Yeshwantrao Chavan College of Engineering (An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University) (Accredited 'A' Grade by NAAC with a score of 3.25) Hingna Road, Wanadongri, Nagpur - 441 110



Bachelor of Engineering Civil Engineering Honors in Construction Technology SoE & Syllabus 2020

28 June 2020



Nagar Yuwak Shikshan Sanstha's Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B.E. SCHEME OF EXAMINATION 2020-21

Civil Engineering

Honors in Construction Technology

SN	Sem	Туре	Sub.	Subject	T/P Contact Hours		urs	S Credits % Weightage		age	ESE Duration			
			Code			L	Т	Ρ	Hrs		MSEs*	TA**	ESE	Hours
1	V	PC	CV2501	Advanced Techniques In Concrete Construction	т	3	0	0	3	3	30	30	40	3
2	V	PC	CV2502	Lab: Construction Materials Laboratory 1	Ρ	0	0	2	2	1		60	40	
3	VI	PC	CV2511	Advanced Construction Materials	т	3	0	0	3	3	30	30	40	3
4	VI	PC	CV2512	Pre Engineering Construction And Technology	т	3	0	0	3	3	30	30	40	3
5	VI	PC	CV2513	Lab: Construction Materials Laboratory 2	Р	0	0	2	2	1		60	40	
6	VII	PC	CV2521	Sustainable Construction Engineering	т	3	0	0	3	3	30	30	40	3
7	VII	PC	CV2522	Construction Planning And Control	т	3	0	0	3	3	30	30	40	3
8	VII	PC	CV2523	Lab: Soft Computing In Construction Management	Р	0	0	2	2	1		60	40	
				Т	OTAL	15	0	6	21	18				

MSEs* = Three MSEs of 15 Marks each will conducted and marks of better 2 of these 3 MSEs will be considered for Continuous Assessment

TA ** = for Theory : 20 marks on lecture quizzes, 8 marks on assignments, 2 marks on class performance TA** = for Practical : MSPA will be 15 marks each

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SoE and Syllabus

SoE No. CVH-201

V Semester

CV2501 : ADVANCED TECHNIQUES IN CONCRETE CONSTRUCTION

COURSE OBJECTIVES	COURSE OUTCOMES				
1. Understand To develop systematic	1. An ability to understand the propertie	es of the			
knowledge of concrete constituents	knowledge of concrete constituents constituent materials of concrete.				
2. To familiarize with the fundamentals of	2. An ability to understand the properties of	fresh and			
concrete	hardened concrete and tests to detern	nine these			
3. Principals involved for high performance	properties.				
concrete	3. An ability to design concrete mixes	and apply			
4. To understand the basic concepts of special	statistical quality control techniques				
concretes	4. An ability to understand importance of Non-	destructive			
5. To introduce fundamentals of concreting	testing and various equipment used.				
methods	5. An ability to understand the durability of con	crete.			
Mapped Program Outcomes : 1,3,7,11,12					
		[07 Hrs.]			
Features of Recent Advances in Concrete, Types of	Concrete to be dealt; Terminologies, Ingredients,				
Properties of Fresh & Hardened concrete, related tes	sts, Production and use of concrete.				
UNIT-2: [06 Hrs.]					
High Performance Concretes: Definition & In	itroduction, Classification, general properties,				
Advantages, Disadvantages, Applications, and Des	to High strength concrete Ultre high strength				
concrete	le, Flight Strength Concrete, Onta-high Strength				
concrete.					
UNIT-3 :Concrete mix design. Basic considerations and choice a mix proportions, various methods [07]					
of mix designs including IS Code method. Quality control and quality assurance of concrete.					
Acceptance criteria. High workability concrete/Self compacting concrete. Fiber					
reinforced concrete. Polymer-concrete composites.					
UNIT-4 :		[06 Hrs.]			
Special Concretes: Definition & Introduction, Ge	eneral properties, Advantages, Disadvantages,				
Applications, Concreting practices, Guidelines for M	Mix design and use of following concretes: High				
density concrete, Shrinkage compensating concrete, Mass concrete, Roller compacted concrete.					
UNIT–5 :		[07 Hrs.]			
Durability of Concrete: Definitions, Deterioration pl	rocesses- Physical, Chemical, Environmental &				
Biological; Measures for ensuring durability, Corrosion of reinforcing steel, protective measures.					
UNIT-6 :		[06 Hrs.]			
Testing and Quality Control of Concrete: Classifica	ation of test methods, In-situ, Non-Destructive &				
Partially-Destructive tests for fresh concrete, harden	ned concrete and durability of concrete.				
Problems on the in-situ testing results and compared	d with Laboratory results.				
Text Books :					

- 1. Gambhir M.L: Concrete Technology Tata McGraw Hill (Second Edition) 1995.
- 2. M.S. Shetty, Concrete Technology S.Chand& Company New Delhi 2005.

