Course Code	Course Name	L-T-P- Credits	Year of Introduction		
CE401	DESIGN OF STEEL STRUCTURES	4-0-0-4	2016		
Prerequisite : CE202 Structural Analysis II					
Course objectives:					

- To introduce the limit state design of steel structural components subjected to bending, compression and tensile loads including the connections
- To enable design of structural components using timber

Syllabus:

Steel and steel structures – bolted and welded connections- tension members – compression members – beams – roof trusses – purlins – timber structures – columns- composite beams

Expected Outcomes:

The students will be able to

- i. design bolted and welded connections
- **ii.** design tension members and beams using the IS specifications
- iii. design columns under axial loads using IS specifications
- iv. design beams and plate girders
- v. assess loads on truss and design purlins
- vi. design structural components using timber.

Text Books:

- 1. L S Jayagopal, D Tensing., Design of steel structures, S Chand & Company, 2015
- 2. S K Duggal., Limit State design of steel structures, Tata McGraw Hill, 2010
- 3. Subramanian N, Design of steel Structures, Oxford University Press, 2011

References :

- 1. P. Dayaratnam., Design of Steel Structures, Wheeler Publishing, 2003
- 2. Punmia B. C., Jain A. K. and Jain A. K., Design of Steel Structures, Laxmi Publications (P) Ltd, 2017
- 3. Raghupathi, Steel Structures, Tata McGraw Hill, 2006
- 4. Ramchandra S and Virendra Gehlot, Design of Steel Structures Vol. II, Standard Book House, 2007
- 5. V L Shah & Veena Gore, Limit State Design of steel Structures, Structures Publications, 2009
- 6. William T Segui., Steel Design, Cenage Learning, 6e, 2017
- 7. IS 800 2007, Code of practice for Structural steel design, BIS

	COURSE PLAN				
Module	Contents	Hours	Sem. Exam Marks %		
I	Introduction to steel and steel structures, properties of steel, structural steel sections. Introduction to design: Design loads and load combinations, limit state design concepts. Connections bolted and welded (direct loads)	9	15		

II	Tension members-Types of sections – net area- design of tension members- concept of shear lag-use of lug angle-connections in tension members	9	15
	FIRST INTERNAL EXAMINATION		
III	Compression members- design of struts- solid and built up columns for axial loads design of lacings and battens-column bases- slab base – gusseted base	10	15
IV	Design of beams- laterally restrained and unrestrained – simple and compound beams- plate girders subjected to uniformly distributed loads – design of stiffeners.	9	15
	SECOND INTERNAL EXAMINATION		
V	Design of roof trusses- types-design loads and load combinations- assessment of wind loads- design of purlins. Moment resistant/Eccentric connections (in plane and out of plane)	10	20
VI	Design of timber structures: types of timber - classification - allowable stresses-design of beams-flexure, shear, bearing and deflection considerations-Design of columns. Design of composite beam sections with timber and steel.	9	20
	END SEMESTER EXAMINATION		

Estd.

Maximum Marks : 100

Exam Duration: 3 Hrs

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI: 2 questions out of 3 questions carrying 20 marks each

Note : 1. Each part should have at least one question from each module

2 .Each question can have a maximum of 4 subdivisions (a, b, c, d)

