- NSS/NCC/Sports proficiency/Community services/Professional society activities/placement activities/clubs/technical magazine/conferences/research papers/Technical activities related to the field of Engineering (1st to 3rd year, 1credits to be earned in 7th semester)

L: Lectures/Week, T: Tutorials/Week, P: Practical Hours/Week

Assessment will consist of the following components

1. Mid-Term
   a. Two minor tests (50% of Mid -term marks)
   b. Assignments (20% of Mid-term marks)
   c. Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks)
   d. Attendance (10% of Mid-term marks)
2. End -Term

- **As per UGC guidelines of total courses can be run through MOOC s. Swayam platform**

BS Basic Science HSMC Humanities social science including management ESC Engineering Science Courses MC Mandatory Course

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

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th SEMESTER

S No	Course code	Courses	Contact hrs per week			Mid Term	End Term	Total Marks	Credits
			L	T	P				
1.	PCC 114	Chemical Reaction Engineering II	3	1	-	50	50	100	4
2.	PCC 116	Process Dynamics & Control	3	1	-	50	50	100	4
3.	PEC 103	Department Elective III Plant Utilities	3	-	-	50			

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

FIRST YEAR

st SEMESTER

Title	**MATHEMATICS I**		**Credits**	04
Code	BS101		**L T P**	3 1 0
Max Marks	**End term**	**Mid Term**		

Title	**ELECTRICAL AND ELECTRONICS ENGINEERING**			**Credits**	4
Code	ESC103			**LT P**	31 -
Max marks	**End term**	**MidTerm**		**Elective**	N
Pre requisites					
Note forexaminer	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**				
Objectives	1. ToprovidethevariousBasicconcepts,lawsandvariouscircuitanalyzingmethodsappliedinsolving Electrical Circuits. ToprovidestudentsaboutbasicknowledgeofA.CandD.Ccircuits,theorems,laws.Introducetothestudentsaboutdifferencebetweensinglephaseandthreephasesystem. 2. Toteachthestudentsbasicprincipleofoperationoftransformers, induction machineand D.Cmachine. 3. Toprovide them knowledge about basic concepts and applications of diodes, rectifiers and transistors. 4. To make them aware about digital circuits.				
Course Outcomes	2. The student will understand how various loads are connected in circuits and difference between single and three phase system. The students will know the principles and working of different types of electrical machines used in industry				

Unit IV

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

Topic	No of Hours

UNIT-IV:	Organizational Conflict and Negotiations: Dynamics and management; Sources, patterns, levels, and types of conflict; Traditional and modern approaches to conflict; Functional and dysfunctional organizational conflicts; Resolution of conflict. Organizational Development: Concept; Need for change, resistance to change; Theories of planned change; organization change and stress management, Organizational diagnosis.	12 HOURS
Text Books	1. Koontz, Harold, Cyril O'Donnell, and Heinz Weihrich: Essentials of Management, Tata McGraw-Hili, New Delhi. Luthans, Fred: Organizational Behaviour, McGraw-Hili, New York. 2. Robbins, Stephen P, and Mary Coulter: Management, Prentice Hall, New Delhi. Robbins, Stephen P: Organizational Behavior" Prentice Hall, New Delhi. 3. S. Stephen P. Robbins: Organizational Behaviour, Prentice Hall of India Private Limited, New Delhi. 4. Stoner, Freeman & Gilbert, Jr.: Management, Prentice Hall of India private Limited, New Delhi.	
Reference Books	1. Griffin, Ricky W: Organisational Behaviour, Houghton Mifflin Co., Boston. 2. Hellreigel, Don, John W. Slocum, Jr., and Richard W. Woodman: Organizational Behavior, South Western College Publishing, Ohio. 3. Hersey, Paul, Kenneth H. Blanchard and Dewey E. Johnson: Management of Organisational Behaviour: Utilising Human Resources, Prentice Hall, New Delhi. 4. Ivancevich; John and MicheeolT.Matheson: Organisational Behaviour and Management, Business Publication Inc., Texas. 5. Steers, Richard M. and J. Stewart Black: Organizational Behavior, Harper Collins College Publishers, New York. Sukla, Madhukar: Understanding Organisations: Organisation Theory and Practice in India, Prentice Hall, New Delhi. 6. Govindarajan & Natarajan: Principles of Management, Prentice Hall of India Private Limited, New Delhi. 7. Stoner, Freeman & Gilbert, Jr.: Management, Prentice Hall of India private Limited, New Delhi. 8. Tripathy& Reddy: Principles of Management, Tata McGraw-Hill Publications, New Delhi. 9. Fred Luthans: Organizational Behaviour, Tata McGraw-Hill Publications, New Delhi. 5. Udai Pareek: Understanding Organizational Behaviour, Oxford University Press, New Delhi.	

Course Assessment Methods

Assessment will consist of the following components

1. Mid-Term Assessment:

One best of two minor tests (50% of Mid -term marks)

Assignments (20% of Mid-term mark.16843(s)-4.16843(m.40293(49.999]TJ -220.08 -1l4 6.996324(e

Title	**ELECTRICALANDELECTRONICS ENGINEERING Lab**			**Credits**	1.5
Code	ESC154	**Semester** nd		**LT P**	- -- 3
Max marks	**End term**	**MidTerm**		**Elective**	N
Pre requisites					
Note for examiner	Students have to perform minimum 8 experiments in a semester				

Objectives

Students will be able

1 To connect electric circuits. And use voltmeter, ammeter and wattmeter

2 Perform open circuit test and short circuit test on a single phase transformer and draw equivalent circuit

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

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Course Code	MC102
Course Title	Universal Human Values

Include practice sessions to discuss the role other

Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.

Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

The StoryofStuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful-E. FSchumacher.

SlowisBeautiful-CecileAndrews

Economy of Permanence - J C Kumarappa

Bharat Mein Angreji Raj - PanditSunderlal

Rediscovering India - byDharampal

10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11.IndiaWins Freedom - MaulanaAbdulKalamAzad

Vivekananda-RomainRolland(English)

Gandhi-RomainRolland(English)

MODEOFCONDUCT L T P C or L T P credits

Lectures hours are to be used for interactive discussion, placing the proposalsabout the topics at hand and motivating students to reflect, explore and verifythem.

Tutorialhoursaretobeusedforpracticesessions.

While analysing and discussing the topic, the faculty mentor's role is in pointingto essential elements to help in sorting them out from the surface elements. Inotherwords,helpthestudentsexploretheimportantorcr

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

FIRST YEAR

nd SEMESTER

Title	**PHYSICS**			**Credits**	04
Code	BS 102			**L T P**	3 1 0
Max Marks	**End term**	**Mid Term**		**Elective**	N
Pre requisites					
Note for the Paper setter	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**				

Objectives

Basic concepts of optics and its applications, electromagnetism, magnetic properties, structural characterizations and concepts of nanotechnology.

Section A

- **Optics and Fibre Optics** (12L + 4T)

  Diffraction and polarisation: Introduction to interference and example; concept of diffraction, Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits; diffraction grating, characteristics of diffraction grating and its applications.

  Polarisation: Introduction, polarisation by reflection, polarisation by double refraction, scattering of light, circular and elliptical polarisation, optical activity.

  Fibre Optics and LASERS: Introduction, optical fibre as a dielectric waveguide: total internal reflection, numerical aperture and various fibre parameters, losses associated with optical fibres, step and graded index fibres, application of optical fibres.

