept of Compounding and Discounting, Nature of Investment Decisions, Investment, Evaluation Criteria: Pay Back Period Method, Accounting Rate of Return Method, Internal Rate of Return Method and Net Present Value Method.
- 8. FINANCIAL LEVERAGE (03)**
Meaning (trading on equity) and measures.
- 9. DIVIDEND POLICY (05)**

Objectives of Dividend Policy, factors influencing firm's dividend policy.
- 10. CAPITAL STRUCTURE (03)**

Essentials of Capital Structure, Approaches to establish target capital structure.

BOOKS:

1. Pandey I.M., Financial Management, Vikas Publishing House Pvt.Ltd.
2. Khan M Y, Indian Financial System, Tata McGraw Hill.
3. Bhole LM and Mahakud Jitendra, Financial Institutions and Markets,

Tata McGraw Hill

REFERENCES:

1. Chandra Prasanna, Financial Management Theory and Practice, Tata McGraw Hill
2. Lasher William R., Practical financial Management, Thomson
3. Van Horne J.C., Financial Management and Policy, Prentice Hall
4. Apte, P.G., International Financial Management, Tata McGraw Hill

HU404H (Humanities III) -In addition to the contents of HU404, additional topics:

Capital Market Intermediaries and their Regulation.

Functions and Operations of Money Market.

Foreign Exchange Market –From FERA to FEMA.

Role of Banks and Financial Institutions in Economic Development.

Course Name : ENGINEERING MATERIALS & SELECTION

Course Code: MT431 Credits :04 L T P :4 0 0

Pre Req. :

Lecture wise break-up

No. of lectures

- | | |
|---|-------------|
| 1. INSPIRATION FOR MATERIAL SELECTION | (02) |
| 2. COST BASIS FOR SELECTION | (01) |
| 3. ESTABLISHMENT OF SERVICE REQUIREMENTS AND FAILURE ANALYSIS | (03) |
| 4. SPECIFICATION AND QUALITY CONTROL | (02) |
| 5. SELECTION FOR MECHANICAL PROPERTIES
Strength, toughness, stiffness, fatigue, high temperature resistance and Creep resistance | (10) |
| 6. SELECTION FOR SURFACE DURABILITY
Wear and abrasion resistance, corrosion resistance. | (06) |
| 7. ELECTRICAL MATERIALS
Selection for electrical, magnetic properties | (04) |
| 8. ADVANCE MATERIALS
Smart materials, intelligent materials | (04) |
| 9. CO-RELATION
Relationship between materials selection and materials processing | (06) |
| 10. CASE STUDIES IN MATERIAL SELECTIONS
Aerospace, Ship, Engine and Power generation, Automobile, Bearings, springs, Gears, tools | (10) |

BOOKS:

1. Charles, Crane and Furness: Selection and uses of materials, Butterworth Heinmann publisher

REFERENCES:

1. Material Transactions IIM, Kolkata
2. Hand book of Materials ASTM

Course Name : ENGINEERING MATERIALS & SELECTION
Course Code: MT431H **Credits :04** **L T P :4 0 0**

In addition to the contents of MT 431 Following Case study/New trends in materials selection will be studied by the honors students:

Case study topics: Bike: racing/touring/mountain/child's, Pipeline for carrying oil in a coastal environment, Space shuttle challenger disaster

Recent Trends in materials selection: Green Engineering in Materials Selection, Computer aided materials selection.

Course Name : FAILURE ANALYSIS OF MATERIALS
Course Code: MT432 **Credits :04** **L T P :4 0 0**

Pre Req. :