- 1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
- 2. Neville, A.M., "Properties of Concrete", Prentice Hall, 1995, London.
- 3. Santhakumar.A.R. ; "Concrete Technology", Oxford University Press, 2007.
- 4. Mehta .P.K., and Paulo J.M. Monteiro, "Concrete- Microstructure, Properties and Materials"-(Indian Ed.,Indian Concrete institute), McGraw Hill.

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SoE and Syllabus

SoE No. CVH-201

V Semester

CV2502 : LAB - CONSTRUCTION MATERIALS LABORATORY-I

	COURSE OBJECTIVE		COURSE OUTCOME
1.	To understand the properties of various grades	1.	An ability to conduct different tests on cement.
	cement.	2.	An ability to assess the different properties of
2.	To study the behavior of concrete at its fresh and		coarse and fine aggregate.
	hardened state	3.	An ability to conduct different workability tests on
3.	To study about the concrete design mix		fresh concrete and various tests on hardened
4.	To know about the procedures in concreting		concrete.
5.	To understand special concrete and their use	4.	An ability to understand working of various Non-
	·		destructive testing equipment.
Map	ped Program Outcomes : 1,4,5,8,11		

Any Five practical from the following are required to be conducted:

- 1. Study of IS code related to mix design.
- 2. Determine Compressive strength of High grade concrete by using different admixture.
- 3. Study and performance on Rebound Hammer.
- 4. Study and performance on Ultrasonic Pulse Velocity.
- 5. Study and performance on Profometer.
- 6. Study and performance on Crack scope.
- 7. Study of Self Compacting Concrete.

Text Books :

- 1. P.C. Vergese, Limit State Design of Reinforced Concrete, Prentice Hall Publishers, 2nd edition, 2008
- 2. Shah and Karve, Reinforced Concrete Structures, Structures Publishers, Pune, 5th edition, 2015.
- 3. Sinha S.N, Reinforced Concrete Design, Tata McGraw Hill Publishing Company Limited, New Delhi, 2007
- 4. Ashok K. Jain, Reinforced Concrete Limit State Design, Nemchand and Brothers, 7th edition, 2012

- 1. P.C. Varghese, Advanced Design of Structures, Prentice Hall Publishers, 2009
- 2. Punmia B.C., Jain A.K., Jain A.K., Reinforced Concrete Structures (Vol-I), Laxmi Publications Pvt Ltd, New Delhi, 2007
- 3. N. KrishanaRaju, Prestressed Concrete, Tata McGraw Hill Publishing Company Limited, New Delhi, 5th edition 2012

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SoE and Syllabus

SoE No. CVH-201

VI Semester CV2511 : ADVANCED CONSTRUCTION MATERIALS

COURSE OBJECTIVES	COURSE OUTCOMES				
 Student will be able to : 1. Study different construction materials. 2. Understand the use of waste product. 3. Various maintenance works in Civil Engineering. 	 Student will be able to : Achieve the knowledge of different construction materials. Know the use of waste product and industrial by product. Explain maintenance and repair techniques for improve condition of structures 				
Mapped Program Outcomes : 1, 5,7,9,12					

Construction materials :- Classification of construction materials, Selection criteria for construction materials, Green building materials, waste products, Reuse and recycling.	[07 Hrs.]
UNIT-2: Ceramic materials :- Classification, glass wool, thermal and electrical properties, fire resistant materials, uses and applications.	[06 Hrs.]
UNIT-3 : Polymeric materials :- Rubber and plastics, Polymers in civil engineering polymers, types of fibers, fiber reinforced plastic in sandwich panels.	[07 Hrs.]
UNIT-4: Introduction to : - Waterproofing materials and compounds, flooring materials, required materials.	[06 Hrs.]
UNIT-5 : Use of waste product and industrial by product:-Fly ash, silica, GGBS and other mineral products, Geotextile and Geo-synthetics applications in civil engineering.	[07 Hrs.]
UNIT-6: Introduction to maintenance work, Classification, Techniques, special methods, materials.	[06 Hrs.]

Text Books :

- 1. Gambhir.M.L., "Concrete Technology", McGraw Hill Education, 2006.
- 2. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
- 3. Neville, A.M., "Properties of Concrete", Prentice Hall, 1995, London.