Course Code	Course Name	L-T-P- Credits	Ye Intro	ar of duction
CE403	STRUCTURL ANALYSIS - III	3-0-0-3	2	016
Prerequ	isite :CE303 Structural Analysis - II			
Course	objectives:		_	
•	To enable the students to have a comprehensive idea of m emphasis on the relative advantages of the flexibility metho To enable the students to visualize structural dynamics pro structural analysis and vibration theory	atrix stru od and the blems wi	ctural ana stiffness th a prope	alysis with method er blend of
Syllabu		911	here's	
Approxi Flexibili	mate Methods of Analysis of Multistoried Frames, Ma ty method, Stiffness method, Introduction to direct stiffness m	trix anal trinethod, St	ysis of ructural d	structures, ynamics
Expecte	d Outcomes:			
The stuc	ents will be able to			
	1. analyse structures using approximate method	ng flevibil	ity metho	d
	iii analyse trusses, continuous beams and rigid frames by	stiffness r	nethod	ju
	iv. conceive Finite element procedures by direct stiffness r	nethod		
	v. use the basics of structural dynamics and analyse the re	sponse of	SDOF sy	stems
Text Bo	oks :			
1. G S	Pandit and S P Gupta, Structural analysis a Matrix approach, N	McGraw I	Hill Educa	ation
(Ind	a), 2e, 2008			
2. Gere	, J.M. and William Weaver, Matrix Analysis of framed structu	ures, CBS	Publishe	rs, 1990
3. Ken	heth M Leet, Chia Ming Uang, Anne M Gilbert, Fundamentals	s of struct	ural analy	vsis, Tata
McC	raw Hill Pvt Ltd., 4e, 2010		012	
4. Red	iy C.S., Basic structural analysis, Tata McGraw Hill, third edi	tion, <i>3e</i> , <i>2</i>	2012	
1 Anil	K Chopra Dynamics of structures Pearson Education/Pren	tice Hall]	India 5e	2016
2. Clou	gh R.W. and Penzein, J., Dynamics of structures, Tata McGra	w Hill, 19	995	2010
3. Mad	hujith Mukhopadhyay and Abdul Hamid Sheikh, Matrix and H	Finite Eler	nent Ana	lysis of
Structures, Ane Books India, 2009				
4. Mario Paz, Structural Dynamics: Theory & Computation, 2e, CBS Publishers, 2004				
5. Raja	sekharan. S. and Sankarasubramanian G., Computational struc	ctural Me	chanics, P	PHI, 2009
o. wan	g C.K., Matrix method of structural analysis, international Te	XI DOOK CO	ompany, 1	1970
	COURSE PLAN			C
Modu le	Contents		Hours	Sem. Exam Marks %
	Approximate Methods of Analysis of Multistoried Frames: A	nalysis		
_	for vertical loads-substitute frames-loading condition for ma	iximum	_	
I	hogging and sagging moments in beams and maximum b	bending	6	15
	moment in columns- wind load analysis of multistoried fr	ames –		
	Portar method and cantile ver method for fateral load allarysis.			

II	Matrix analysis of structures: static and kinematic indeterminacy- force and displacement method of analysis-definition of flexibility and stiffness influence coefficients Concepts of physical approach	6	15
	FIRST INTERNAL EXAMINATION		
III	Flexibility method: flexibility matrices for truss and frame elements-load transformation matrix-development of total flexibility matrix of the structure-analysis of simple structures-plane truss and plane frame-nodal loads and element loads-lack of fit and temperature effects	7	15
IV	Stiffness method: Development of stiffness matrices by physical approach-stiffness matrices for truss and frame elements- displacement transformation matrix-analysis of simple structures- plane truss and plane frame-nodal loads and element loads-lack of fit and temperature effects	7	15
	SECOND INTERNAL EXAMINATION		
V	Introduction to direct stiffness method-Rotation of axes in two dimensions, stiffness matrix of elements in global co- ordinates from element co-ordinates- assembly of load vector and stiffness matrix, solution of two span continuous beam-single bay single storey portal frame.	8	20
VI	Structural dynamics-introduction-degrees of freedom-single degree of freedom subjected to harmonic load -linear systems- equation of motion, D'Alembert's principle-damping- free response of damped and undamped systems- logarithmic decrement- transient and steady state responses, Dynamic magnification factor – Vibration isolation –Concept of two degree of freedom systems (No derivation and numerical problems)	8	20
	END SEMESTER EXAMINATION		

Estd

11/1

Maximum Marks :100

Exam Duration: 3 Hrs

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI: 2 questions out of 3 questions carrying 20 marks each

Note : 1.Each part should have at least one question from each module

2. Each question can have a maximum of 4 subdivisions (a, b, c, d)

Course	Course Name	L-T-P-	Year of
Code		Credits	Introduction
CE405	ENVIRONMENTAL ENGINEERING- I	3-0-0-3	2016

