TITLE OF THE C	OURSE: ESTIMATIO	N COSTING AND CON	TRACT	MANAGEMENT	
B.E., VII Semester, Civil Engineering					
[As per Choice Based Credit System (CBCS) scheme]					
Subject code	18CV71	CIE		50	
Number of lecture	04	SEE		50	
hours per week					
Total number of	50	Exam hours		03	
lecture hours					
	С	REDITS 04			
Course objectives: This	course will enable studer	nts to;			
1. Estimate the quantitie	es of work, develop the bi	ill of quantities and arrive	at the Co	ost of civil engineering	
Project	, I	1		6 6	
2. Understand and appl	y the concept of Valuation	on for Properties			
3. Understand, Apply a	nd Create the Tender and	l Contract document.			
	Modules			Teaching Hours /	
				RBT LEVEL	
Module-1					
Quantity Estimation for	Building; study of variou	us drawing attached with			
estimates, important ter	ms, units of measuremen	ts, Abstract, Types of			
estimates - Approximate	e, detailed, supplementar	y and revised, Specification	on	10HR	
for Civil Engineering W	orks: Objective of writin	g specifications essentials	s in	L1,L2,L3	
specifications, general a	and detail specifications o	of different items of works	in	, ,	
buildings	1				
Module-2					
Estimation of building -Short wall and long wall method - centre line method.					
Estimate of buildings such as residential buildings, Hostel buildings, School				10HR	
buildings, Commercial buildings, etc and R.C.C structures including Slab,			,	L1,L2,L3	
beam, column, footings, with bar bending schedule.			, ,	, ,	
Module-3					
Estimate of Steel truss,	manhole and septic tanks	. Quantity Estimation for			
Roads: Road estimation	, earthwork fully in bank	ing, cutting, partly cutting	5	10HR	
and partly Filling, Detai	led estimate and cost ana	lysis for roads.		L1,L2,L3	
Module-4					
Analysis of Rates : Fact	ors Affecting Cost of Cir	vil Works , Concept of Di	irect		
Cost, Indirect Cost and	Project Cost Rate analysis	s and preparation of bills, I	Data		
analysis of rates for var	ious items of Works, Su	b-structure components, l	Rate	10HR	
analysis for R.C.C. slab	s, columns and beams			L2,L3	
Valuation: Definitions of	of terms used in valuation	process, Cost, Estimate,			
Value and its relationship, Capitalized value. Concept of supply and demand			nd		
in respect to properties (land , building , facilities'), freehold and lease hold ,			ld,		
Sinking fund, depreciation-methods of estimating depreciation, Outgoings,			5,		
Processand methods of	valuation : Rent fixation,	valuation for mortgage,			
valuation of land.					
Module-5					
Contract Management	-Tender and its Proc	cess: Invitation to ten	nder,	10HR	
Prequalification, admini	strative approval & Tech	nical sanction. Bid submis	sion	L1,L2,L3	
and Evaluation process	and Evaluation process. Contract Formulation: covering Award of contract,				
letter of intent, letter of	acceptance and notice to	proceed. Features / elem	ents		
of standard Tender docu	ment (source: PWD / CP'	WD / NHAI / NHEPC / NI	PC).		

Law of Contract as per Indian Contract act 1872, Types of Contract, Entire				
contract, Lump sum contract, Item rate, % rate, Cost plus with Target, Labour.				
Contract Management-Post award :Basic understanding on definitions,				
Performance security, Mobilization and equipment advances, Secured				
Advance, Suspension of work, Time limit for completion, Liquidated damages				
and bonus, measurement and payment, additions and alterations or variations				
and deviations, breach of contract, Escalation, settlement of account or final				
payment, claims, Delay's and Compensation, Disputes & its resolution				
mechanism, Contract management and administration				
COURSE OUTCOME:				
After studying this course, students will be able to:				
1. Prepare detailed and abstract estimates for roads and building.				
2. Prepare valuation reports of buildings.				
3. Interpret Contract document's of domestic and international construction works				
Question paper pattern:				
1. The question paper will have 5 modules comprising of ten questions. Each full question carrying				
equal marks				
2. There will be two full questions (with a maximum of three subdivisions, if necessary) from each				
module Each full question shall cover the topics as a module.				
3. The students shall answer five full questions, selecting one full question from each module.				
4. If more than one question is answered in modules, best answer will be considered for the award of				
marks limiting one full question answer in each module.				
TEXT BOOK:				
1. Datta B.N., "Estimating and costing", UBSPD Publishing House, New Delhi				
2. B.S. Patil, "Civil Engineering Contracts and Estimates", Universities Press				
3. M. Chakraborthi; "Estimation, Costing and Specifications", Laxmi Publications				
4. MORTH Specification for Roads and Bridge Works – IRC New Delhi				
5. H.S.Vishwanth., "Estimation and valuation", Sapna publications, Bangalore.				
REFERENCE BOOK:				
1. Kohli D.D and Kohli R.C, " Estimating and Costing",12 th Edition, S.Chand Publishers,				
2014.				
2. Vazirani V.N and Chandola S.P, " Estimating and costing", Khanna Publishers, 2015.				
3. Rangwala, C. "Estimating, Costing and Valuation", Charotar Publishing House Pvt. Ltd.,				
2015.				
4. Duncan Cartlidge, "Quantity Surveyor's Pocket Book", Routledge Publishers, 2012.				
5. Martin Brook, "Estimating and Tendering for Construction Work", A Butterworth-				
Heinemann publishers, 2008.				
6. Robert L Peurifoy, Garold D. Oberlender, "Estimating Construction Costs" – 5ed, Tata McGraw-Hill				
New Delhi				