  Lasers: Introduction to the interaction of radiation with matter, principles and working of laser: population inversion, pumping, various modes, threshold population inversion, types of laser: solid state, semiconductor, gas; application of lasers.

- **Structural Characterization** (16 hours+5T)

  Space lattices and their symmetries, crystal structures (cubic and hexagonal cells), assignment of coordinates, directions and planes in crystals, linear, planer and space densities in crystals, close-packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids, crystal Structure analysis, X-ray diffraction and Bragg's law, crystal defects, Point, line, surface and volume imperfections

Section B

- **Dielectric and Magnetic Properties** (17L + 6T)

  Dielectric Materials Review of basic formulas, dielectric constant and polarizability, sources of polarizability, classical treatment ofri,zaa,2 -10.8 Td [(D)4.23538(i)-3.97824(f)-0.2(.239(l)8.8)0.128297()-3.97824(f)-0.2(.239

Diel i ct i Td d a a t e s t l a

c. Introduction to Solids (Tata McGraw Hill, Third Edition) - Leonid V Azaroff

Reference Books

- Sharpe, A. G.:Inorganic Chemistry, 3rd Edition, Longman Publishers ELBS, 1992
- Lee, J. D:Concise: Inorganic Chemistry, 5th Edition, Chapman and Hall Publishers, 1996.
- Cotton, F. A. & Wilkinson, G.:Advanced Inorganic Chemistry, 3rd Edition,Wiley Eastern Ltd., 1982
- Atkins, P.W & Paula, J.D. Physical Chemistry, 10th Ed., Oxford University Press(2014).
- Castellan, G. W. Physical Chemistry 4th Ed., Narosa (2004).
- Mortimer, R. G. Physical Chemistry 3rd Ed., Elsevier: NOIDA, UP (2009).
- Barrow, G. M., Physical Chemistry 5th Ed., Tata McGraw Hill: New Delhi (2006).
- Engel, T. & Reid, P. Physical Chemistry 3rd Ed., Prentice-Hall (2012).
- Rogers, D. W. Concise Physical Chemistry Wiley (2010).
- Metz, C. R. Physical Chemistry 2nd Ed., Tata McGraw-Hill (2009).
- Silbey, R. J.; Alberty, R. A. &Bawendi, M. G. Physical Chemistry 4th Ed., JohnWiley & Sons, Inc.

Title	**MATHEMATICS II**		**Credits**	4
Code	BS104		**L T P**	3 1 -
Max marks	**End term**			

Course Objectives	The students shall 1. Learn the methods to formulate and solve partial differential equations. 2. Learn to expand various functions in terms of Fourier series. Learn to apply the method of separation of variables to solve partial differential equations of engineering interest. 3. Learn to find Laplace transforms and inverse transforms and apply these to solve differential equations. 4. Understand the concept of Complex functions and their applications to various problems.
Course Outcomes	CO 1: Formulate and solve various partial differential equations. CO 2: Expand functions in terms of Fourier series. Solve partial differential equations of engineering interest by the method of separation of variables. CO 3: Find Laplace transforms, inverse transforms and apply these to solve various differential equations.

Title	**COMPUTER PROGRAMMING FOR PROBLEM SOLVING**		**Credits**	2
Code	ESC 101		**L T P**	2 -
Max Marks	**End term**			

UNIT	Hrs
CO1-To develop basic understanding of computer system, its evolution, importance and applications of computers and programs.	
Introduction to Computers Basic introduction to computers, block diagram of computer. Evolution of languages: Machine languages, Assembly languages, High-level languages. Software requirements for programming: System softwares like operating system, compiler, linker, and loader.Application programs like editor.	02

Algorithms and Flowcharts:
Overview and need of algorithms and flowcharts for

Pre requisites				

Note for Examiners Question No. 1 which is compulsory will cover the

	2. visualize the different types of geometrical objects and the assembly of machine parts.

Title	**OPERATIONS RESEARCH**				**Credits**	4
Code	MBA 102	Course type	Core	**Semester** 2nd	**L T P**	3 1 -
Max Marks	**End term**	**Midterm**		**Practical**	**Elective**	N
Pre requisites						
Course Objectives	The objective of this course is to acquaint students with scientific tools and techniques operations research for making effective business decisions.					
Course Outcomes	CO1: To enable the students generate mathematical models for business scenario.					

	– EOQ and EBQ Models (With and without shortages), Quantity Discount Models. Decision making under risk – Decision trees – Decision making under uncertainty. Application of simulation techniques for decision making.	HOURS
Text Books	1.Vohra, N.D.: Quantitative Techniques in Management; 2nd Edition, Tata McGraw Hill. 2.Gupta, P.K. and Hira, D.S.: Operation Research, S. Chand, New Delhi. 3.SwarupKanti, Gupta, P.K. and Man Mohan: Operation Research, 12th revised Edition, Sultan Chand & Sons, New Delhi;	
Reference Books	1.Mittal, K. V, Mohan, C. Optimization Methods in Operations Research and Systems Analysis, New Age, 2003. 2. Ravindran, A, Phillips, D. T, Solberg, J. J, Operations Research: Principles and Practice, John Willey and Sons, 2nd Edition, 2009. 3. P. SankaraIyer, Operations Research, Tata McGraw-Hill, 2008. 4. Paneerselvam R., Operations Research, Prentice Hall of India, Fourth Print, 2008.	
Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) 2.End –Term Assessment: University Examination	

(Number of lab. Hrs. 3 per experiment)

Total 48 lab. Hrs.

1.	To find the energy band gap of the given semiconductor by four probe method.
2.	To study the Hall Effect of a given semiconductor
3.	To determine the dielectric constant of the given materials.
4.	To study the B-H curve of the ferromagnetic materials.
5.	To determine the value of e/m for electron by long solenoid (helical) method.

. **Outcome of course**

-

function of ecosystem, types of ecosystem, Introduction to biodiversity, International concern over environmental problems **Air pollution** Sources of air pollution, types of air pollutants, air quality, effects of air pollution, greenhouse effect, ozone layer depletion, smog and photochemical smog, acid rain-	

	candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs

Course Objective: The course objective is to inculcate fundamental aspects of fluid flow and apply basic principles of fluid static and fluid dynamics to various chemical engineering problems.

Course Outcome :

- Understand and solve hydrostatic problems related to forces on submerged bodies and pressure measurement.
- To understand fluid flow phenomena and study basic equations of fluid flow
- Study of incompressible fluids to energy losses in pipes and Dimentional analysis
- To understand the concept of compressible flow and study of flow measuring devices.

Unit I

Fluid Statics: Hydrostatic equilibrium, Manometers,

CO Understand and apply knowledge of Filtration Processes, constant pressure and constant volume filtration and various filtration equipments, their types and applications.