Pre-requisites: CE203 Fluid Mechanics -I

Course objectives:`

- To study the significance of water resources and the factors affecting the quality and quantity of water
- To study the various types of treatment techniques adopted for a public water supply system

Syllabus :

Water sources, demand, factors, Quantity estimation, Population forecasting, Quality of water. Water treatment- Physical methods, Chemical methods. Design of sedimentation tank, flocculator, clariflocculator, filters, Membrane treatment techniques. Disinfection- methods. Distribution of water, Pumps, Hardy Cross method of analysis

Expected Outcomes:

The students will

- i. become aware of the various pollutants affecting water quality
- ii. know about the different treatment units available in a water treatment plant and their design procedures

Text Books:

- 1. B.C Punmia, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., 2016
- 2. G S Birdie, Water Supply and Engineering, Dhanapat Rai Publishing Company, 2014
- 3. P.N. Modi, "Water Supply Engineering", Standard Book House, NewDelhi
- 4. Peavy H S, Rowe, D.R. Tchobanaglous "Environmental Engineering" Mc GrawHill Education, 1984
- 5. S.K.Garg, "Water Supply Engineering", Khanna Publishers. 2010

References

- 1. K N Dugal, Elements of Environmental Engineering, S Chand and Company Pvt Ltd, 2007
- 2. Mackenzie L Davis, Introduction to Environmental Engineering, McGrawhill Education (India), 2012
- 3. Metcalf & Eddy, "Waste Water Engineering", Tata Mc Grawhill Publishing Co Ltd, 2003
- 4. P Venugopala Rao, Environmental Engineering, PHI Learning Pvt Ltd, 2002
- 5. Subhash Verma, Varinder Kanwar, Siby John, Water supply Engineering, Vikash Publishing, 2015

COURSE PLAN				
Module	Contents	Hours	Sem. Exam Marks %	
Ι	Introduction of environment- sources of water supply-Water demand, quantification of water demand through population forecasting – Factors affecting consumption-Fluctuations in demand	7	15	

II	Types of intakes-Conveyors, pumps and location of pumping station- Quality of water - Drinking water standards - Physical, chemical and biological analysis.	6	15
	FIRST INTERNAL EXAMINATION		
III	Treatment of water-Theory and principles of Sedimentation tanks- Stoke's law-Types of settling (Type I & Type II only)-Coagulation- Mixing-Flocculation, Design of Sedimentation tanks (circular and rectangular)-Clariflocculators	7	15
IV	Filtration-Types of filters- Working and Design of Rapid and Slow sand filters. Loss of head in filters, Pressure filters	7	15
	SECOND INTERNAL EXAMINATION		
V	Disinfection of water - Methods, Chlorination-Types, Factors affecting - Chlorine demands. Miscellaneous treatment-Ion exchange, Lime-soda process, Electro dialysis - Colour, Taste and Odour removal-Adsorption-Aeration-Fluoridation-Defluoridation	7	20
VI	Lay out of water distribution network-Methods of distribution-Hardy cross method-Equivalent pipe method-Pipe appurtenances.	8	20
END SEMESTER EXAMINATION			

Maximum Marks :100

Exam Duration: 3 Hrs

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI: 2 questions out of 3 questions carrying 20 marks each ista. Note :

- 1. Each part should have at least one question from each module
- 2. Each question can have a maximum of 4 subdivisions (a, b, c, d)

CE407TRANSPORTATION ENGINEERING - II3-0-0-32016	Course Code	Course Name	L-T-P- Credits	Year of Introduction
	CE407	TRANSPORTATION ENGINEERING - II	3-0-0-3	2016

Prerequisite : CE308 Transportation Engg.-I

Course Objectives:

- To set a solid and firm foundation in Railway engineering, including the history development, modern trends, maintenance, geometric design and safety of railways.
- To introduce dock, harbour and tunneling

Syllabus :

Introduction to railways in India and its evolution, modern technologies, geometric design of tracks, railway operation control, maintenance and an introduction to the railway accidents. Alignment, surveying, driving, ventilation and drainage of tunnels and types of harbours and docks.