7. David Pratt, "Fundamentals of Construction Estimating" - 3ed,

8. PWD Data Book ,CPWD Schedule of Rates (SoR). and NH SoR – Karnataka

9. FIDIC Contract forms

10. B.S. Ramaswamy "Contracts and their Management" 3ed , Lexis Nexis (a division of Reed Elsevier India Pvt Ltd)

TITLE OF T	HE COURSE: DESIG	N OF RCC AND STEEL STRU	CTURES
	B.E., VII Semest	ter, Civil Engineering	
~	As per Choice Based Ci	redit System (CBCS) scheme]	
Subject code	18CV72	CIE	50
Number of lecture	04	SEE	50
hours per week	50		02
Total number of	50	Exam hours	03
	CRI	EDITS 04	
 Course Learning Ol Provide basic kno Steel structures Identify, formulate Give procedural 1 specifications of Structures like Ro Imbibe the culture the analysis, desig Provide factual k participate and suc 	ojectives: This course windledge in the areas of line, and solve engineering knowledge to design a RC Structures like Re of Truss, Plate Girder and of professional and ethic of RC and Steel Struct chowledge on analysis cceed in competitive examples of the second sec	ill enable students to mit state method and concept of problems in RC and Steel Structor system, component or process taining wall, Footing,, Portal I d Gantry Girder. cal responsibilities by following c ures. and design of RC Structural e minations.	design of RC and ures as per needs and Frames and Steel codal provisions in lements, who can
	Modules		Teaching Hours/ RBT LEVEL
	PART-A	<u> </u>	
Retaining Walls: Design of siretaining wall. Design of circular wa by limit state method.	10 HR/ L3,L4		
Contry Cirdor: Design	PART-B	nacassary chacks	
Roof Truss: Design of roof truss for different cases of loading, forces in members to given.10 HR/ L3,L4Plate Girder: Design of welded plate girder with intermediate stiffener, bearing stiffener and necessary checks10 HR/ L3,L4			
Course Outcomes:			

Question Paper Pattern:

- Five questions shall be asked from part A and Three questions from part B.
 One full question should be answered from each part.

- 3. Each question carries 50 marks.
- 4. Code books IS 456, IS 800, IS 3370 (Part IV), SP-16, SP (6) Steel Tables, shall be referred for designing. The same will be provided during examination.

Textbooks:

- 1. N Krishna Raju, **"Structural Design and Drawing of Reinforced Concrete and Steel"**, University Press
- 2. Subramanian N, "Design of Steel Structures", Oxford university Press, New Delhi.
- 3. K S Duggal, "Design of Steel Structures", Tata McGraw Hill, New Delhi

Reference Books:

- 1. Charles E Salman, Johnson & Mathas, "Steel Structure Design and Behavior", Pearson Publications
- 2. Nether Cot, et.al, "Behavior and Design of Steel Structures to EC -III", CRC Press
- 3. P C Verghese, "Limit State Design of Reinforced Concrete", PHI Publications, New Delhi.