Course Outcomes	
	Identifytheapplicationofbasicchemistryconceptstoprocessindustrieslike Chlor-Alkali Industry, Manufacture of soda ash and caustic soda and Sulphuric Acid. Recognizecurrentissuesandtrendsinprocessindustrieswitha Study of manufacture of Cement and Glass and identifytheimportanceofsafety, health, and the environment in process industries. Describe the basic history and manufacture of industrial gases and Manufactureofdifferenttypesofpaints and Courseoutcomesoutlinetheguidingprinciplesofqualityintheprocessindustries. Describethemanufactureofvariousfertilizersandprocessesinvolvedandrecognizethesafetyaspects.
THEORY	
Note for the Examiner	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**

UNIT I

d y: Electrochemistry of brine electrolysis current efficiency, energy efficiency, diaphragm, mercurcy and dow Cells, caustic soda, chlorine.

d A

UNIT-III **Non parametric tests** Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes, Test of Homogeneity and goodness of fit. Sign test for paired data. Rank sum test. Kolmogorov-Smirnov – test for goodness of fit, comparing two populations. Mann – Whitney U test and Kruskal Wallis test. One

Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) 2.End –Term Assessment: University Examination

Title	**Startup, Funding**			**Credits**	2
Code	VAC 102			**L T P**	2 - -
Max Marks	**End term**	**Mid Term**		**Elective**	N
Pre requisites					
THEORY			**Time**		3 Hours
Note for the Examiner	**Question No. 1, which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term exam will be hrs.**				

Startups are emerging as engines of rapid growth across various economies. Startups have witnessed tremendous growth from being just 452 in 2016 to 84,012 in 2022, amongst which more that 100 are unicorns (valuation more than $1 billion). Recognising the immense potential, the course aims to prepare students and budding entrepreneurs to gain understanding of financial concepts in the context of startups and introduce them to the concepts related to stages and types of funding available for startups.

Course outcomes

After successful completion of the course, students will be able to:

- Understand the basic financial terms used in context of funding of startups
- Construct and interpret basic financial statements needed in starting and operating startups
- Interpret and compare various valuation methods
- Prepare VC term sheets to get funds

Eligibility

Open to students currently enrolled in science/engineering/management undergraduate,postgraduate, and PhD programme at Panjab University. The course has a maximum capacity of 60 participants.

Syllabus

Unit I

Financial statements: Introduction to balance sheet and income statement. Introduction to cash flow statement, ratios – profitability, efficiency, liquidity and leverage.

Unit II

Financial Planning: are you ready to raise capital?,financial plans and pro-forma financial statements, planning a cash flow statement, burn rate.

Unit III

Funding options: Bootstrapping, types of funding –

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

	vi. Verify f / for laminar flow through a straight tube.

List of experiments

1. To determine the coefficient of discharge for Ventu

SECOND YEAR

th SEMESTER

Title	**HEAT TRANSFER**			**Credits**	4
Code	PCC105			**L T P**	3 1 -
Max Marks	**End term**	**Mid term**		**Elective**	N
Pre requisites					
objectives	1. To understand the fundamental concepts of heat transfer through conduction, convection, radiation, and combination of these modes of heat transfer 2. To understand boiling and condensation phenomena 3. To develop the problem-solving skills essential to good engineering practice in selected engineering applications				
Note for the Examiner	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**				

Unit I

Conduction: Steady state conduction in one dimensional system, general conduction equation, effect of variable thermal conductivity, steady state conduction involving internal heat generation, lagging on pipes, the critical thickness of insulation on pipes, extended surfaces of uniform thickness and fin effectiveness, fin efficiency.

Unit II

Convection: Free and forced convection, concept of heat transfer co-efficient, dimensionless numbers in free and forced convection, Dimensional analysis, experimental determination of heat transfer coefficient and common working correlations.

Radiation Heat Transfer: Black Body radiation, and

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

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Corrosion: Types and mechanism of corrosion, factors influencing corrosion, combating corrosion, few examples of selection of materials of construction for handling different chemicals like sulfuric acid, nitric acid, NaoH, HCl, acetic acid.

Title	**CHEMICAL TECHNOLOGY ORGANIC**			**Credits**	3
Code	PCC 11`			**LT P**	3- -
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**	N
Prerequisites					

THEORY

Course Outcomes

- IdentifytheprocessesandtheconceptsinvolvedintheExtractionandrefiningofoils&fats,hydrogenation ofoilsand Manufactureofsoap and detergents.
- Describe the variouswater treatment processesfor desalination aswell asWater softening;usingLime soda, Ionexchangemethods
- DescribethedifferentManufacturingprocessesofpulpandpaperandsugar
- Identifytheconceptsinvolvedinpolymerscienceandpetroleumrefiningoperations.

THEORY

Note for the Examiner

Stresses and Strains in Thin Shells Thin cylinder shell under internal pressure, thin spherical shell under internal pressure, volumetric strain, modifications for built-up shells, numerical problems. (4 hours)

Unit IV

Stresses and Strains in Springs Types of Springs, stresses in Close coiled helical springs, open coiled helical springs, leaf springs, springs in parallel and in series, numerical problems. (5 hours)

Strain Energy and Theories of Elastic Failure Strain energy, resilience, Strain energy in tension and compression due to suddenly applied load and impact loads, strain energy due to shear, strain energy due to bending, strain energy due to torsion, theories of elastic failure and their graphical representation, numerical problems. (5 hours)

Books Recommended

1. Ryder, G. H$_S$: Strength of Materials, 3rd Edition S.I. Units Macmillan, 1969.
2. Bedi, D. S. : Strength of Materials, 6th Edition Khana Book Publishing Co. (P)Ltd.
3. Timoshenko, S. : Strength of Materials Part-I, 3rd Edition, Cbs Publishers, 1986.
4. Singal & Sharma

	Facility Location importance; location planning process; Factors in Location Analysis; Location Analysis Techniques. **Facility Layout** Introduction, Objectives of Layout, Types of Layouts, Importance of layout decisions and nature of layout problems, Assembly Line Balancing, Material handling.	
UNIT-II	**Capacity Planning** Concepts; Factors Affective Capacity; Planning; Cap	

Reference books	1. Operations Management: Process and Supply Chains, Eleventh Edition, Lee J. Krajewski, Manoj K. Malhotra, Larry P. Ritzman& Samir K. Srivastava,Pearson
Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) 2.End –Term Assessment: University Examination

Title	**MANAGERIAL ECONOMICS**				**Credits**	4
Code	MBA 106	Course Type	Core		**L T P**	4 0 0

Max Marks

UNIT-III	**Production Function**: Concept and types, Returns to Factor and Returns to Scale, Law of Variable Proportions. **Cost concepts and Analysis**: Concept of Cost, Short run and Lung-run Cost Curves, Relationships among various costs, The Learning Curve, Economies of Scope and Economies of Scale, The Estimation of Cost, Break-Even Analysis, Combining Break-Even Analysis with Demand, Degree of Operating Leverage, The Uses and Limitations of Break-Even Analysis.. **Revenue Curves**: Concept and Types.	7 HOURS
UNIT-IV	**Perfect Competition**: Characteristics, Equilibrium Price, Profit Maximizing output in Short Run and Long Run; **Monopoly**: Characteristics, Equilibrium Price, Profit Maximizing output in Short Run and Lung Run; Price Discrimination; **Imperfect Competition**: Characteristics and Price Equilibrium in Monopolistic Competition, oligopoly –types, Price Equilibrium and Barriers to Entry.	16 HOURS

Text Books 1. H.L.Ahuja: Managerial Economics, S.Chand P9455(a)-17.499609 855.(

THIRD YEAR

th SEMESTER

Title	**CHEMICAL ENGINEERING THERMODYNAMICS**			**Credits**	4
Code	PCC106			**L T P**	3 1 -
Max Marks	**End term**	**Mid term**		**Elective**	N
Pre requisites					
THEORY			**Time**		3 Hours

Note for the Examiner **Question No 1 which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions fe**