- 1. Shetty M.S., "Concrete Technology", S.Chand and Company Ltd. Delhi, 2003.
- 2. Rangawala S.C. Engineering Materials Chortor Publications 1991.
- 3. S.K. Duggal Building Materials, New Age International Publications 2006.

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SoE No. CVH-201

[06 Hrs.]

VI Semester

CV2512 : PRE ENGINEERING CONSTRUCTION AND TECHNOLOGY

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the Concepts of prefabrication	Students are able
2. To identify and design suitable pre-	1. To understand the use of prefabrication Technology
engineered structure	2. To design the pre-engineered structures and execute
3. To identify the stresses in pre-engineered pre	the same for a given structure
stressed / precast components of the structure	 To know the different types of stresses acting on the structures while lifting the pre stressed /precast components of the prefabricated structures and type of equipment required to (eliminate/resist) support such stresses.
Mapped Program Outcomes : 1,2,3,4,12 PSO	:i

UNIT_1:

[06 Hrs.] Introduction to prefabrication, Types of prefabrication, materials used for prefabrication, site and plant prefabrication, Economy of prefabrication (concrete and structural steel)

UNIT-2:

UNIT-2 :	[07 Hrs.]
Planning for Components of prefabricated structures, Disuniting of structures, Design of simple	
rectangular beams and I beams. Handling and erection stresses. Elimination of erection stresses.	I

UNIT-3:

Roof and floor panels, ribbed floor panels, wall panels, footings, Joints for different structural Connections, Effective sealing of joints for water proofing, Provisions for non-structural fastenings, Expansion joints in pre-cast construction (concrete). Designing and detailing of precast unit for factory structures, Purlins, Principal rafters, roof trusses (structural steel)

UNIT-4:

[07 Hrs.] Choice of production setup, Manufacturing methods, Stationary and mobile production, Planning of production setup, Storage of precast elements, Dimensional tolerances, Acceleration of concrete hardening. Equipment's for hoisting and erection, Techniques for erection of different types of members like Beams, Slabs, Wall panels and Columns, Vacuum lifting pads.

UNIT-5:

[07 Hrs.] Precast sandwich Panels, Prestressed concrete solid flat slabs, Hollow core slab/panels, Prestressed concrete, and Precast segmental Box Girders, Specifications and Seismic considerations.

UNIT-6:

[06 Hrs.] Introduction – Advantages - Pre Engineered Buildings Vs Conventional Steel Buildings, Design of Pre Engineered Buildings (PEB), load combinations to be considered for Foundation design, Applications

- 1. L. Mokk, "Prefabricated Concrete for Industrial and Public Structures," Publishing House of the Hungarian Academy of Sciences, Budapest, 2007.
- 2. B. Lewicki, "Building with Large Prefabricates", Elsevier Publishing Company, Amsterdam, London, New York. 1998.
- 3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the use of Precast Concrete, Netherland Betor Verlag, 2009
- 4. T. Koncz, "Manual of Precast Concrete Construction", Vol. I, II, III & IV, Berlin, 1971.

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VI Semester

CV2513 : LAB - CONSTRUCTION MATERIALS LABORATORY-II

COURSE OBJECTIVE	COURSE OUTCOME
1. To learn the principles and procedures of testing of	1. Student knows the techniques to characterize
highway materials	various pavement materials through relevant tests.
Mapped Program Outcomes : 1,2,12	

PRACTICALS Minimum 8 practical's out of following will be performed I. TEST ON AGGREGATES

- 1. Specific Gravity
- 2. Water Absorption of Aggregates
- 3. Determination of elongation and flakiness index
- 4. Determination of impact value of coarse aggregate
- 5. Determination of aggregate crushing value of coarse aggregate
- 6. Los Angeles Abrasion Test

II. TEST ON BITUMEN

- 1. Specific Gravity of Bitumen
- 2. Penetration Test
- 3. Viscosity Test
- 4. Softening Point Test
- 5. Ductility Test

III. TESTS ON BITUMINOUS MIXES

- 1. Determination of Binder Content
- 2. Marshall Stability

Text Books/Reference Books

- 1. Highway Materials and Pavement Testing, Nem Chand and Bros., Roorkee, Revised Fifth Edition, 2009
- 2. Methods for testing tar and bituminous materials, IS 1201-1978 to IS 1220- 1978, Bureau of Indian Standards
- 3. Methods of test for aggregates, IS 2386 1978, Bureau of Indian Standards
- 4. Mix Design Methods Asphalt Institute Manual Series No. 2, Sixth Edition, 1997, Lexington, KY, USA.
- 5. IS383 1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011
- 6. IS1542-1992: Indian standard specification for sand for plaster, 2009 7. IS 10262-2009: Indian Standard Concrete Mix Proportioning –Guidelines, 2009
- 7. IS 4031 (Part 1) 1996 Indian Standard Method for determination of fineness bydry sieving.
- 8. IS 2386 (Part 1 to Part 6) 1963 Indian Standard methods for test for aggregate forconcrete
- 9. IS 383– 1970 Indian Standard specification for coarse and fine aggregates from natural sources for concrete.