Course Outcome:

• This course will enable students to gain knowledge in railway and water transportation.

Text Books:

- 1. Mundrey J. S, Railway Track Engineering, Tata McGraw Hill, 2009
- 2. Rangawala, S.C., Railway Engineering, Charotor Publishing House
- 3. Rao G. V, Principles of Transportation and Highway Engineering, Tata McGrawHill, 1996
- **4.** Srinivasan, R., Harbour, Dock & Tunnel Engineering, Charotor Publishing House, 28e, 2016

References:

- 1. Bindra, S.P., A course in Docks and Harbour Engineering, Dhanpat Rai& Sons
- 2. Chandra, S. and Agarwal, M.M. ,Railway Engineering, Oxford University Press, New Delhi, 2008
- 3. Saxena, S. C and Arora, S. P, Railway Engineering, Dhanpat Rai& Sons, 7e, 2010
- 4. Subhash C. Saxena, Railway Engineering, Dhanpat Rai& Sons

Module	Contents	Hours	Sem. Exam Marks %
I	Introduction to Railways in India: Role of Indian Railways in National Development – Railways for Urban Transportation – Modern developments- LRT & MRTS, tube railways, high speed tracks. Alignment- basic requirements and factors affecting selection, Component parts of a railway track - requirements and functions - Typical cross-section	7	15
II	Permanent Way : Components and their Functions: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks . Sleepers – Functions, Materials, Density, Ballast less Tracks. Geometric design of railway track: Horizontal curves, radius – super	7	15

	elevation -cant deficiency - transition curves - gradients - different types - Compensation of gradients.		
	FIRST INTERNAL EXAMINATION		
III	Railway operation and control: Points and Crossings – Design features of a turnout – Details of station yards and marshalling yards – Signaling, interlocking of signals and points - Principles of track circuiting - Control systems of train movements – ATC, CTC – track circuiting	6	15
IV	Maintenance:- Introduction to track maintenance, Items of track maintenance, packing and over hauling, screening Railway accidents: Human and system contribution to catastrophic accidents, Human Factors in Transport Safety.	6	15
SECOND INTERNAL EXAMINATION			
V	Tunnel Engineering: Tunnel - sections - classification - tunnel surveying -alignment, transferring centre, grade into tunnel – tunnel driving procedure - shield method of tunneling, compressed air method, tunnel boring machine, Tunnel lining, ventilation - lighting and drainage of tunnels.	8	20
VI	 Harbours- classification, features, requirements, winds and waves in the location and design of harbours. Break waters - necessity and functions, classification, alignment, design principles, forces acting on break water - construction, general study of quays, piers, wharves, jetties, transit sheds and warehouses - navigational aids - light houses, signals - types - Moorings Docks - Functions and types - dry docks, wet docks - form and arrangement of basins and docks 	8	20
	END SEMESTER EXAMINATION		

Maximum Marks :100

Exam Duration: 3 Hrs

- Estd.
- Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each
- Part B Module III & IV: 2 questions out of 3 questions carrying 15 marks each
- Part C Module V & VI: 2 questions out of 3 questions carrying 20 marks each
- Note : 1.Each part should have at least one question from each module
 - 2 Each question can have a maximum of 4 subdivisions (a,b,c,d)

Course	Course Name	L-T-P-	Year of
Code		Credits	Introduction
CE409	QUANTITY SURVEYING AND VALUATION	3-0-0-3	2016

Pre-requisites: CE334 Computer Aided Civil Engg. Lab

Course objectives:

- To have an awareness regarding specifications, analysis of rates, valuation etc. in connection with construction
- To prepare detailed estimates, bar bending schedules of various items of work

Syllabus :

Specifications- Analysis of rates- CPWD data book and schedule of rates- Detailed specification, preparation of data and analysis of rates for various items of work- Quantity Surveying- Types of Estimate - Valuation- Methods of valuation-Depreciation- Fixation of rent- Detailed estimate including quantities, abstract and preparation of various items of works, Preparation of bar bending schedules for various RCC works

Expected Outcomes:

The students will be able to

- i. work out the quantities of materials and labour required for different types of civil works
- ii. prepare schedule of rates for various items of work

Text Books

- 1. B N Dutta, Estimating and costing in Civil Engineering, USB publishers and distributers Ltd. New Delhi
- 2. D D Kohli, RC Kohli, A textbook of Estimating and costing, S Chand Publishing, 2011
- **3.** Dr. S. Seetharaman, M. Chinnasamy, Estimation and Quantity Surveying, Anuradha Publications, Chennai.