Unit I

Brief review of the terms: state functions, types of systems, internal energy, heat and work and reversible and irreversible processes. 1 hour

Use of Steam tables, First Law of Thermodynamics and its Engineering Applications i.e. constant volume processes, constant pressure processes, isothermal and adiabatic processes, pumps, turbines, compressors, nozzles, heat exchangers, pitot tube, venturimeter and orifice meter. 8 hours

Course Objectives	➢ To make students understand various conventional and non-conventional energy resources. ➢ To make students solve the problems of combustion. ➢ To make students understand the working of various types of furnaces.
Course Outcomes	Upon successful completion of the course, the students will: CO1: Have in-depth knowledge of conventional and non-conventional fuels.Have knowledge of solid fuels, their origin, analysis, cleaning methods and carbonization process. Synthetic fuels from coal. CO2: Knowledge of liquid fuels, their origin, refining & distillation of crude oil. Manufacturing processes of gaseous fuels and their utilization. CO3: Become confident in solving combustion problems.Be able to describe various furnaces, draught and furnace atmosphere. CO4: Have in-depth knowledge of various renewable sources of energy, their scope and technologies in use.

UNIT I CO

Fuels: Types of conventional fuels, their merits and demerits. Non-conventional/renewable energy sources, their importance for sustainable development and environmental protection. 5 Hrs

Solid Fuels: Origin of coal, proximate and ultimate analysis of coal, coal preparation and washing methods, safe storage of coal. Low and High temperature carbonization, products of carbonization, By product coke ovens. Synthetics fuels from coal –Bergius process and Fischer Tropsch process. 10 Hrs

UNIT II CO

Liquid fuels: Origin of petroleum, refining and distillation of crude oil, uses of petroleum products. 7 Hrs

Gaseous fuels: Natural gas, manufacture of water gas and producer gas, gas cleaning methods. 8 Hrs

UNIT III CO

Principles of combustion: Combustion calculations, waste heat utilization. 7 Hrs.

Furnaces: Classification of furnaces, draught, furnace atmosphere, Portland cement continuous rotary kiln, blast furnace, glass melting furnace 8 Hrs.9455(i)-16.7976(333 0 0 cm E

	principles of mass transfer in gases and in liquids and their applications in various mass transfer systems used in process and allied industries.
Course Outcomes	CO1: Classify mass transfer operations, laws of mass transfer, evaluation of

Methods	One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) .End –Term Assessment: University Examination

Title	**Business Analytics with R**	**Credits**	04

Code

UNIT-II Data types & Data Structures in R: Data types in R and its appropriate uses,

Title	**Process Instrumentation**			**Credits**	4
Code	PCC113			**L T P**	3 1 -
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**	N
Pre requisites					
Course Objectives	**Question No. 1 which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**				
Course Objectives	➢ To provide knowledge of pressure, temperature, level, viscosity, conductivity, density and weight measurements. ➢ To provide knowledge of recording instruments, indicating and signalling instruments, control centre, transmission of instrument reading and instrumentation diagrams.				
Course Outcomes	Upon successful completion of the course, the students will be able to: CO1: Classify elements and types of instruments, static and dynamic characteristics of instruments.Illustrate the different methods for the measurement of temperature. CO2: Elucidate the construction and working of various industrial devices used to measure pressure and vacuum.Discuss methods for measurement of viscosity. CO3: Explicate the construction and working of various industrial devices used to measure level. Discuss methods for measurement of conductivity. CO4: Describe recorders, indicating & signalling instruments and Control Centre. Construct instrumentation diagrams. Discuss methods for measurement of density and weight.				

THEORY

UNIT I

General Concept Need and classification of measurements and instruments, Basic and auxiliary functional elements of a measurement system. Static and Dynamic Characteristics of Instruments: Static Characteristics: Range and span, accuracy and static error, reproducibility and drift, sensitivity and dead zone. Dynamic Characteristics: Speed of response and lag, fidelity and dynamic error, dead time. 5 Hrs.

Temperature measurement Bimetallic thermometers, filled-in system thermometers. Thermocouples, metal resistance thermometers and thermistors, optical and radiation pyrometers, radiation receiving elements. 10 Hrs.

UNIT II

Pressure measurement Bourdon gauge, Bellows type gauge. Vacuum measurement– Mcleod gauge & pirani vacuum gauge. Measurement of pressure in corrosive fluids: Diaphragm seal, liquid seal and purge system. 10 Hrs.

Viscosity measurement Float viscometer, rotational viscometer 5Hrs.

UNIT III

Liquid level measurement Direct measurement of liquid level– Float & tape liquid level gauge, float and shaft liquid level unit, hydraulic remote transmission of liquid level. Level measurement in open vessels: Bubbler system, diaphragm box system, air trap system. Level measurement in pressure vessels– Differential pressure manometer, use of liquid seals with a manometer, displacement float liquid level gauge. 8 Hrs.

Conductivity measurementwith and without electrodes 7 Hrs.

UNIT IV

Density measurement: Liquid level method, displacement meter and hydrometer. 4 Hrs.
Weight measurement Spring scale, pneumatic force meter & hydrostatic force meter. 4Hrs.
Process Instrumentation: Recording instruments, indicating and signalling instruments, control centre transmission of instrument reading, instrumentation diagrams. 7 Hrs.

Books Recommended

1. Patranabis, D. : Principles of Industrial Instrumentation, Tata McGrawHill Publishing Co. Ltd.
2. Eckman, Donald P. : Industrial Instrumentation, CBS Publisher and Distributors
3. Considine, D.N. : Process Instruments and Controls Handbook, McGraw Hill
4. Fribance, A.E. : Industrial Instrumentation Fundamentals, Tata McGraw-Hill Publishing Co.
5. Singh, S.K. : Industrial Instrumentation and Control, Tata McGraw-Hill

Title	**Environmental Engineering**			**Credits**	3 1 -
Code	PCC 112			**L T P**	4- -
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**	N
Pre requisites					

Note for the Examiner	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**

Course Outcomes COs
Subject Environmental Engineering
CO1: Describe principal air pollutants, their sources and effects, atmospheric dispersion of air pollutants in detail and estimation of concentration of air pollutants using Gaussian Plume model.
CO2: Demonstrate the construction, working and describe the theory of particulate control equipments. Analysis of design parameters of the various control equipments and evaluation of their collection efficiencies.
CO3: Classify water pollutants, their sources and effects and calculation of water quality parameters (physical, chemical and biological) like BOD, COD, DO,TDS, SS, color, odor, turbidity, microbial activity etc.
CO4: Application and design of physical/ chemical/ biological treatment methods for small communities/municipal sewage/industrial water/ waste water treatment. Bio-kinetic parameters and advanced waste-water treatment methods. Classification of solid wastes, their sources, effects, methods of treatment and disposal of solid wastes.

Syllabus
Unit I
Inter-relationship between man, energy and environment pollution. Population models and effect of population on degradation of environment. Ambient air quality standards and description of atmospheric layers.
Air Pollution- Principal Air pollutants (gaseous and particulates) and their sources. Effect of air pollutants on

nstAir t l4(a)8.21497(m)-3.85644(f)-0.247207(e)2(l)8.83688(l)306( )-6.34447(v)0.1203(a)-4.60306(n)0.128297(d)0.1318(a)-17.42097()12

	Ponchon Savarit method to calculate the number of stages for distillation column and able to design the column. • The students will be able to understand the working of different equipments used for various mass transfer operations such as leaching, crystallization, etc.