Lecture wise break-up **No. of lectures**

1. **FAILURE OF METALS:** (08)
Basic reasons, various types.
2. **BASIC PRINCIPLES OF METAL DEFORMATION:** (06)
Introduction to crystal geometry, Deformation, Basic models of deformation, Resolved shear stress, relations of slip to crystal structure, critical resolved shear stress.
3. **FRACTURE IN METALS :** (10)
Types of fracture, Theoretical cohesive shear strength, Griffith theory, objections to Griffith theory, Nucleation of crack – different models, Propagation of crack, effect of grain size on brittle fracture, intergranular brittle fracture, effect of inclusions, temp. on brittle fracture, fracture toughness.
4. **TECHNIQUES OF FAILURE ANALYSIS :** (10)
Destructive and Non-destructive Testing, Macro- examination, Microscopic examination, TEM, SEM, X-Ray diffraction techniques
5. **FAILURE MODES:** (08)
Failure by fatigue, creep, fretting creep, oxidation impact, wear, corrosion, case studies.
6. **QUALITY ASSURANCE :** (04)
A strong link to failure analysis, Quality control concept, quality assurance.
7. **CASE STUDIES** (10)

BOOKS:

1. Metal Fracture - P.F. Temson, Paragon Press
2. Plastic Deformation & fracture of materials -H. Mugaraei, VCM Pub. Weinheim

3. Non destructive evaluation and quality assurance – Baldev Raj & sreenivasan, interline Pub. Co. Bangalore.
4. Metals Hand Book - Testing of metals.

REFERENCES:

1. Hand book on Metallurgical failure analysis

Course Name : FAILURE ANALYSIS OF MATERIALS
Course Code: MT432H **Credits** :04 **L T P** :4 0 0

One review assignment, two case studies, one project work and atleast 30 numerical/conceptual problems.

Course Name: NANO MATERIAL TECHNOLOGY AND APPLICATIONS
Course Code: MT438 **Credits** :04 **LTP** :4 0 0
Lecture wise break-up **No. of lectures**

1. **SCIENCE AND TECHNOLOGY OF NANOMATERIALS: (08)**
 Introduction to Nanostructured materials, Fundamentals of nanoscience: Size dependence of properties - Particle size determination - Bulk to nano transition - Semiconducting nanoparticles - Carbon nanostructures - Low-dimensional structures: Quantum wells, Quantum wires, and Quantum dots, Nano clusters & Nano crystals, Electronic and optical properties of nanocrystallites, Metallic and semiconducting superlattices.
2. **SYNTHESIS OF NANOSTRUCTURED MATERIALS: (10)**
 Preparation of nanosystems. Introduction to nanolithography - Carbon nanotubes: preparation - Synthesis and preparation of nanomaterials (crystalline and thinfilm) - Physical and chemical methods - Control and stability (size, shape, composition).
3. **VIBRATIONAL PROPERTIES OF NANOCRYSTALLITES: (12)**
 Magnetic nanostructured materials; Nanoscale magnetism of fine particles of transition metals, alloys and oxides: GMR, TMR, SPT, relaxation process and static and dynamic studies. Synthesis, mechanical characterization and fabrication of structural nano ceramics and nano composites with emphasis on low temperature superplasticity and Superplastic forming/diffusion bonding.
4. **FABRICATION AND CHARACTERIZATION OF NANO ELECTRONIC DEVICES AND MEMS: (10)**
 Synthesis and characterisation of nano-multicomponent systems for sensors(magnetic, electronic and optical) and electrodes. Synthesis and fabrication of carbon nano structures for fuel cell and energy storage applications. Design of functional polymer brushes and nano-wires. Synthesis of nano-scale dendrides, cavities for catalysis and separation.
5. **CHARACTERIZATION OF NANOSYSTEMS: (10)**
 Basic Material Properties - Mean Values and Correlation Functions – Xray diffraction - Scanning Electron Microscopy - Scanning Tunneling Microscopy – Electron Microscopy - X-ray absorption spectroscopy - Photoelectron emission spectroscopy.

6. NANO MATERIALS APPLICATIONS: (04)
Nanotubes, nanowires, and nanodevices-introduction - Functional Nanostructures

BOOKS:

1. Nanomaterials: Synthesis, Properties and Applications- edited by A.S. Edelstein, R C. Cammarata (IOP publication).
2. Nanostructured Materials: Processing Properties and Applications – Carl C. Koch (Noyes Publications).
3. Charles P. Poole and Frank J Owens. *Introduction to nanotechnology*. Wiley Interscience, 2003. (US \$ 80.00).