References:

- 1. BS Patil, Civil Engineering contracts and estimates, Universities press
- 2. V N Vazirani & S P Chandola, Civil engineering Estimating and Costing, Khanna Publishers.
- 3. IS 1200-1968; Methods of measurement of Building & Civil Engineering works.
- 4. CPWD data book and schedule of rates.

Note:

For analysis of rate and cost estimation, unit rate and labour requirement should be given along with the questions in the question paper. No other charts, tables, codes are permitted in the Examination Hall. If necessary, relevant data shall be given along with the question paper.

COURSE PLAN				
Module	Contents	Hours	Sem. Exam Marks %	
Ι	General Introduction- Quantity Surveying- Basic principles-Types of Estimates - Specifications- purposes and basic principles-general specifications - Detailed specifications-Method of measurement of various items of work. Analysis of rates- Introduction to the use of CPWD data book and schedule of rates- conveyance and conveyance statement -	6	10	

	Miscellaneous charges.		
п	Preparation of data and analysis of rates for various items of work connected with building construction and other civil engineering structures with reference to Indian Standard Specification.		10
	FIRST INTERNAL EXAMINATION		
III	Detailed estimate including quantities, abstract and preparation of various items of works- buildings- centerline method and long wall short wall method- sanitary and water supply works- soak pits, septic tanks, overhead tanks, culverts, Retaining walls, road construction. Bar-bending schedule-preparation of bar-bending schedule for RCC works connected with building construction, culverts and minor irrigation works.	18	50
	SECOND INTERNAL EXAMINATION		
IV	Valuation - Explanation of terms, types of values, sinking fund, years purchase, Depreciation - Straight line method, constant percentage method, S.F method .Obsolescence. Valuation of real properties-rental method, profit based method, depreciation method. Valuation of landed properties -belting method, development method, hypothecated building scheme method. Rent calculation. Lease and Lease hold property	12	30
	FND SEMESTED EVAMINATION		

Maximum Marks: 100

Exam Duration: 3 Hrs

- Part A -Module I & II : 2 questions out of 3 questions carrying 10 marks each
- Part B Module III : 2 questions out of 3 questions carrying 25 marks each
- Part C Module IV : 2 questions out of 3 questions carrying 15 marks each
- Note : 1. Part A should have at least one question from each module
 - 2. Part B three full questions carrying 25 marks on building estimate, preparation of bending schedule, or estimation of any other structure.
 - 3. Part A and C each question can have a maximum of 2 subdivisions (a, b)

Course Code	Course Name	L-T-P- Credits	Year of Introduction		
CE431	ENVIRONMENTAL ENGINEERING LAB	0-0-3-1	2016		
Prerequisites: C	CE405 Environmental Engineering - I				
Course objectiv • Te	es: o equip the students in doing analysis of water and	wastewater	· samples		
List of Experim 1. To analyse the sample and t	 List of Experiments: (Minimu 10 experiments are mandatory) 1. To analyse the physical characteristics viz. colour, turbidity, and conductivity of a given water sample and to determine its suitability for drinking purposes 				
2. To analyse the assessing its	he chemical characteristics of a given water sampl potability	e viz. pH, ao	cidity, alkalinity for		
3. To analyse the content to as	he chemical characteristics of a given water sampl sess its suitability for drinking purposes and build	e viz. chlori ing construc	des and sulphates tion		
4. To determine	e the Dissolved Oxygen content of a given water s	ample for cl	necking its potability		
5. To determine	e the available chlorine in a sample of bleaching p	owder			
6. To analyse the	he various types of solids in a given water sample				
7. To determine	e the BOD of a given wastewater sample				
8. To determine	e the COD of a given wastewater sample				
9. To determine	e the optimum dosage of alum using Jar test				
10. To determine	10. To determine the Nitrates / Phosphates in a water sample				
11. To determine	11. To determine the iron content of a water sample				
12. To determine the MPN content in a water sample and assess the suitability for potability Expected outcome:					
	2014		лирозоз		