UNIT I

A : Equilibria for absorption systems – use of Raoult's law, Henry's law for solubility predictions, Selection of absorbent, limiting liquid gas ratios, absorption factor use in design of plate absorbers. Kremser equation for ideal plates and translation of ideal plates to real plates using various efficiencies. Concept of transfer units for the design of packed absorbers.

UNIT II

: Limitations and applications, prediction of VLE using thermodynamic & experimental techniques. Dew point & bubble point estimations for binary & multicomponent mixtures. Distillation methods – flash distillation, differential distillation for binary systems, steam distillation, optimum reflux ratio. Fractionation of binary mixtures using McCabe – Thiele method and enthalpy concentration method (Ponchon and Savarit method). Packed distillation columns. Azeotropic&extractive distillation preliminaries and molecular distillation.

UNIT III

Code HSMC 102 **Semester** 7th

Wiley, 1984.

3. Guthrie, K.M. :

UNIT-IV	**Planning demand and supply** Planning& Sourcing in Supply Chain, Demand forecasting, Type and Time horizon of forecast and category of forecasting, aggregate planning; Financial issues in Supply Chain - Macro and micro view, Asset management, Du Pont Model, Supply Chain Costing; Decision environment in SCM; Global supply chain perspectives - New business models, role of IT in SCM.	12 HOURS
Text books	1. HaraldDyckhoff et al, Ed.: Supply Chain Management and Reverse Logistics, Springer (India). 2. JayashreeDubey and M.L. Saikumar Ed.: Supply Chain Management, IIPE Hyderabad and New Century Publication.	

Reference books

1. Sarika Kulkarni, Ashok Sharma: Supply Chain Management-Creating Linkages for Faster Business Turnaround, McGraw Hill.
2. RP Mohanty: Supply Chain Management-Theories and Practice, Biztantra.
3. Robert B. Handfield, Ernest L. Nicholas, Jr.: Introduction to Supply Chain Management,Pearson Education.
4. Ronald H. Ballou, Samir K. Srivastava: Business Logistics/Supply Chain Management, Pearson Education.

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

FOURTH YEAR

th SEMESTER

Title	**CHEMICAL REACTION ENGINEERING II**			**Credits**	4
Code	PCC 114			**L T P**	3 1 -
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**	N
Pre requisites					

THEORY

Note for the Examiner Question paper will have first question compulsory and four questions from each section and the choice will be in each section.

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

Gain margin and phase margin, Ziegler-Nichols controller settings. Introduction to advanced control techniques such as cascade control, feed forward control, ratio control, inferential control

Recommended Books

1. Coughanowr, D.R. : Process Systems Analysis and Control, 2nd Edition, Mc Graw Hill, Inc. 1991.

2. Stephanopolous G. : Chemical Process Control -An Introduction to Theory and Practice, Prentice Hall of India, New Delhi, 2012.

3. Ogata K.: System Dynamics, 4th Edition, Pearson Education, 2004.

4. Harriott, P.: Process Control, TMH Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1972.

Title

UNIT-III	**Project scheduling network techniques in project management** CPM and PERT analysis, float times, crashing of activities, contraction of network for cost optimization, updating, cost analysis of resources allocation, multiple projects: project dependence, capital rationing, ranking methods of projects, mathematical programming approach, linear programming model, post project evaluation.	7 HOURS
UNIT-IV	Entrepreneur- Concept on percent - Functions and clarifications of entrepreneurs - Characteristics of entrepreneur - Nature and importance of ,entrepreneur –	

Outcomes	them to make better marketing decisions and discuss and analyze the marketing environment, marketing research process and customer value. CO2:To employ the concepts consumer behavior for implementing relevant segmentation, targeting and positioning strategy. CO3:To develop the skills needed to take better distribution decisions and critically analyze the promotion mix and design promotional campaigns and To identify suitable pricing strategy for a given market. CO4:To understand the role of services marketing and develop customer relationship management systems.
Note for the Examiner	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**

UNIT-I

UNIT-IV

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

Teaching Scheme and Syllabi of B E Chemical Engin

8th Semester

CHE 106	Six month Industrial Training/Research Training	Credits:13

	duration of End Term exam will be hrs
Course Objective	Students learn about nuances of Nanotechnology from basics to application such that they may be able to use this knowledge in their Professional Careers

Network decisions in SCM; Suppliers and Customers;

	CO6: Perform technical feasibility, marketing feasibility and commercial viability using NPV, and further to understand tax and legal aspects of a project. CO7: Analyse project appraisal in public & private sector and estimate shadow prices and social discount rate. CO8: Examine project risk and performance assessment. CO9: Evaluate project management techniques using case studies.

Unit I

Project Management: concept of project management attributes of a project, project management systems, project life cycle, Difference among Projects, Routine Activities and Programs, responsibilities and qualities of

Unit I

Introduction to computational fluid dynamics (CFD), need for problem solving with CFD, understanding CFD approach, modelling and governing equations, mass, momentum and energy conservation equations, applications to different branches of Science and Engineering, specific applications to Chemical Engineering, various tools and software related to CFD.

Unit II

Partial differential equations, classification, parabolic, hyperbolic and elliptical equations, illustrative examples. Approximate solution to differential equations, error minimization principles, variation principles and weighted residual approach.

Fundamentals of discretization, finite element method, finit.34456( )]TJ 1n44.60306(q)-b123.98035(f)-0.247207(f)-13.0644(e)8.214

	iii. Analyse and understand fluidized bed behaviour. iv. Understand expanded bed, elutriation and spouted bed. v. Analyse and understand the factors affecting fluidization performance.

Unit I

Introduction: Phenomena and fundamentals of fluidization, history of fluidization, liquid like behavior of fluidized bed, advantages and disadvantages of fluidized bed, industrial applications like chemical reactions and catalysis; physical and mechanical processes.

Unit II

Fluidization regimes, mapping, fluidized state spectrum, particulate and aggregative fluidization, minimum fluid voidage, channeling, slugging, pressure drop flow diagrams, fluidization performance: effect of bed height, height to diameter ratio, particle size distribution, gas velocity, fluid distributor design, dense bed viscosity.

Fluidized bed behavior:fixed bed and onset of fluidization: basics of fixed bed, minimum fluidization velocity estimation and correlations.

Unit III

Expanded bed: liquid solid system, voidage function, stratification, Richardson and Zaki correlation, gas solid system, fluidization efficiency, fluctuation ratio, Elutriation: definition, factors affecting elutriation, elutriation mechanism, terminal velocity. Dilute phase and moving solids: disperse-phase characteristics, Introduction to spouted bed, pressure drop flow diagram, Solids and fluid mixing.

Unit IV

Heat and mass transfer in fluidized beds:Heat transfer mechanism, heat transfer between dense phase and dilute phase fluidized beds, generalized correlation for fluidized bed mass transfer and its limitations.