	TITLE OF THE COURSE: RAILWAYS, HARBOUR, TUNNEL & AIRPORTS					
	B.E., VII Seme	ester, Civil Engi	neering			
[As per Choice Based Credit System (CBCS) scheme]						
Subject code	18CV731	CIE		50		
Number of lecture	04	SEE		50		
hours per week		SLL		50		
Total number of lecture hours	40	Exam hours		03		
	C	REDITS 03				
Course Learning O	bjectives: This course	will enable studer	nts to			
1.Understand the hi	story and development,	role of railways	, railway plan	ning and development		
based		on		essential		
2.Learndifferenttype	sofstructuralcomponents	s,engineeringprop	pertiesofthemat	terials, to calculate them		
aterial quantities req	uired for construction					
3. Understand varie	ous aspects of geometry	ical elements, p	oints and cros	ssings, significance of		
maintenance of track	KS.	c 11	1.6			
4. Design and plan	airport layout, design	facilities require	ed for runway	, taxiway and impart		
5 Apply design fast	sual alus	doals and naccours	au novicational	aide also avpose them		
to various methods	of tunneling and tunnel a	Consories	y navigational	alus, also expose mem		
	of turnering and turner a	eeessories.				
Modules Teaching Hours/ RBT LEVEL						
Module-1						
Railway Planning: S	ignificance of Road, Ra	il, Air and Water	r transports –			
Coordination of al	l modes to achieve s	Coordination of all modes to achieve sustainability – Elements of				
permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, –						
permanent way – R	ails, Sleepers, Ballast, 1	rail fixtures and	fastenings, –	8HR		
permanent way – R Track Stress, coning	ails, Sleepers, Ballast, 1 of wheels, creep in rail	rail fixtures and s, defects in rails	fastenings, – – Geometric	8HR /L1,L2		
permanent way – R Track Stress, coning design of railways, g	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation,	rail fixtures and s, defects in rails widening of gaug	fastenings, – – Geometric ge on curves-	8HR /L1,L2		
permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only)	ails, Sleepers, Ballast, 1 of wheels, creep in rails radient, super elevation, gs(Explanation & Sketc	rail fixtures and s, defects in rails widening of gaug ches of Right an	fastenings, – – Geometric ge on curves- id Left hand	8HR /L1,L2		
permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only).	ails, Sleepers, Ballast, 1 of wheels, creep in rails radient, super elevation, gs(Explanation & Sketc	rail fixtures and s, defects in rails widening of gaug thes of Right an	fastenings, – – Geometric ge on curves- id Left hand	8HR /L1,L2		
permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only).	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal	rail fixtures and s, defects in rails widening of gaug thes of Right an	fastenings, – – Geometric ge on curves- id Left hand	8HR /L1,L2		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laving –	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc Module-2 on and Maintenance, Cal Construction and maint	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway	8HR /L1,L2 8HR		
permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards and	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc Module-2 on and Maintenance, Cal Construction and mainten d passenger amenities-	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track Urban rail – Infra	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for	8HR /L1,L2 8HR /L1,L2,L3		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and maint and passenger amenities- iderground railways	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track Urban rail – Infra	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for	8HR /L1,L2 8HR /L1,L2,L3		
permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc Module-2 on and Maintenance, Cal Construction and mainten d passenger amenities- iderground railways Module-3	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track Urban rail – Infra	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for	8HR /L1,L2 8HR /L1,L2,L3		
permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and maint ad passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms:	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for	8HR /L1,L2 8HR /L1,L2,L3		
permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel Design of Harbours	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and mainten d passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition : Requirements, Classif	rail fixtures and s, defects in rails widening of gaug ches of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms: ication, Location	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for Planning and and Design	8HR /L1,L2 8HR /L1,L2,L3		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel Design of Harbours Principles – Harbours	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and maint ad passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition : Requirements, Classif r Layout and Terminal I	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms: ication, Location Facilities , Coast	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for Planning and and Design al Structures,	8HR /L1,L2 8HR /L1,L2,L3 8HR		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel Design of Harbours Principles – Harbour	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and mainten d passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition : Requirements, Classif r Layout and Terminal I port – Wave action on C	rail fixtures and s, defects in rails widening of gaug ches of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms: ication, Location Facilities , Coasta	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for Planning and and Design al Structures, s and Coastal	8HR /L1,L2 8HR /L1,L2,L3 8HR /L2,L3,L4		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel Design of Harbours Principles – Harbours Protection Works. T	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and mainten d passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition : Requirements, Classif r Layout and Terminal I port – Wave action on C funneling: Introduction,	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms: ication, Location Facilities , Coasta Coastal Structures size and shape of	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for Planning and and Design al Structures, and Coastal of the tunnel,	8HR /L1,L2 8HR /L1,L2,L3 8HR /L2,L3,L4		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel Design of Harbours Principles – Harbour Inland Water Transp Protection Works. T tunneling methods in	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and maint ad passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition : Requirements, Classif r Layout and Terminal I port – Wave action on C Cunneling: Introduction, a soils, tunnel lining, tun	rail fixtures and s, defects in rails widening of gaug ches of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms: ication, Location Facilities , Coasta Coastal Structures size and shape of nel drainage and	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for Planning and and Design al Structures, s and Coastal of the tunnel, ventilation.	8HR /L1,L2 8HR /L1,L2,L3 8HR /L2,L3,L4		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel Design of Harbours Principles – Harbours Principles – Harbours Protection Works. T tunneling methods in	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketce <u>Module-2</u> on and Maintenance, Cal Construction and mainten d passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition : Requirements, Classif r Layout and Terminal I port – Wave action on C funneling: Introduction, n soils, tunnel lining, tun <u>Module-4</u>	rail fixtures and s, defects in rails widening of gaug thes of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms: ication, Location Facilities , Coasta Coastal Structures size and shape of nel drainage and	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for Planning and and Design al Structures, and Coastal of the tunnel, ventilation.	8HR /L1,L2 8HR /L1,L2,L3 8HR /L2,L3,L4		
Permanent way – R Track Stress, coning design of railways, g Points and Crossing turnouts only). Railway Construction for track laying – stations and yards an Metro, Mono and ur Harbour and Tunnel Design of Harbours Principles – Harbour Inland Water Transp Protection Works. T tunneling methods in Airport Planning: Appendix	ails, Sleepers, Ballast, 1 of wheels, creep in rails gradient, super elevation, gs(Explanation & Sketc <u>Module-2</u> on and Maintenance, Cal Construction and maint ad passenger amenities- iderground railways <u>Module-3</u> Engineering: Definition : Requirements, Classif r Layout and Terminal I port – Wave action on C Cunneling: Introduction, a soils, tunnel lining, tun <u>Module-4</u> fir transport characterist	rail fixtures and s, defects in rails widening of gaug ches of Right an culation of Mater tenance of track Urban rail – Infra of Basic Terms: ication, Location Facilities , Coasta Coastal Structures size and shape of nel drainage and	fastenings, – – Geometric ge on curves- id Left hand rials required s – Railway astructure for Planning and and Design al Structures, and Coastal of the tunnel, ventilation.	8HR /L1,L2 8HR /L1,L2,L3 8HR /L2,L3,L4 8HR		