REFERENCES:

1. Carbon Nanotubes : Properties and applications by Michael J. O Connell
2. Nanomaterials : Mechanics and Mechanism by K T Ramesh

Course Name: NANO MATERIAL TECHNOLOGY AND APPLICATIONS
Course Code: MT438 Credits :04 LTP :4 0 0

Two review assignments from International journals, One project work on latest nanomaterials and their behaviour, Atleast 30 conceptual problems.

Course Name : SURFACE ENGINEERING
Course Code: MT439 Credit :04 L T P :4 0 0

Pre Req. :

Lecture wise break-up No. of lectures

1. **SCOPE : (10)**
Influence of surface on metallurgical & mechanical properties. Structure and characterization of surfaces. Interaction of solid surfaces : Concepts and definitions of friction. Water and lubrication. Coefficient of friction and factors affecting friction. Modes of wear and factors affecting wear rate. Type of lubrication, lubricants and additives, application, maintenance and removal of lubricants.
2. **CORROSION EFFECTS : (10)**
Brief review of corrosion, erosion-corrosion and environment assisted fracture processes, prevention by surface coating and inhibition.
3. **MODIFICATION OF SURFACE (20)**
Classification of surface modification techniques and criteria for their selection. Substrate—its important and preparation for subsequent coating. Brief discussion of techniques like plasma nitriding, carburizing, vapour deposition, ion implantation, laser and electron beam processor. Metallic and refractory coatings by plasma techniques, the coating process, equipment, parameters controlling quality, post-coating treatments, surface engineering of iron and steels; non-ferrous materials and of selected iron-metallic materials.
4. **CHARACTERIZATION: (10)**
Testing and characterization of coating and thin films.

BOOKS:

1. Properties of Metallic surfaces, Institute of Metals.

2. Surface Treatments for Protection, The Institute of Metallurgists.
3. Wear Resistance of Metals and Alloy, G.R. Kingsbuly (edn.)
4. Wear of Metals, A.D. Sarkar

REFERENCES:

1. Friction and Wear of Materials, E. Robmowies
2. Surface Engineering, ASM
3. Surface Treatment of Metals, Shreir

Course Name : SURFACE ENGINEERING
Course Code: MT439 Credit :04 L T P :4 0 0

One review assignment, two case studies, one project work and atleast 30 numerical problems.

Course Name : CAPSTONE PROJECT II
Course Code: MT440 Credits :04 Design Points: 02 L T P :0 0 8
Pre Req. : -

In the Capstone project-II, the students have to complete the project and submit a comprehensive report on the topic already chosen in Capstone project-I or students can choose a new topic if capstone I research project is completed. The students will be required to submit the report and will work will be evaluated.

Course Name : METAL CASTING LAB
Course Code: MT481 Credits:02 Design Points: 02 L T P : 0 0 4
Pre Req.: —

1. Melting & Casting
 - (i) Prepare a master alloy of chemistry as assigned design – Melting – Testing – application.
 - (ii) Change calculation and design
2. Characterization and sand Testing
 - i. Specific Surface
 - ii. AFS Number
 - iii. AFS & MB Clay Permeability of Sand
 - iv. Compactability and flow ability
 - v. Effect of clay on strength and role of moisture
 - vi. Water adsorption capacity
 - vii. Mold & Core hardness
3. Preparation of a Mold
 - Determine the Casting System design, Riser placement and Design and pour the mold to make and sound casting.
4. Special Methods
 - Make a Core Box & using suitable sand system make a core.
 - Use the core in mold as in above and develop a cored casting

- Developing a centrifugal or die casting

Course Name : PROCESSING, MANUFACTURING & CHARACTERIZATION LAB

Course Code: MT482 Credits: 02 Design Points: 02 L T P : 0 0 4

List of Experiments:

1. To perform annealing, Normalizing and Hardening of Carbon steel and to study the effect of each process on properties and structure of the steel.
2. To perform tempering of Hardened Carbon Steel and to study the effect of it on the properties and structure of these.
3. To perform hardenability test on Carbon Steel and to plot the hardenability curve of each.
4. To perform the Carburizing treatment and to study the effect of time on the Case depths of carburized steel. Measurement of Case depth.
5. Studying the heat affected zone in Gas welding by metallographic techniques.
6. Characterize the given powder and report the physical properties of the powder. To determine the compressibility and optimize the compacting pressure to achieve high densities and low densities.
7. Sinter the compacts pressed at the optimized compacting pressure and report the change in properties.
8. Preparation of Plaster mould.
9. Slip preparation, Grinding, charging of materials.
10. Slip casting.