Books Recommended

1. Leva, M.

Powell's conjugate direction, Gradient-based methods- Cauchy's (steepest descent) method, Newton's method. **hrs**

Unit IV

Constrained Optimization Algorithms Kuhn-Tucker conditions, Transformation methods, Penalty function method, Method of multipliers, Sensitivity analysis, Direct search for constraint Minimization-Variable elimination method, Complex search method, Successive linear and quadratic programming, Optimization of staged and discrete processes. **hrs**

Non traditional Optimization Techniques Introduction to Simulated annealing, Genetic algorithms, Differential evolution. **hours**

Unit IV

THERMAL PROPERTIES - phonon heat capacity, density of states, Einstein model, Debye model of heat capacity, inharmonic crystal interaction, thermal expansion. Thermal conductivity, Umklapp Processes. **hours**

Course Outcomes

By the end of the course

1) Students will be able to solve the problems based on crystal structure and thermal properties of solids
2) Understand and apply the basic concepts of crystal binding and crystal vibrations in different phenomena.

ADVANCED PHYSICS

Note for the Examiner Question No ; which is comp

Course Outcomes

By the end of this course:

1. Students will be able to solve numerical problems in Quantum Mechanics, Nuclear and Solid State Physics.
2. Students will be aware of latest developments in certain areas of Physics like condensed matter physics, superconductivity etc. which have important applications for societal needs.
3. Students will be able to correlate the various phenomena with quantum mechanical concepts.

Unit I

Module : History of nanomaterials (2 Hours)
Module : Discussion of the Feynman talk "There is plenty of room at the bottom" (4 Hours)

Unit II

Module : Synthesis routes for nano and ultra fine grained materials: bottom up and top down approaches (2 Hours)
Module : Specific synthesis routes such as vapor deposition, sol-gel, rapid solidification processing, high energy ball milling, cryo rolling, and equal channel angular extrusion (6 Hours)

Unit III

Module : Thermodynamics of nanomaterials (3 hours)
Module : Mechanical property aspects of nanomaterials, inverse Hall-Petch relationship (2 Hours)

Unit IV

Module : Specific nano materials and their applications such as:
Carbon nanostructures (Nanotubes, nanohorns, graphene, buckyballs etc) (6 Hours)
Semiconducting nanomaterials – Quantum confinement, Quantum wells, quantum wires and quantum dots. (3 Hours)
Magnetic nanomaterials – super paramagnetism (2 hours),
Ferroelectric, nano ceramics (2 Hours)
Superplasticity (2 Hours)
Nanocomposites (2 Hours)

Module : Characterization techniques from the perspective of nanomaterials (4 Hours)

Suggested books

1. Introduction to Nanomaterials, Charles Poole and Frank Owens, Wiley 2007

Course Outcomes

After completing this course, the student should be able to:

5) Indicate the differences between nanomaterials and conventional materials
6) Indicate how specific synthesis techniques can result in nanomaterials
7) Give examples of specific nanomaterials and explain the scientific reasons for the properties displayed by them
8) Describe how specific characterization techniques can be used to analyze nanomaterials

Functional Materials

Note for the Paper setter Question No which is compulsory will cover the entire syllabus havinaten at m h

Suggested books

1.

function and Probability densityfunction, Expectation and variance, Discrete and Continuous Probability distribution: Binomial, Poission and Normal distributions.

Unit III

Sampling, Testing of Hypothesis and Statistical Quality Control: Introduction, Sampling Theory (Small and

Paper Title Departmental Elective Theory

	differential equations

Unit I

Solution of Algebraic and Transcendental Equations
Bisection Method, Method of False Position, Iteration Method / Fixed Point Iteration Method, Newton-Raphson Method. **hrs**.

Curve Fitting Least-Squares Curve Fitting Procedures for Fitting the Straight Line, theSecond-degree Parabola and Fitting of other Curves.
hrs Finite Differences: Forward, Backward and Central Differences. Differences of a Polynomial, Factorial Notation. **hrs**

Unit II

Interpolation
Newton's Formulae for Forward and Backward Interpolation, Central Difference Interpolation Formulae: Stirling's Formula, Bessel's Formula, Interpolation with unevenly Spaced Points:Lagrange's Interpolation Formula, Divided Differences, Newton's Divided Difference Formula.
hrs
Inverse Interpolation Lagrange's Method, Iterative Method.
hrs
Numerical Differentiation
Formulae for Derivatives, Maxima and Minima of a Tabulated Function.
hrs

Unit III

Numerical Integration
Newton-Cotes Quadrature Formula: Trapezoidal Rule, Simpson's 1/3-Rule, Simpson's 3/8-Rule, Weddle's Rule. **hrs**

Numerical Solution of Ordinary Differential Equation
Picard's Method, Euler's Method, Taylor's Series Expansion Method, Runga-Kutta Method, Predictor-Corrector Methods- Euler's modified method, Milne's Method.
Simultaneous and Higher Order Equations Runge-Kutta Method.
hrs

Unit IV

Solution of Linear System of Equations Gaussian Elimination Method, Gauss-Jordan Method, Jacobi Iteration Method, Gauss-Seidel Iteration Method, Condition of Convergence.
hrs
Numerical Solution of Partial Differential Equations
Classification of Second order equations, Finite-Difference Approximation toPartial Derivatives, Elliptic Equations- Solution of Laplace's Equation, Solution of Poisson's Equation, Parabolic Equations-Solutio

1.	Hildebrand, F.B.	:	Introduction to Numerical Analysis.
2.	Scarborough, J.B.	:	Numerical Mathematical Analysis, Oxford and ISH Pub. Co.
3.	Chopra, S.C., & Canale, R.P.	:	Numerical Methods for Engineers.
4.	Sastry, S. S.	:	Introductory Methods of Numerical Analysis, 4th Edition, Prentice Hall.
5.	Grewal, B. S.		Numerical Methods in Engineering and Science.

Course Objectives

1. This course is aimed at introducing the primary important concepts of project management, project life cycle, scheduling, evaluation, analysis and reporting.
2. To identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials
3. To develop a detailed implementation plan that will allow to monitor project progress and ensure everything runs smoothly from start to finish
4. to provide internal stakeholders with information r

	publishing.
Reference books	1. UNIDO: Guidelines for Project Evaluation, United Nations, reprinted, 1993. 2. Manual for the preparation of Industrial Feasibility Studies, United Nations 1995. 3. Manual for Evaluation of Industrial Projects, United Nations, reprinted on 1993. 4. IMD little and J.A. Mirrlees: Project Apraisal and Planning in Developing Countries, 5. Vasanta Desai: Entrepreneurial development, and Management, 13th edition, Himalaya pub., Harper Collins, edition- Paperback. Peter F. Drucker: Innovation and development

Course Assessment Methods

Course Assessment Methods	The students will be assessed based upon the practical assignments and viva voce.
Objectives	Students will learn to use MATLAB to solve Chemical Engineering numerical

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

FIFTH YEAR

th SEMESTER

Title	**FINANCIAL MANAGEMENT**				**Credits**	04
Code	MBA 113	Course type	Core		**L T P**	4 0 0
Max Marks	**End term**	**Mid term**		**Practical**	**Elective**	N
Pre requisites	**Financial Accounting**					
Course Objectives	The objective of this course is to inform the students about the basic concepts of financial management and contemporary theory and policy in order to master the concepts, theories and technique of financial management					

Course Outcomes

	Management; Inventory Investment Analysis; Inventory Control System.	
UNIT-IV	**Capital Budgeting** Meaning;Basic Principles of Costs and Benefits; Investment Criteria; Pay back Method; Accounting Rate of Return method; Net Present Value Method; Benefit-Cost Ratio; Internal Rate of Return; Capital Rationing; Introduction to Basic Techniques of Risk Analysis in Capital Budgeting. **Dividend Decisions** Meaning and Types of Dividend; Issues in Dividend Policy; Traditional Model; Walter Model; Gordon Model; Miller and Modigliani Model; Bonus Shares and Stock Splits. **Corporate Restructuring** Meaning and forms of corporate restructuring, merger and amalgamation takeover and acquisition, types or forms of mergers and takeovers, their benefits and motives.	11