selection and ICAO stipulations, typical airport layouts, Parking and				
circulation area.				
Module-5				
Airport Design: Runway Design: Orientation, Wind Rose Diagram, Runway length, Problems on basic and Actual Length, Geometric design of runways, Configuration and Elements of Taxiway Design, Airport Zones, Passenger Facilities and Services, Runway and Taxiway Markings and lighting.	8HR /L3,L4,L5,L6			
Course Outcomes: After studying this course, students will be able to:				
1. Acquires capability of choosing alignment and also design geometric asp runway and taxiway.	ects of railway system,			
2. Suggest and estimate the material quantity required for laying a railway able to determine the hauling capacity of a locomotive.	r track and also will be			
3. Develop layout plan of airport, harbor, dock and will be able relate the	e gained knowledge to			
identify required type of visual and/or navigational aids for the same.	0 0			
4. Apply the knowledge gained to conduct surveying, understand the tunnel	ing activities.			
Question paper pattern:				
• The question paper will have ten full questions carrying equal marks.				
• Each full question will be for 20 marks.				
• Frach full question will have sub- question covering all the topics under a module.				
• Each full question will have to answer five full questions, selecting one full questions	tion from each module			
The students will have to answer five full questions, selecting one full ques				
1. Saxena Subhash C and Satvanal Arora. "A Course in Railway Engineer	ing". Dhannat Rai and			
Sons, Delhi.	ing, Dhanpat rai and			
2. Satish Chandra and Agarwal M. M,"Railway Engineering", 2nd Editi	on, Oxford University			
Press,New Delhi.	•			
3. Khanna S K, Arora M G and Jain S S,"Airport Planning and Des	ign", Nemch and and			
Brothers, Roorkee.				
4. CV enkatramaiah, "Transportation Engineering", Volume II: Railways, Airpor	ts,DocksandHarbours,			
Bridgesand Tunnels, Universities Press.				
5. Bindra S P, "A Course in Docks and Harbour Engineering", Dhanpat Rai	and Sons, New Delhi.			
Keterence Books:	Dublishing Co			
1. Oza.n.r.anuOza.O.n., Acourse in Bailway Track Engineering" Tata Ma Grow L	Fuolishing Co.,			
3. Srinivasan R. Harbour "Dock and TunnelEngineering" 26thEdition 2013	1111.			
5. Similation IX, Hurbour, Dook and FumerEngmeering ,20thEdition2015				

	TITLE OF THE COURSE:PAVEMENT DESIGN				
	B.E., VII Semester, Civil Engineering				
[As per Choice Based Credit System (CBCS) scheme]					
Subject code	18CV732	CIE	50		
Number of lecture	04	SEE	50		
hours per week					
Total number of	40	Exam hours	03		
lecture hours					
	<u>C</u>	REDITS 03			
1. Gain knowledge abo design, and maintenance 2. Excel in the path of a 3. Understand design of Kansas) and also the sa 4. Understand the vario	but the process of collecter of pavement. analysis of stress, strain a concepts of flexible pavement by us causes leading to failur form functional and structure.	and deflection in pavement. The second deflection in pavement. The second deflection in pavement. The second deflection is pavement. The second deflection is pavement in the second deflection of pavement by second deflection deflec	etors affecting pavement IRC 37-2018, Methods, he same.		
5. Develop skills to per	Iorm functional and struc Modules	aurai evaluation of pavement by st	Teaching Hours/		
	wiodules		RBT LEVEL		
Module -1					
Introduction: Desirable characteristics of pavement, Types and components, Difference between Highway pavement and Air field pavement, Design strategies of variables, Functions of sub grade, sub base, Base course, surface course, comparison between Rigid and flexible pavement Fundamentals of Design of Pavements: Stresses and deflections, Principle, Assumptions and Limitations of Boussinesa's theory. Burmister two layer theory and problems on above			10HR/ L2, L3,L4		
Module -2	Module -2				
Design Factors: Design wheel load, contact pressure, Design life, Traffic factors, climatic factors, Road geometry, Subgrade strength and drainage, ESWL concept Determination of ESWL by equivalent deflection criteria, Stress criteria, EWL concept, and problems on above.stress and strain flexible pavement by burmister three layer theory Flexible pavement Design:Kansas method, CBR method, IRC Method (old), CSA method using IRC-37-2018, problems on above			10HR / L5,L6		
Module -3					
Flexible Pavement Failures, Maintenance and Evaluation: Types of failures, Causes, Remedial/Maintenance measures in flexible pavements, Functional Evaluation by Visual inspection and unevenness measurements, Structural evaluation by Benkleman beam deflection method, Falling weight deflectometer, GPR method. Design factors for runway pavements, Design methods for Airfield pavement and problems on above			10HR/ L2, L3,L4		
Module -4					
Stresses in Rigid Paver Analysis, Modified Wes Warping stress, Frictio problems on above Des	nent : Types of stress, An stergaard equations, Criti nal stress, combined str ign of Rigid Pavement: 1	alysis of Stresses, Westergaard's cal stresses, Wheel load stresses, esses (using chart / equations), Design of CC pavement by IRC:	10HR/ L4,L5		

58-2015 for dual and Tandem axle load, Reinforcement in slabs, Design of Dowel			
bars, Design of Tie bars, Design factors for Runway pavements, Design methods			
for airfield pavements, problems of the above			
Module -5			
Rigid Pavement Failures, Maintenance and Evaluation: Types of failures, causes,			
remedial/maintenance measures in rigid pavements, Functional evaluation by			
Visual inspection and unevenness measurements, joints, Reinforcement,			
Requirements of joints, Types of joints, Expansion joint, contraction joint, warping	L4,L5,L6		
joint, construction joint, longitudinal joint, Design of joints			
Course Outcomes: : After studying this course, students will be able to:			
1. Systematically generate and compile required data's for design of pavement (Hig	hway & Airfield).		
2. Analyze stress, strain and deflection by boussinesq's, burmister's and westergaa	rd's theory.		
3. Design rigid pavement and flexible pavement conforming to IRC58-2015 and IR	C37-2018.		
4. Evaluate the performance of the pavement and also develops maintenance statem	ent based on site specific		
requirements	_		
Question paper pattern:			
• The question paper will have ten full questions carrying equal marks.			
• Each full question will be for 20 marks.			
• There will be two full questions (with a maximum of four sub- questions) from each module.			
• Each full question will have sub- question covering all the topics under a module.			
• The students will have to answer five full questions, selecting one full question fro	om each module.		
Toythooka			
1 S.K.Khanna, C.E.C. Justa and A.Vaananaavan "Iliahusay Engineering" Nam (Chand & Duathans		
1. 5 K Khanna, C E G Jusio, and A veeraragavan, Highway Engineering, Nem C	a" Vhanna nublishana		
2. L.K.Kaufyan and Dr.N.B.Lai, Principles and Practices of Highway Engineerin	g, Khanna puolishers		
5. Fang H. Huang, Pavement Analysis and Design, University of Kentucky			
Reference Books			
1 Voder & witczak "Principles of navement design" John Wiley & Sons			
2 Subha Rao "Principles of Pavement Design"			
2. Sublia Rab, Filliciples of Favement Design. 2. P. Srinivasa Kumar, "Davament Design", University Press, A. Delevant recent IDC codes			