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VII Semester

CV2521 : SUSTAINABLE CONSTRUCTION ENGINEERING

COURSE OBJECTIVES COURSE OUTCOMES 1. To get a comprehensive overview of materials used for sustainable buildings. The students will be able to understand; 2. To understand the effects of technology on Sustainable buildings.			
 To get a comprehensive overview of materials used for sustainable buildings. A comprehensive overview of materials used for sustainable buildings. 		COURSE OBJECTIVES	COURSE OUTCOMES
 To understand the enects of technology of materials and the way they are used with respect to sustainability Create new engineering materials to improve the performance in construction practices Develop the technological innovations needed to safeguard, improve, and economize infrastructure and accient. 	1. 2.	To get a comprehensive overview of materials used for sustainable buildings. To understand the effects of technology on materials and the way they are used with respect to sustainability	 The students will be able to understand; 1. A comprehensive overview of materials used for sustainable buildings. 2. Create new engineering materials to improve the performance in construction practices 3. Develop the technological innovations needed to safeguard, improve, and economize infrastructure and accepter.

Mapped Program Outcomes : 1,2,12

UNIT-1: [07 Hrs.] Introduction To Sustainable Building Materials- qualities, use, examples - Natural building materials. UNIT-2: [06 Hrs.] Fundamentals of Sustainable Construction Engineering- Sustainability and resources, need, present practices at national and international level, The Sustainability Quadrant- challenges & Issues, Government initiatives. **UNIT-3**: [07 Hrs.] Construction Product, Process Design and Development- Sustainability of construction resources, process modifications, product performance evaluation. UNIT-4: [06 Hrs.] Sustainability assessment using standard approaches- LEED/GRIHA rating evaluation process. Socio -economic feasibility of sustainable construction products. **UNIT-5**: [07 Hrs.] Innovative & customized sustainable product design based on social constraints, tools & aids available for sustainable construction products. UNIT-6: [06 Hrs.] Life Cycle Assessment and Costing-Various aspects related to construction cost, present value analysis, life cycle stages.

Text Books :

- 3. Sustainable Engineering Practice ASCE Publication 2010.
- 4. Hagger Sustainable Industrial Design and Waste Management, Techniz Book 2010.
- 5. Helmut Rechberger, Practical handbook of Material Flow Analysis, Taylor & Francis. 2010.
- 6. Michael Z. Hou, Heping Xie, Jeoungseok Yoon Underground Storage of CO2 and Energy Taylor & Francis, 2010.
- 7. LEED for India: Reference Guide, 2011.
- 8. Sustainable Building Design Manual Pvt. 1 & 2, The Energy and Resources Institute, TERI, 2004
- 9. Ross Spiegel.G, Green Building Materials A Guide to Product Selection and Specification, 3rd Edition by, John Wiley & Sons, 2010
- 10. Jagadish K.S. Alternative Building Materials and Technologies, New age International Pvt. Ltd Publishers, 2008.
- 11. Traci Rose Rider, Stacy Glass, Jessica McNaughton, Understanding Green Building Materials, W.W. Norton and Company, 2011.