Text books	1. I.M.Pandey: Financial Management, Vikas Publishing House 2. Prasanna Chandra: Financial Management, Tata McGraw-Hill Publishing 3. M.Y.Khan and P.K.Jain: Financial Management-Text and Problems, McGraw-Hill
Reference books	1. James C.Van Horne: Financial Management, Pearson Education 2. Richard A. Brearley and Stewart C.Myres: Principles of Corporate Finance, McGraw Hill 3. John J. Hampton: Financial Decision Making-Concepts, Problems and Cases, Prentice Hall India 4. P.V. Kulkarni and B.G.Satyaprasad: Financial Management, Himalaya Publishing House. 5. Lawrence J.Gitman: Principles of Management, Pearson Education. 6. Jonathan Berk, Peter De Marzo, Ashok Thampy: Financial Management, Pearson Education. 7. VyuptakeshSharan: Fundamentals of Financial Management, Pearson Education
Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) .End –Term Assessment: University Examination

Title	**LEGAL ASPECTS OF BUSINESS**			**Credits**	04
Code	MBA 114			**L T P**	4 0 0
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**	N
Pre requisites					

Course Objectives	The objective of the course is to acquaint student with relevant legal aspects of business related to the formation, management and other activity of the companies, fundamentals of patent law and develop the basic understanding for drafting a patent specification, IT act

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

Note for the Examiner	**Question No , which is compulsory, will cover the entire syllabus, having ten conceptual questions of one mark each or five questions of two marks each. Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit. The duration of End Term exam will be hrs**	
UNIT-I	**Company Law** Definition and nature of a company, kinds of companies , formation of a company, memorandum of association, articles of association, prospectus, membership in a company, shares , transfer and transmission of shares, meetings and proceedings.	HOURS
UNIT-II	**Information Technology Act** Objective of the act, documents excluded from the scope of the act, digital signatures, types of digital signatures in India, certifying authorities in India, regulation of certifying authorities, duties of subscribers, offences, appellate tribunal, penalties and adjudication	HOURS
UNIT-II-	**Patents Law** Patents Act 1970 as amended by the The Patents (Amendment) Act 2005, The Patents rules, 2003 as amended by The Patents (Amendment) Rules ,2006, Inventions not patentable, applications for patents, publication and examination of applications, grant of patents and rights conferred thereby, Patent Cooperation Treaty (PCT), Trade Related Intellectual Property Rights (TRIPS). A brief introduction to trademarks, geographical indications, industrial Designs, trade secrets, copy rights – Definition and functions	HOURS
UNIT-IV	**Consumer Protection Act** Definitions under the act : complaint , consumer, defect, deficiency , unfair trade practice, consumer protection councils, redressal machinery under the act, district forum, state commission, national commission	HOURS
Text books	1. K.C.Garg, V.K.Sareen , Mercantile Law, Kalyani Publishers, 14th ed.(2008). 2. Mamoria CB, Mamoria, Gankar - Dynamics of Industrial Relations (Himalaya Publications, 15th Ed.)	
Reference books	1. Manish Arora , Guide to Patents Law, Universal Law Publishing Co., 4th ed. 2. Srivastava SC - Industrial Relations and Labour Laws (Vikas, 2000, 4th Ed.)	
Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) .End –Term Assessment: University Examination)	

GROUP A FUNCTIONAL SUBJECTS

Title	**MARKET RESEARCH AND CONSUMER BEHAVIOUR**		**Credits**	04	
Code			**L T P**	4 0 0	
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**	Y
Pre requisites	**Marketing Management**				
Course Objective	The objective of the course is to equip the students with				

	innovation process, method of analysis and evaluation used in the product development process.
Course Outcomes	CO1: To define basic and contemporary concepts related to marketing research and various research designs. CO2: To develop knowledge and skills to help in diagnosing and measuring marketing problems. To learn the use of statistical tools to study the relationship between various marketing variables. CO3:To apply the fundamental concepts of product and brand development and management CO4: Use portfolio analysis and the product life cycle to understand how a firm manages its product mix. Apply an understanding of the product manager's role in product pricing, sales, and promotion.
Note for the Examiner	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**

UNIT I

UNIT-IV	**Socio cultural meaning of brands** understanding the social psychology of brands,emotions and brands,symbolic meaning of brands, cultural meaning systems and brands, Brand equity:introduction and definition, name value, model of brand equity synthesis, auditing and measuring brand equity managing brands, branding strategies for functional and symbolic brands, brand stretching and retrenching, branding services and managing the corporate brand, brands and advertising	12 HOURS
Text books	1.Malhotra, N. K., Marketing Research: An applied orientation,PearsonPrentice Hal, New Jersey. 2.Ulrich, K.T. and S.D. Eppinger, Product Design and Development, McGraw Hill	
Reference books	1.Churchill, Gillert, Iacobucci, Dawn, Marketing Research, Thomson 2.Elliott, R. and Percy, L., Strategic brand management, Oxford UniversityPress. 3.Kinnear, T.C. and Taylor J. R., MarketingResearch: an Applied Approach, McGraw Hill Inc. 4.Trott, Paul, Innovation Management and New Product Management, Prentice Hall	
Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) 2.End –Term Assessment: University Examination	

Title	**BUSINESS ENVIRONMENT**				**Credits**	4
Code					**L T P**	4 0 0

UNIT-I

	7. Adhikary, M., Business Economics, Excel Books, New Delhi. 8. Aswathappa, K., Essentials of business environment, Himalaya Publishing House. 9. Cherulinum, F., Business Environment, Himalaya Publishing House Puri, V.K. and Misra, S.K., Indian economy, Himalaya Publishing House.
Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) .End –Term Assessment: University Examination

Title	**INDUSTRIAL RELATIONS AND LABOUR LAWS**	**Credits**	04
Code			

UNIT II	**Grievance Handling** Grievance, Causes/Sources of Grievances, Grievance Redressal Machinery, Legislative Aspects of the Grievance Redressal Procedure in India, Domestic enquiry. **The Industrial Disputes Act**: Industry, workman, Industrial Dispute - methods and authorities for the settlement of industrial disputes, Strikes and Lockouts , Lay off and Retrenchment. **ining** Concept, meaning - objectives of collective bargaining, Negotiating techniques and skills, process of collective bargaining, Impact of Collective Bargaining.	11 HOURS
UNIT III	**The Workmen s Compensation Act**: Workman, employer's liability to pay compensation, disablement, amount of compensation. **Tripartite and bipartite bodies**: Workers Participation in Management. **Factories Act**: Factory, worker, manufacturing process, provisions of health, safety and welfare, working hours of adults, special provisions relating to children, annual leave with wages.	11

Pre requisites	Organizational behaviour, Human Resource Management
Course Objectives	The objective of the course is to acquaint the students with the influence of cross-cultural issues on organisations, and examines factors invol