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TITLE OF THE	COURSE: MUNICIP	AL AND INDUSTRIAL WASTE	WATER		
ENGINEERING B.E., VII Semester, Civil Engineering [As per Choice Based Credit System (CBCS) scheme]					
Subject code18CV741CIE50					
Number of lecture hours per week	04	SEE	50		
Total number of lecture hours	40	Exam hours	03		
	CRE	DITS 03			
 Understand the vari Understand and d wastewater treatmer physicochemical trea Understand the con Understand the con rural areas. Apply the principles 	ous water demands and esign different unit op at process 3.Understant tment units acept and design of vario cept of various advance s of Industrial effluent tre	population forecasting methods. berations and unit process in in nd the concept and design o bus biological treatment units waste water and low cost treatment eatment process for different industr	volved in f various nt processes for ial wastes. Teaching		
Modules			Hours/ RBT LEVEL		
	Mo	dule-1			
sewerage systems, dry weather flow, wet weather flow, factors effecting dry and wet weather flow on design of sewerage system, estimation of storm flow, time of concentration flow, material of sewers, shape of sewers, laying and testing of sewers, ventilation of sewers. lowcost waste treatment; oxidation pond, septic tank, Sewer appurtenances, manholes, catch basins, basic principles of house drainage, typical layout plan showing house drainage connections,			10HR/ L1,L2,L3		
	Мо	dule-2			
Design of sewers , hydraulic formula for velocity, effects of variation on velocity, regime velocity, design of hydraulic elements for circular sewers for full flow and partial flow conditions, disposal of effluents by dilution, self purification phenomenon, oxygen sag curve, zones of purification, sewage farming, sewage sickness, numerical problems on disposal of effluents, StreeterPhelps equation			10HR/ L1,L2,L3		
Module-3					
Waste water characteristics , sampling, significance and techniques, physical, chemical and biological characteristics, flow diagram for municipal waste water treatment, unit operations; screens, grit chambers, skimming tanks, equalization tanks Suspended growth and fixed film bio process, design of trickling filters, activated sludge process, sequential batch reactors, moving bed bio reactors, sludge digesters.			10 HR/ L1,L2,L3		
Module-4					
Difference between d discharge on streams, reduction, strength re	omestic and industrial methods of industrial duction, neutralization.	waste water, effect of effluent waste water treatment; volume equalisation and proportioning.	10 HR/ L1,L2,L3, L4.L5		

Removal of organic, inorganic and colloidal solids, combined treatment methods;				
merits, demerits and feasibility, principles of discharge of raw, partially treated and				
completely treated wastes in to streams				
Module-5				
Process flow chart, sources and characteristics of industrial waste water, treatment				
methods, reuse and recovery and disposal; cotton and textile industry, tanning	10HR/			
industry, cane sugar and distilleries, dairy industry, steel and cement industry,	L1,L2,L3			
paper and pulp industry, pharmaceutical and food processing industry.				
Course outcomes: After studying this course, the students will be able to:				
1. Select the appropriate sewer appurtenances and materials in sewer network.				
2. Design the sewers network and understand the self purification process in flow	ving water.			
3. Deisgn the varies physic- chemical treatment units				
4. Design the various biological treatment units				
5. Design various AOPs and low cost treatment units.				
Keterence Books:				
1. CPHEEO manual on sewage treatment, Ministry of Orban Development,				
Government of India, New Delhi, 1999				
2. Mark.J Hammer, water & waste water rechnology John whey & Sons Inc., New York 2008				
3. Benefield R.D., and Randal C.W, "Biological Process Design for Wastewater				
Treatment". Prentice Hall, Englewood Chiffs, New Jersey 2012				
4. Metcalf and Eddy Inc. "Wastewater Engineering - Treatment and Reuse". Pu	ublishing Co.			
I the New Delhi 4th Edition 2009				
Text Books:				
1 Howard S. Peavy, Donald R. Rowe, George T. "Environmental Engineering	o" - Tata			
McGraw Hill, New York, Indian Edition, 2013				
2. B C Punmia, "Environmental Engineering vol-II", Laxmi Publications 2nd,	2016			
3. Karia G.L., and Christian R.A. "Wastewater Treatment Concepts and Design				
Approach". Prentice Hall of India Pvt. Ltd., New Delhi, 3rd. Edition, 2017				
4. S.K.Garg, "Environmental Engineering vol-II. Water supply Engineering". Khanna				
Publishers, – New Delhi, 28th edition and 2017				
5. Municipal & Industrial Waste Water Engineering 7th Sem Be Civil Engineer	ering			
by Hs Vishwanath (Author). Sapna Book	0			
6. Patwardhan A.D, "Industrial Waste Water Treatment", PHI Learning Privat	te			
LimitedNew Delhi				