Course	Course Name	L-T-P-	Year of
Code		Credits	Introduction
CE473	ADVANCED COMPUTATIONAL TECHNIQUES AND OPTIMIZATION	3-0-0-3	2016

Prerequisite : CE306 Computer Programming and Computational Techniques

Course objectives:

- To introduce different numerical solutions and importance of optimization
- To impart ability to apply mathematics and optimizing techniques for finding solutions to real time problems.

Syllabus :

Introduction to numerical methods- errors in numerical methods-Systems of linear algebraic equations- Elimination and factorization methods- Gauss Seidel iteration. Eigen Value problemspower method. General Optimisation procedures - and features of mathematical programming as applicable to Civil engineering problems. Unconstrained and constrained optimization problems -Formulation of objective function and constraints. Lagrangian interpolation- Quadratic and Cubic splines (Problems on quadratic splines only)- Data smoothing by least squares criterion- Nonpolynomial models like exponential model and power equation- Multiple linear regression. Numerical integration- Newton - Cotes open quadrature- Linear Programming - Simplex method standard form - Simplex algorithm - Two phase solution by simplex method - Duality of linear programming Formulation of geometric programming. Ordinary differential equations- 1st order equations- Solution by use of Taylor series- Runge- kutta method- Ordinary differential equations of the boundary value type- Finite difference solution- Partial differential equations in two dimensions-Parabolic equations- Explicit finite difference method- Crank-Nicholson implicit method- Ellipse equations Non- Linear Programming problems – one dimensional minimisation. Unconstrained optimization Techniques Direct search method. Random search Univariate pattern search. Descent methods.

Course Outcomes:

The students will be able to:

- i. Find different numerical solutions of complicated problems
- ii. Determine solutions of real time problems applying numerical methods in mathematics
- iii. Understand the importance of optimization and apply optimization techniques in real time problems

Text Books / References:

- 1. Grewal B.S. "Numerical Methods in Engineering and Science" Khanna Publishers.
- 2. Chapra S.C. and Canale R.P. "Numerical Methods for Engineers" Mc Graw Hill 2006.
- 3. Smith G.D. "Numerical solutions for Differential Equations" Mc Graw Hill
- 4. Ketter and Prawel "Modern Methods for Engineering Computations" Mc Graw Hill
- 5. Rajasekharan S. "Numerical Methods in Science and Engineering"S Chand & company 2003.
- 6. Rajasekharan S. "Numerical Methods for Initial and Boundary value problems," Khanna publishers 1989.
- 7. Terrence .J.Akai "Applied Numerical Methods for Engineers", Wiley publishers 1994.
- 8. R.L. Fox, Optimisation methods in Engineering Design, Addison Wesely
- 9. S.S. Rao, Optimisation Theory and applications, ,Wiley Eastern.
- 10. Belegundu., Optimisation concepts and Applications Engineering,