Course Name: NANO MATERIAL TECHNOLOGY AND APPLICATIONS

Course Code: MT438 Credits :04 LTP :4 0 0

Lecture wise break-up No. of lectures

1. **SCIENCE AND TECHNOLOGY OF NANOMATERIALS: (08)**
Introduction to Nanostructured materials, Fundamentals of nanoscience: Size dependence of properties - Particle size determination - Bulk to nano transition - Semiconducting nanoparticles - Carbon nanostructures - Low-dimensional structures: Quantum wells, Quantum wires, and Quantum dots, Nano clusters & Nano crystals, Electronic and optical properties of nanocrystallites, Metallic and semiconducting superlattices.
2. **SYNTHESIS OF NANOSTRUCTURED MATERIALS: (10)**
Preparation of nanosystems. Introduction to nanolithography - Carbon nanotubes: preparation - Synthesis and preparation of nanomaterials (crystalline and thinfilm) - Physical and chemical methods - Control and stability (size, shape, composition).
3. **VIBRATIONAL PROPERTIES OF NANOCRYSTALLITES: (12)**

Magnetic nanostructured materials; Nanoscale magnetism of fine particles of transition metals, alloys and oxides: GMR, TMR, SPT, relaxation process and static and dynamic studies. Synthesis, mechanical characterization and fabrication of structural nano ceramics and nano composites with emphasis on low temperature superplasticity and Superplastic forming/diffusion bonding.

4. FABRICATION AND CHARACTERIZATION OF NANO ELECTRONIC DEVICES AND MEMS: (10)

Synthesis and characterisation of nano-multicomponent systems for sensors(magnetic, electronic and optical) and electrodes. Synthesis and fabrication of carbon nano structures for fuel cell and energy storage applications. Design of functional polymer brushes and nano-wires. Synthesis of nano-scale dendrides, cavities for catalysis and separation.

5. CHARACTERIZATION OF NANOSYSTEMS: (10)

Basic Material Properties - Mean Values and Correlation Functions – Xray diffraction - Scanning Electron Microscopy - Scanning Tunneling Microscopy – Electron Microscopy - X-ray absorption spectroscopy - Photoelectron emission spectroscopy.

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Course Name: NANO MATERIAL TECHNOLOGY AND APPLICATIONS
Course Code: MT438 Credits :04 LTP :4 0 0

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Course Name : SURFACE ENGINEERING
Course Code: MT439 Credit :04 L T P :4 0 0

Pre Req. :

Lecture wise break-up No. of lectures

1. SCOPE : (10)

Influence of surface on metallurgical & mechanical properties. Structure and characterization of surfaces. Interaction of sold surfaces : Concepts and definitions of friction. Water and lubrication. Coefficient of friction and factors affecting friction. Modes of wear and factors affecting wear rate. Type of lubrication, lubricants and additives, application, maintenance and removal of lubricants.

2. CORROSION EFFECTS : (10)
Brief review of corrosion, erosion-corrosion and environment assisted fracture processes, prevention by surface coating and inhibition.

3. MODIFICATION OF SURFACE (20)
Classification of surface modification techniques and criteria for their selection. Substrate—its important and preparation for subsequent coating. Brief discussion of techniques like plasma nitriding, carburizing, vapour deposition, ion implantation, laser and electron beam processor. Metallic and refractory coatings by plasma techniques, the coating process, equipment, parameters controlling quality, post-coating treatments, surface engineering of iron and steels; non-ferrous materials and of selected iron-metallic materials.

4. CHARACTERIZATION: (10)
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Course Code: MT439 Credit :04 L T P :4 0 0

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