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TITLE OF THE COURSE: HYDROLOGY & IRRIGATION ENGINEERING B.F., VII Semester, Civil Engineering				
[As per Choice Based Credit System (CBCS) scheme]				
Subject code	18CV742	CIE	50	
Number of lecture	04	SEE	50	
hours per week	04	SEE	30	
Total number of	40	Exam hours	03	
lecture hours	40	Examinours	03	
	CRE	DITS 03		
 Course Learning Object Understand the concentration, evaporation Quantify runoff and Demonstrate different procedure. Design canals and canals 	ectives: This course will ept of hydrology and con and transpiration. use concept of unit hydro at methods of irrigation, r nal network based on the	enable students to: nponents of hydrologic cycle such a ograph. nethods of application of water and e water requirement of various crops	s precipitation, irrigation	
5. Determine the reserv	oir capacity.			
	Modules		Teaching Hours/ RBT LEVEL	
	Mo	dule-1		
and Indian water availability, Practical application of hydrology, Hydrologic cycle (Horton's) qualitative and engineering representation. Precipitation: Definition, Forms and types of precipitation, measurement of rain fall using Symon's and Syphon type of rain gauges, optimum number of rain gauge stations, consistency of rainfall data (double mass curve method), computation of mean rainfall, estimation of missing data, presentation of precipitation data, moving average curve, mass curve, rainfall hyetographs.			10HR/ L1,L2,L3	
Module-2				
Losses Evaporation: measurement using IS and Rohwer's equation Introduction, Consump Estimation by Blaney-C infiltration capacity, infiltration equation, in	Introduction, Process, class-A Pan, estimation u s) Reservoir evaporation ptive use, AET, PET, Criddle equation. Infiltrat measurement by doub filtration indices	factors affecting evaporation, using empirical formulae (Meyer's and control. Evapo-transpiration: Factors affecting, Measurement, ion: Introduction, factors affecting ble ring infiltrometer, Horton's	10HR/ L1,L2,L3	
Module-3				
Runoff: Definition, concept of catchment, factors affecting runoff, rainfall – runoff relationship using regression analysis. Hydrographs: Definition, components of hydrograph, base flow separation, unit hydrograph, assumption, application and limitations, derivation from simple storm hydrographs, S curve and its computations, Conversion of UH of different durations.			10 HR/ L1,L2,L3	
Module-4				
Irrigation: Definition. I surface and ground wat Requirements of Crops	Benefits and drawbacks of er, flow irrigation, lift irri by: Duty, delta and base p	of irrigation. System of irrigation: gation, Bandhara irrigation. Water period, relationship between them,	10 HR/ L1,L2,L3, L4,L5	

factors affecting duty of water crops and crop seasons in India, irrigation efficiency, frequency of irrigation.				
Module-5				
Dams & Reservoir: Definition, Investigation for reservoir site, storage zones determination of storage capacity using mass curves, economical height of dam, Basic profile of Earthen Dams & Gravity Dams. Canals: Types of canals. Alignment of canals. Definition of gross command area, cultural command area, intensity of irrigation, time factor, crop factor. Unlined and lined canals. Standard sections. Design of canals by Lacey's and Kennedy's method.	10HR/ L1,L2,L3			
 Course outcomes: After studying this course, students will be able to: 1. Understand the importance of hydrology and its components. 2. Measure precipitation and analyze the data and analyze the losses in precipitation 3. Estimate runoff and develop unit hydrographs. 4. Find the benefits and ill-effects of irrigation. 5. Find the quantity of irrigation water and frequency of irrigation for various crops. 6. Find the canal capacity, design the canal and compute the reservoir capacity. 				
 Reference Books: 1. K. Subramanya, "Engineering Hydrology", Tata McGraw Hill Publishers, New Delhi. 2. Jayarami Reddy, "A Text Book of Hydrology", Lakshmi Publications, New Delhi. 3. Punmia and LalPandey, "Irrigation and Water Power Engineering" Lakshmi Publications, New Delhi. 4. H.M. Raghunath, "Hydrology", Wiley Eastern Publication, New Delhi. 5. Sharma R.K., "Irrigation Engineering and Hydraulics", Oxford & IBH Publishing Co., New Delhi. 6. VenTe Chow, "Applied Hydrology", Tata McGraw Hill Publishers, New Delhi. 7. Modi P.N "Water Resources and Water Power Engineering" Standard book house, Delhi. 8. Garg S.K, "Irrigation Engineering and Hydraulic Structures" Khanna publications, New Delhi. 				
 K. Subramanya,"Engineering Hydrology", Tata Mcgraw Hill Publishers,New Delhi. Jayarami Reddy," A Text Book of Hydrology",Lakshmi Publications,New Delhi. Punmia and Lalpandey,"Irrigation and Water Power Engineering", Lakshmi Publications,New Delhi. 				