UNIT IV

	3. To analyse the important aspects of service systems that control the provision of capacity to meet customer requirements 4. To implement statistical methods and management techniques to monitor control, and improve the service operations.	
THEORY		
Note for the Examiner	**Question No : which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**	
UNIT I	**Introduction**: Services – Importance, role in economy, service sector – growth; Nature of services -Service classification , Service Package, distinctive characteristics , open-systems view; Service Strategy – Strategic service vision, competitive environment, generic strategies, winning customers; Role of information technology; stages in service firm competitiveness; Internet strategies - Environmental strategies.	9 HOURS
UNIT II	**Service Design** : New Service Development – Design elements – Service Blue-printing - process structure – generic approaches –Value to customer; Retail design strategies – store size – Network configuration ; Managing Service Experience –experience economy, key dimensions ; Vehicle Routing and Scheduling. **Service Quality** :Service Quality- Dimensions, Service Quality Gap Model; Measuring Service Quality –SERVQUAL - Walk-through Audit; Quality service by design - Service Recovery - Service Guarantees; Service Encounter – triad, creating service orientation, service profit chain; Front-office Back-office Interface – service decoupling.	13 HOURS

Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks)

UNIT II **Technology Choice and Evaluation** :Methods of analyzing alternate technologies, Techno-economic feasibility studies, Need for multi-

Teaching Scheme and Syllabi of B E Chemical Engineering MBA

Title	**PURCHASE AND MATERIALS MANAGEMENT**		**Credits**	04
Code			**L T P**	4 0 0
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**

UNIT IV

Course Outcomes	1. To develop understanding of the basic framework of research process, various research designs and techniques; sources of information for literature review and data collection and to organize and conduct research in a more appropriate manner, write a research report and research proposal. 2. To account for the most common multivariate methods, apply the multivariate methods in the framework of the multivariate analysis, and use the statistical software to analyse data	
PRACTICAL		
Note for the Examiner		
UNIT-I	**Introduction to business research** Definition, characteristics, types; research process – an overview, review of literature – its role and significance in the stages of research process, theory building, ethical issues in business research; formulation of the research problem and research proposal; hypothesis - definition, formulation and types; Research Design- Meaning; Characteristics and related concepts; types of research design and their importance. **Sampling** Sampling design and sampling procedures, sample size estimation , fieldwork, processing of data. **Validity and Reliability** Types and Tests of Validity and Reliability: **Data Collection, preparation and analysis**: Primary/Secondary data – definition, types, sources, evaluation and searches, primary data collection methods - surveys, observation and experiments, direct personal interview, indirect oral interview, information through local agencies, mailed questionnaire method, schedule sent through enumerators; questionnaire and its designing and characteristics of a good questionnaire; measurement and scaling concepts, measurement scales. Data cleaning and preparation ;	11 HOURS
UNIT-II	**Introduction to multivariate techniques**	

Title	**WORKSHOP ON BUSINESS COMMUNICATION , SOFT SKILLS**			**Credits**	01
Code	MBA 121			**L T P**	0 0 2
Max Marks	**End term**	**Mid term**	**Practical** 50	**Elective**	N
Pre requisites					
Course Objectives	To develop and nurture the soft skills of the students through individual and group activities and to expose students to right attitudinal and behavioral aspects and to build the same through activities				
Course Outcomes	1. Effectively communicate through verbal/oral communication and improve the listening skills 2. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations				

Practical

UNIT-I **Meaning and importance of communication in business** Process, types of communication: formal and informal and their characteristics, essentials of effective business communication, Channels of communication, their effectiveness, limitations, Barriers of communication, approaches to effective Communication, Negotiation skills and participating decision making in Management Presentations, Book Reviews and Summaries

Time Management and Goal Setting

	Strategic Evaluation and Control Techniques of strategic evaluation and control, Strategic issues in technology management, Entrepreneurial ventures, Issues in non-profit organization issues, Issues in evaluation and control, Popular strategies of non-profit organizations.	
Text books	1. J. David Hunger, Thomas L. Wheelen and tom Wheelen: Essentials of Strategic Management, Prentice Hall India 2. Charles W.L. Hill and Gareth P. Jones: Strategic Management, Dreamtech Press.	
Reference books	1. Michael Hitt and Robert E. Hoskisson: Strategic Management – Competitiveness and Globalization, South Western Thomson. 2. Glueck: Business Policy and Strategic Management, Tata McGraw Hill. 3. Thomas: Strategic Management, Harper and Row. 4. Jeyarathnam: Strategic Management, Himalaya Publishing House. 5. Sharplin: Strategic Management, Tata McGraw Hill. 6. Francis: Strategic Management, Himalaya Publishing House. 7. Colin White: Strategic Management, Palgrave Macmilan. 8. M.E. Porter: Competitive Advantage, The Free Press.	
Course Assessment Methods	Assessment will consist of the following components 1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) .End –Term Assessment: University Examination)	

GROUP C FUNCTIONAL SUBJECTS

Title

Assessment Methods	1. Mid-Term Assessment: One best of two minor tests (50% of Mid -term marks) Assignments (20% of Mid-term marks) Class Surprise Tests/ Quizzes/Presentations/Term paper (20% of Mid-term marks) Attendance. (10% of Mid-term marks) .End –Term Assessment: University Examination

Title	**PRODUCT INNOVATION IN TECHNOLOGY BUSINESS**			**Credits**	04
Code				**L T P**	4 0 0
Max Marks	**End term**	**Mid term**	**Practical**	**Elective**	Y
Pre requisites	**Marketing Management**				

Course Objective

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SECTION B

UNIT III **Marketing** Planning for International Marketing - Overseas Marketing Research and Information System, Foreign Market Entry Strategies,

Course Otucomes	CO 1: To recognize the difference in the operations in the international and domestic financial markets CO 2: To explain the various ways the exchange rate evolved over the years in the International markets. CO 3: To analyze short term assets and liabilities and prepare the Balance of Payments account CO 4: To explain the exchange rate fluctuations in the market and recognize opportunity of managing exchange risk using the forward markets	
THEORY		
Note for the Examiner	**Question No which is compulsory will cover the entire syllabus having ten conceptual questions of one mark each or five questions of two marks each Rest of the Questions to will be divided into FOUR Units having TWO questions each and candidate is required to attempt at least ONE question from each Unit The duration of End Term exam will be hrs**	
UNIT I	**Internationalization of financial function** International financial management - An overview, Objectives of international firm and impact of risk; Financial function in multinational corporation.	11 HOURS
UNIT II	**Foreign Exchange Risk** Foreign exchange market, foreign exchange risk and exposure, exposure information system, strategies for exposure management and techniques for foreign exchange rate projections, devices for foreign exchange risk and exposure devices.	11 HOURS
UNIT III	**Managing Short term Assets and Liabilities** International working capital management, Invest	

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UNIT IV	Distribution planning, costs and control- Functions of intermediaries (wholesaler & retailers), Selection and motivation of intermediaries, Need, criterion and establishing objectives for intermediaries; Control issues- Major cost centers in distribution, Establishing standards for control, Controlling channel members and tools for control	11 HOURS

Paper Title RESEARCH PROJECT MANAGEMENT Practical
Paper Code MBA

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Course

Delhi.
2. Kanter, J., Managing with Information, Prentice Hall of India.
3. Laudon, K. C. andLaudon, J. P., Management Information Systems: Organization and Technology in the Network Enterprise, Prentice Hall.
4. Murdic, R.G., and Claggett, J.E., Information Systems for Modern Management, Prentice- Hall.

Course Assessment Methods
Internal Assessment based on class presentation and report submission