11. Andrew B Templeman, Civil Engineering Systems				
COURSE PLAN				
Module	Contents	Hours	Sem. Exam Marks %	
Ι	Introduction to numerical methods- errors in numerical methods- Systems of linear algebraic equations- Elimination and factorization methods- Gauss Seidel iteration. Eigen Value problems- power method.	7	15	
Π	General Optimisation procedures - and features of mathematical programming as applicable to Civil engineering problems. Unconstrained and constrained optimization problems - Formulation of objective function and constraints.	6	15	
	FIRST INTERNAL EXAMINATION	1	1	
Ш	Lagrangian interpolation- Quadratic and Cubic splines (Problems on quadratic splines only)- Data smoothing by least squares criterion- Non- polynomial models like exponential model and power equation- Multiple linear regression. Numerical integration- Newton – Cotes open quadrature	7	15	
IV	Linear Programming - Simplex method standard form - Simplex algorithm - Two phase solution by simplex method - Duality of linear programming Formulation of geometric programming	6	15	
	SECOND INTERNAL EXAMINATION			
v	Ordinary differential equations- 1st order equations- Solution by use of Taylor series- Runge- kutta method- Ordinary differential equations of the boundary value type- Finite difference solution- Partial differential equations in two dimensions- Parabolic equations- Explicit finite difference method- Crank-Nicholson implicit method- Ellipse equations	7	20	
VI	Non- Linear Programming problems – one dimensional minimisation. Unconstrained optimization Techniques Direct search method. Random search Univariate pattern search. Descent methods	7	20	

QUESTION PAPER PATTERN (External Evaluation) :

Maximum Marks :100

Exam Duration: 3 Hrs

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI: 2 questions out of 3 questions carrying 20 marks each

Note : 1.Each part should have at least one question from each module

2.Each question can have a maximum of 4 subdivisions (a, b, c, d)

Course code	Course Name	L-T-P - Credits	Year of		
			Introduction		
**341	DESIGN PROJECT	0-1-2-2	2016		
Prereguisite : Nil					

Course Objectives

- To understand the engineering aspects of design with reference to simple products
- To foster innovation in design of products, processes or systems
- To develop design that add value to products and solve technical problems

Course Plan

Study :Take minimum three simple products, processes or techniques in the area of specialisation, study, analyse and present them. The analysis shall be focused on functionality, strength, material, manufacture/construction, quality, reliability, aesthetics, ergonomics, safety, maintenance, handling, sustainability, cost etc. whichever are applicable. Each student in the group has to present individually; choosing different products, processes or techniques.

Design: The project team shall identify an innovative product, process or technology and proceed with detailed design. At the end, the team has to document it properly and present and defend it. The design is expected to concentrate on functionality, design for strength is not expected.

Note : The one hour/week allotted for tutorial shall be used for discussions and presentations. The project team (not exceeding four) can be students from different branches, if the design problem is multidisciplinary.

Expected outcome.

The students will be able to

- i. Think innovatively on the development of components, products, processes or technologies in the engineering field
- ii. Analyse the problem requirements and arrive workable design solutions

Fetal

Reference:

Michael Luchs, Scott Swan, Abbie Griffin, 2015. Design Thinking. 405 pages, John Wiley & Sons, Inc

Evaluation

First evaluation (Immediately after first internal examination)20 marksSecond evaluation (Immediately after second internal examination)20 marksFinal evaluation (Last week of the semester)60 marks

Note: All the three evaluations are mandatory for course completion and for awarding the final grade.

Course code	Course Name	L-T-P - Credits	Year of	
			Introduction	
**352	Comprehensive Examination	0-1-1-2	2016	
Prerequisite : Nil				

Course Objectives

- To assess the comprehensive knowledge gained in basic courses relevant to the branch of study
- To comprehend the questions asked and answer them with confidence.

Assessment

Oral examination – To be conducted by the college (@ three students/hour) covering all the courses up to and including V semester– 50 marks

Written examination - To be conducted by the Dept. on the date announced by the University– common to all students of the same branch – objective type (1 hour duration)– 50 multiple choice questions (4 choices) of 1 mark each covering the six common courses of S1&S2 and six branch specific courses listed – questions are set by the University - no negative marks – 50 marks.

Note: Both oral and written examinations are mandatory. But separate minimum marks is not insisted for pass. If a students does not complete any of the two assessments, grade I shall be awarded and the final grade shall be given only after the completion of both the assessments. The two hours allotted for the course may be used by the students for discussion, practice and for oral assessment.

Expected outcome.