TITLE OF TH	HE COURSE:ENVI	RONMENTAL ENGI	NEERIN	G LAB	
	B.E., VII Seme	ster, Civil Engineering			
[As	per Choice Based O	Credit System (CBCS) se	cheme]		
Subject code	18CVL75	CIE		50	
Number of lecture hours	04	SEE		50	
per week		SEE		50	
Total number of lecture hours	28	Exam hours		03	
	CR	EDITS 01			
Course Learning Object	tives: This course w	ill enable students,			
1. To learn different met	hods of water & was	ste water quality			
2. To conduct experimen	ts to determine the	concentrations of water	and waste	water	
3. To determine the degr	ee and type of treat	nent			
4. To understand the envi	ironmental significa	nce and application in e	nvironmer	tal engineering	
practice	U	11		6 6	
	EXPERIMENT	TS		Teaching Hours /	
				RBT LEVEL	
1 . Preparation chemical r method.	eagents required for	a laboratory analysis by	standard	3HR/L3,L4,L5	
2. Determination of pH, C	Conductivity, TDS a	nd Turbidity.		3HR/L3,L4,L5	
3. Determination of Acidi	ty and Alkalinity	•		3HR/L3,L4,L5	
4. Determination of Calci	um, Magnesium and	l Total Hardness.		3HR/L3,L4,L5	
5. Determination of Disso	lved Oxygen			3HR/L3,L4,L5	
6. Determination of BOD.				3HR/L3.L4.L5	
7. Determination of Chlorides				3HR/L3,L4,L5	
8. Determination of percentage of % of available chlorine in bleaching powder				3HR/L3.L4.L5	
sample, Determination of Residual Chlorine and chlorine demand.					
9. Determination of Solids	9. Determination of Solids in Sewage: i) Total Solids, ii) Suspended Solids, iii) 3HR/L3.L4.L5				
Dissolved Solids.	C /			, ,	
10. Determination of optim	mum coagulant dosa	age using Jar test appara	tus.	3HR/L3,L4,L5	
11. Determination of Fluc	oride, Nitrate and Su	lphate by spectrophotor	neter	3HR/L3,L4,L5	
12. Determination of COI	D(Demonstration)			3HR/L3,L4,L5	
13. Air Quality Monitorin	g (Demonstration)			3HR/L3,L4,L5	
14. Determination of So	ound by Sound lev	vel meter at different	locations	3HR/L3,L4,L5	
(Demonstration)					
Course Outcomes: After studying this course, students will be able to:					
1. Acquire capability to conduct experiments and estimate the concentration of different					
parameters.	parameters.				
2. Compare the result with standards and discuss based on the purpose of analysis.					
3. Determine type of treatment, degree of treatment for water and waste water.					
4. Identify the parameter to be analyzed for the student project work in environmental stream.					
Question paper pattern:					
Two experiments shall be asked from the above set of experiments.					
One experiment to be conducted and for the other student should write detailed procedure.					
References					
1. IS codes-3025 series					
2. Standard method for examination of water and waste water, APHA, 20 th edition					
Clair Sawyer and Perry McCarty and Gene Parkin, "Chemistry for Environmental Engineering and					
Science", McGraw-Hill Series in Civil and Environmental Engineering.					

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TITLE OF THE COURSE: COMPUTER AIDED DETAILING OF STRUCTURE LAB						
	B.E., VII Seme	ster, Civil Engineering				
[As per Choice Based Credit System (CBCS) scheme]						
Subject code	18CVL76	CIE		50		
Number of lecture	04	SEE		50		
hours per week						
Total number of	28	Exam hours		03		
lecture hours						
~ ~ ~ ~ ~ ~	CR	EDITS 01				
Course Learning Ob	jectives: This course w	ill enable students to				
1. Be aware of th	e Scale Factors, Section	s of drawings, Draft the d	etailing	of RC and Steel		
Structural mem		T 1. T (
	Experiments			RBT LEVEL		
Module-1	<u>aaa</u>					
Detailing of R	CC Structures					
Beams – Simp	ly supported, Cantilever	and Continuous.				
Staircase – Do	y, 1 wo way and One-wa glegged	ty continuous.		14 HR/		
Cantilever Ret	aining wall			L2,L3		
Counter Fort R	Retaining wall					
	C					
Module-2						
Detailing of St	teel Structures					
Connections –	Beam to beam, Beam to	Column by Bolted and We	elded			
Connections.						
Built-up Columns with lacings and battens				14 HR/		
Column bases	s and Gusseted base	s with bolted and we	elded	L2,L3		
connections.	connections.					
Roof Truss – V	Roof Truss – Welded and Bolted					
Welded Plate g	girder & Gantry Girder					
Course outcomes: A	working drawings	e, students will be able to:				
Ouestion nanor natt	orn.					
1 Two questions she	ull be asked from each M	Iodule				
2 One full question	should be answered from	n each Module				
Each question carries 50 marks						
Textbooks:						
1. N Krishna Raju, "Structural Design and Drawing of Reinforced Concrete and Steel". University						
Press						
2. Krishna Murthy, "Structural Design and Drawing – Concrete Structures", CBS Publishers. New						
Delhi		~	3	· ·		
Reference Books:						
1. SP 34: Handbook on Concrete Reinforcement and Detailing, Bureau of Indian Standards.						
2. IS 13920, Ductile Design And Detailing Of Reinforced Concrete Structures Subjected To						
Seismic Forces - Code Of Practice, Bureau of Indian Standard.						

TITLE OF THE C	OURSE: CIVIL EN	GINEERING WORKS	SHOP PRACT	TICE LAB		
B.E., VII Semester, Civil Engineering						
[As per Choice Based Credit System (CBCS) scheme]						
Subject code	18CVL77	CIE	50			
Number of lecture hours	03	SEE	50			
per week	05	SEL	50			
Total number of lecture	28	Exam	03			
hours	20	hours	03			
CREDITS 01						
Course Learning Object	ives:					
1. Understand the basic p	practical knowledge	about the construction s	site.			
2. Understand the variou	s materials required	for different construction	on activities.	0		
3. Demonstration of vari	ous plumbing works	s and different joint in d	oors, window	s & truss.		
4. To observe the differen	t weldings.					
	EXPERIMEN	NTS		Teaching		
				Hours/		
				RBT LEVEL		
Visit a nearby site where	construction is at	initial stageand observe	e for			
Iollowing (II necessary vi	lsit two/threetimes	with a gap of a week).	11			
drawings are availabler	elate/match activiti	les with the drawings.				
(a) Digging and ming						
(b) Foundation preparations						
(c) Brick/stone masonry	(c) Brick/stone masonry					
(d) Concrete laying and C	uring			6HR/ L3,L4,L5		
(e) Laying OI sewerage/sa	milary miles	andaoiling				
(1) Dat benuing and bat is	iying for corunnis, d	eams and cennig.				
(g) Onsite testing for quar						
(i) Erection and removal						
	(1) Erection and removal of form work, scatfolding, centering/shuttering					
Prepare a brief report on co	nstruction activities	observed and methods, t	ools,			
equipment and materials be	eing used.					
T 7°• 4						
visit a nearby site when	re construction is	at advance stage and (observe for			
Ionowing (II necessary v	isit two/three time	s with a gap of a week				
(a) Fluinding (b) Wolding fittings						
(b) Weiting, Intings,						
(d) Flooring	0HK					
(a) POP work	/L3,L4,L3					
			1			
Prepare a brief report on co						
equipment and methods be	ing used.					