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VII Semester

CV2522 : CONSTRUCTION PLANNING AND CONTROL

	COURSE OBJECTIVES		COURSE OUTCOMES	
1.	To develop concepts related with project	1.	Understand the concepts o	f project
	management system which involves different stages		management and organizing and pl	anning and
	of construction and to learn basic laws used in		different laws.	
	construction industry.	2.	Evaluate the development of networ	k technique
2.	To execute various networking techniques (CPM		of major projects.	
	and PERT) of project controlling in the context of	3.	Develop knowledge about	material
	various construction aspects.		management techniques carried	l out in
3.	Development of projects by managing resources		construction industry.	
	management and material management.	4.	Practical exposure to various	us major
4.	Exposure to information system, MIS and reports		construction information system and	MIS.
	and managing documents.			
Мар	ped Program Outcomes : 1,4,8,9,10,11,12			
UNIT	-1 :			[06 Hrs.]
Unde	erstanding Project Management, Project manage	er, Or	ganization structures, Stages of	
Cons	struction, organizing and staffing the project office and t	team C	Construction Planning.	
	· • •			[07.1]*** 1
UNIT-2:				[07 Hrs.]
Construction Labour, Payment of wages Act, Workmen's Compensation Act, Minimum Wages Act.				
UNIT-3:				[06 Hrs.]
Project planning, milestone schedules, WBS, Network techniques, CPM, PERT and Prima Vera, Line				
of Balancing Techniques. Critical Chain Method.				
UNIT	-4 :			[07 Hrs.]
Resources leveling and smoothing.				
Management: Introduction for Management, History of Management theory, Leadership.				
UNIT-5 :				[07 Hrs.]
Material management- purchases management and inventory control, ABC analysis.				
UNII-6:				[Ub Hrs.]
Project management mormation system, will reporting, Daily, weekly and monthly reporting, Actual				
vs. Planned reporting, Planning & Cost control document, Quality and safety documents at site.				

Text Books :

- 1. Shrivastava U.K., Construction Planning and management, Galgotia publication.
- 2. Khanna O.P, Industrial Engineering & Management, Dhanpat Rai & Sons, New Delhi, 1992.
- 3. Verma Mahesh, Equipment Management, S.Chand & Sons
- 4. Punmia B.C.& Khandelwal K.K., Project Planning & Control with PERT&CPM, Laxmi Publications, New Delhi,1990.
- 5. BL Gupta, Amit Gupta, Construction Management & Machinery, Standard Publishers Distributors, 2010.

- 1. Peurifoy, M.H, Construction Management, McGraw Hill, New York.
- 2. Srinath L, CPM & PERT, Affiliated East-West Press Pvt. Ltd., New Delhi.
- 3. P.S.Gahlot & B.M.Dhir, Construction Planning and Management, New Age International.
- 4. Chaudhary Roy, Project Management, Tata McGraw Hill, New Delhi.

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VII Semester

CV2523 : LAB - SOFT COMPUTING IN CONSTRUCTION MANAGEMENT

COURSE OBJECTIVES	COURSE OUTCOMES				
1. To Learn use of various software related to construction management	On completion of this course students are able to 1. Understand Civil Engineering drawing, its				
 To execute various networking techniques (CPM and PERT) of project controlling in the context of various construction aspects. 	specification, construction materials2. develop extensive databases of information to be used for construction management purposes				
 To prepare a Construction programme for Town ship, Road Project, Bridge project etc. with using construction management softwares (Microsoft Project and Prima Vera Software) 	 using various computing tools 3. Prepare quantity surveying details, capital budgeting of a construction project, resource allocation, and scheduling in excel sheet. 4. Use of construction management software (MS-PROJECT, PRIMAVERA), 				
Mapped Program Outcomes : 1,2,4,8,9,10,11,12					

- 1. Technical Report on use of Civil Engineering drawing, understanding its specification and study of related codes and bye laws (01 Assignment by considering a case study of any Civil Engineering Structure)
- 2. Technical Report on study of properties and cost estimation of different construction materials. (01 Assignment by considering a case study considered in Practical 1)
- 3. Preparation of spreadsheet for Quantity Takeoff, rate analysis (01 Assignment by considering a case study considered in Practical 1)
- Preparation of project planning and scheduling- Critical path method (CPM) Project Evaluation Review Techniques (PERT) – Advanced planning and scheduling concepts using excel spreadsheet. (01 Assignment by considering a case study considered in Practical 1)
- Preparation of project planning and scheduling- Critical path method (CPM) Project Evaluation Review Techniques (PERT) – Advanced planning and scheduling concepts using excel spreadsheet. (01 Assignment by considering a case study considered in Practical 1).
- 6. Use of Project management software such as Primavera software, Microsoft project- Preparation of project and feed data into the software for various projects

Text Books :

- 1. Shrivastava U.K., Construction Planning and management, Galgotia publication.
- 2. Khanna O.P, Industrial Engineering & Management, Dhanpat Rai & Sons, New Delhi, 1992.
- 3. Verma Mahesh, Equipment Management, S. Chand & Sons
- 4. Punmia B.C.& Khandelwal K.K., Project Planning & Control with PERT&CPM, Laxmi Publications, New Delhi,1990.
- 5. BL Gupta, Amit Gupta, Construction Management & Machinery, Standard Publishers Distributors, 2010.

- 1. Project Management using Primavera, Eastwood Harris Publications.
- 2. M.S. Project Microsoft Press.

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