• The students will be confident in discussing the fundamental aspects of any engineering problem/situation and give answers in dealing with them

Course code	Course Name	L-T-P - Credits	Year of Introduction		
**451	Seminar and Project Preliminarv	0-1-4-2	2016		
	Prerequisite : N	il			
Course Object	tives				
To deve	elop skills in doing literature survey, techn	ical presentation and rep	oort preparation.		
To enab	ble project identification and execution of p	oreliminary works on fi	nal semester		
project		FAT ALL			
Course Plan	API ARIMU I	CALAM			
Seminar: Each	a student shall identify a topic of current re	elevance in his/her brand	ch of engineering,		
get approval of	f faculty concerned, collect sufficient lite	erature on the topic, stu	dy it thoroughly,		
prepare own re	port and present in the class.	UICAL			
Project prelim	inary:	ITV	1. 0		
Identify suitabl	le project relevant to the branch of study.	Form project team (n	ot exceeding four		
students). The	students can do the project individually al	so. Identify a project si	upervisor. Present		
approved by the	posal before the assessment board (ex-	cluding the external e	xpert) and get it		
The preliminar	w work to be completed: (1) Literature s	survey (2) Formulation	of objectives (3)		
Formulation of	hypothesis/design/methodology (4) Forn	nulation of work plan (5) Seeking funds		
(6) Preparation	of preliminary report		c) 2001111g 1011005		
<i>Note:</i> The same	e project should be continued in the eight	n semester by the same	project team.		
Expected out	come.	,	5		
The students w	ill be able to				
i. Analyse	e a current topic of professional interest an	d present it before an au	dience		
ii. Identify	an engineering problem, analy <mark>se</mark> it and p	ropose a work plan to se	olve it.		
Evaluation					
Seminar	: 50 marks	400/	1.11.		
(Distribution of	of marks for the seminar is as follows: 1. P: $0(-9, \frac{11}{2})$	resentation : 40% 11. A	bility to answer		
questions : 30	$\% \propto 111. \text{ Report : } 30\%)$	valuation by the supervi	aor : 400 and		
progress evalu	linary . 50 marks (Progress ev	external expert : 60% T	soi . 40% allu		
evaluations, mid semester and end semester, are mandatory.)					
evaluations, find semester and end semester, are mandatory.)					
<i>Note:</i> All evaluations are mandatory for course completion and for awarding the final grade.					
	2014				
	2014				

Course code	Course Na	ime	Credits	Year of Introduction
**492	PROJEC	CT	6	2016
	Pre	requisite : Nil	-	
Course Object	tives			
• To appl	ly engineering knowledge in r	practical problem s	olving	
To fost	er innovation in design of pro	ducts, processes or	systems	
• To deve	elop creative thinking in findi	ng viable solutions	to engineering pr	oblems
Course Plan	A A D	KA		
In depth study	of the topic assigned in the l	ight of the prelimi	nary report prepa	red in the seventh
Review and fir	alization of the approach to the	ne problem relating	to the assigned to	opic
Preparing a det	ailed action plan for conducti	ng the investigatio	n, including team	work
Detailed Analy	sis/Modelling/Simulation/De	sign/Problem Solvi	ing/Experiment as	needed
Final developn	nent of product/process, testin	g, results, conclusi	ons and future dir	ections
Preparing a pap	per for Conference presentation	on/Publication in Jo	ournals, if possible	e
Preparing a rep	port in the standard format for	being evaluated by	the dept. assessn	nent board
Final project p	resentation and viva voce by t	he assessment boar	rd including exter	nal expert
Expected out	come			
The students w	Think innevetively on the day	lonmont of compon	ante producte proc	20020 OF
111.	technologies in the engineering	field	ents, products, proc	
iv.	Apply knowledge gained in so	lving real life engine	ering problems	
		C C		
Evaluation	10			
Maximum M	larks : 100		1	
(1) Two progr	ess assessments	20% by the facu	Ity supervisor(s)	
(11) Final proj	ect report	30% by the asse	ssment board	
(III) Project p	resentation and viva voce	50% by the asse	ssment board	
Note: All the	three evaluations are mandato	ory for course com	pletion and for aw	arding the final
grade.	three evaluations are mandate	y for course comp	pretion and for aw	aroning the final
	E	ista,		
		INTA /		
	4	014		