Visit a nearby site where construction work is at finishing stage and observe				
for following (if necessary visit two/three times with a gap of a week):				
(a) Carpentry work				
(b) False ceiling and aluminum –glass works				
(c) White washing/painting work (surface preparationbeing carried out for	6HK			
timber/steel/plastered surface.)	/L3,L4,L5			
Prepare a brief report on construction activities observed and material, tools,				
equipment and methods being used.				
Mark level of given height from ground level at differentlocations in the				
workshop using water pipe technique.				
Prepare a plain smooth block (cuboid) of timber of givendimension using sawing				
and planning operations.	6HR			
Join two wooden blocks with the help of dovetail joint. (Using sawing and	/L3.L4.L5			
chiseling operations)	, , -			
Drill the hole of given dimension at given location on a metal/wood piece.				
Observe demonstration of Arc welding and Gas Cutting of metal plates.				
PLUMBING				
Assemble a pipe line as per given drawing using pipes of one inch diameter, pipes				
of half inch diameter, nipple, reducer, union, T, elbow, tap etc. (This may involve	6HR			
basic tasks such as marking, cutting, threading, etc and use of appropriate	/L3,L4,L5			
techniques so that water leakage does not occur) and then dissemble this pipe line.				
MODELING				
DIFFERENT CIVIL ENGINEERING STRUCTURES	6HR			
Such as types of Dams, types of Bridges, Multi Storey Building, towers, OHT,	/L3,L4,L5			
educational Building, Hospitals, Commercial Building, Warehouse,				
Course Outcomes:				
1. To develop basic technical knowledge of construction activities.				
2. Apply basic techniques for masonry and concrete related works.				
3. Identifying appropriate material required for each activity.				
4. To observe technical aspects involved in workmanship of various plumbing tasks.				
5. To observe technical aspects involved in safety precausions.				

INDUSTRIAL PSYCHOLOGY AND ORGANISATIONAL BEHAVIOUR					
B.Tech, VII Semester, civil Engineering					
[A	s per Choice Based Cred	it System (CBCS	S) scher	ne]	
Subject Code	18HSM79	CIE Mark	(S		50
Number of Lecture	01	SEE Mark	KS .		50
Hour/Week					
Total Number of	20	Exam Ho	Exam Hours		03
Lecture Hours					
	CRED	ITS-01			
Course Objectives: T	his course will enable stu	udents to:			
1. Relating huma	n psychology to science				
2. Understand the	e human psychology				
3. Understand the	e nature of organization a	and organization	models		
4. Understand the	e human social communi	cation			
5. Understand the	e leadership qualities				
Modules			Teach	ning	Revised
			Hours	S	Bloom's
					Taxonomy
					(RBT)
					Level
Module -1					
			3 Hor	irs	L1.L2
Introduction to I/O r	sychology:				,
Major fields of I/C) psychology brief h	istory of I/O			
nsychology employ	ment of I/O psychology	ethics in I/O			
psychology, clipioy	ter_1)	, ethics in 1/0			
Module -2					
Organisational commu	inication:		3 Hor	INC	1112
Types of organizat	tional communication	internersonal	5 1100	115	1.1,1.2
appes of organization	aving employee commu	interpersonal			
(Chapter 11)	oving employee commu	inication skins.			
(Chapter-11) Modulo 3					
Loodorship			5 II.au		1112
Leadership :	-1 -1	:-	5 Hot	irs	L1,L2
Introduction, person	al characteristics as	sociated with			
readership, interaction	between the leadership a	aday. (Charter			
specific leader skills, le	eadership where we are t	oday. (Chapter-			
Module -4	1 (1' /		<i>=</i> TT		
Group behaviour- tean	ns and conflicts	C	5 Hou	irs	L1, L2
Group dynamics, fa	ctors affecting group	performance,			
individual versus g	roup performance, gr	oup conflicts.			
(Chapter-13)					
Module-5			. =-		
Stress management:			4 Hot	irs	L1,L2
Dealing with the dem	ands of life and work,	stress defined,			
predisposition to stres	ss, sources of stress, co	onsequences of			
stress, stress reduction	intervention related to li	fe /work issues.			
(Chapter-15)					

Course Outcomes: At the end of this course, students would be able to

- 1. Comprehend the knowledge and concepts of human psychology
- 2. know the importance of psychology
- 3. have insight into individual and group behavior
- 4. deal with people in better way
- 5. motivate groups and build groups

Text Book: Michael G.Aamodt, Industrial/Organizational Psychology: An Applied Approach, 6th Edition, Wadsworth Cengage Learning, ISBN: 978-0-495-60106-7.

Reference Books:

1. Blum M.L. Naylor J.C., Horper & Row, Industrial Psychology, CBS Publisher, 1968

2. Luthans, Organizational Behaviour, McGraw Hill, International, 1997

3. Morgan C.t., King R.A., John Rweisz & John Schoples, Introduction to Psychology, McHraw Hill, 1966

4. Schermerhorn J.R.Jr., Hunt J.G &Osborn R.N., Managing, Organizational Behaviour, John Willy