Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Four Years B.E. Course
Scheme of Examination B.E. First year (All Branches of Engineering)

First Semester

Sub Code	Subjects	Workload in hrs			Credits	Marks					Minimum Passing Marks	
		L	T/A	P		Theory		Practical		Total		
						Internal	Uni	Internal	Uni		Theory	Practical
BSE1-1T	Mathematics-I	3	1	-	4	30	70	-	-	100	45	-
BSE1-2T	Applied Physics	3	2	-	4	30	70	-	-	100	45	-
BSE1-3T	Energy and Environment	2	2	-	3	30	70	-	-	100	45	-
BSE1-4T	Communication Skills	2	-	-	2	15	35	-	-	50	23	-
BSE1-5T	Engineering Graphics	1	-	-	1	15	35	-	-	50	23	-
BSE1-6T	Basics of Civil & Mechanical Engineering	4			Audit	50	-	-		Audit	-	-
BSE1-2P	Applied Physics Lab	-	-	3	1.5			25	25	50	-	25
BSE1-3P	Energy and Environment Lab	-	-	2	1			25	25	50	-	25
BSE1-4P	Communication Skills Lab	-	-	2	1			25	25	50	-	25
BSE1-5P	Engineering Graphics Lab	-	-	4	2			25	25	50	-	25
Three weeks Induction Program												
	Total	**15**	**11**		**19.5**	**120***	**280**	**100**	**100**	**600**		

- L- Lecture , P-Practical, T- Tutorial , A- Activity (Half Credit per Hour)

RTM Nagpur University
Syllabus (Theory)

Semester	Course Title (Subject) Code: BSE1-6T	Hours / Week			Credits	Maximum Marks			Exam Duration (Hrs.)
		L	T	P		Continual Assessment	University Examination	Total	
B.E. I Sem	Basics of Civil and Mechanical Engineering	4	-	-	0	50		50	

Sr. No.	Course Objective The objective of this course is–
1	To give an understanding to the students of the vast breadth and numerous areas of engagement available in the overall field of CivilEngineering
2	To motivate the student to pursue a career in one of the many areas ofCivil Engineering with deep interest andkeenness
3	To expose the students to the various avenues available for doing creative and innovative work in this field by showcasing the many monuments and inspiring projects of publicutility.
4	To introduce manufacturing processes applying proper method to produce components. To be able to select and compare domestic appliances.
5	To get knowledge about various energy sources and its conversion.
6	To get acquainted with vehicle systems.

Course Outcomes

After successful completion of this course the student will be able to:

CO1	Introduction to what constitutes CivilEngineering. Identifying the various areas available to pursue and specialize within the overallfield of CivilEngineering. Highlighting the depth of engagement possible within each of theseareas.
CO2	Exploration of the various possibilities of a career in this field. Understanding the vast interfaces this field has with the society atlarge. Providing inspiration for doing creative and innovativework
CO3	Showcasing the many monuments, heritage structures, nationallyimportant infrastructure, and impressive projects to serve as sources ofinspiration. Highlighting possibilities for taking up entrepreneurial activities in thisfield. Providing a foundation for the student to launch off upon an inspired academicpursuit into this branch ofengineering
CO4	Discuss several manufacturing processes and identify the suitable process. Explain various types of mechanism and its application
CO5	Describe and compare the conversion of energy from renewable and non-renewable energy sources.
CO6	List down the types of road vehicles and their specifications; Illustrate various basic parts and transmission system of a road vehicle.

SYLLABUS	
Contents	No of hours
Unit-I : **Basic Understanding**: Role of Civil Engineering in Infrastructure development. Current budgets for infrastructure works; Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers. **Fundamentals of Architecture & Town Planning**: Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities **Fundamentals of Building Materials**: Stones, bricks, mortars, Plain, Reinforced&Prestressed Concrete, Construction Chemicals; Structural Steel, High Tensile Steel,Carbon Composites; Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes **Basics of Construction Management & Contracts Management**: Temporary Structures in Construction; Construction Methods for various types of Structures; Major Construction equipment; Automation & Robotics in Construction; Modern Project management Systems; Importance of Contracts Management	8
Unit-II: **Environmental Engineering & Sustainability**: Water treatment systems; Effluent treatment systems; Solid waste management; Sustainability in Construction. **Geotechnical Engineering**: Basics of soil mechanics, rock mechanics and geology; various types of foundations; basics of rock mechanics &tunneling. **Hydraulics, Hydrology &Water Resources Engineering**: Fundamentals of fluid flow, basics of water supply systems; Underground Structures; Underground Structures Multi- purpose reservoir projects. **Structural Engineering**: Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; Experimental Stress Analysis; Wind tunnel studies. **Surveying &Geomatics**: Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR. **Traffic &Transportation Engineering**: Investments in transport infrastructure development in India for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; Road Safety under heterogeneous traffic.	8
Unit-III:. **Repairs & Rehabilitation of Structures:** Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures; Non-Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs. **Computational Methods, IT, IoT in Civil Engineering:** Typical software used in	8

Civil Engineering: Highway design (MX), Building Information Modelling; Highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB, NASTRAN,NISA,MIKE21,MODFLOW,REVIT,TEKLA,AUTOCAD,...GEOSTUDIO, EDUSHAKE,MSP, PRIMAVERA, ArcGIS, VisSIM,) **Basics of Professionalism**: Professional Ethics, Entrepreneurial possibilities in Civil Engineering, Possibilities for creative & innovative working, Technical writing Skills enhancement; Facilities Management; Quality & HSE Systems in Construction.	
Unit IV : **Introduction to Manufacturing**: Conventional Manufacturing Processes: Casting, Forging, Metal forming (Drawing, Extrusion, etc.), Sheet metal working, Metal joining, etc and components produced. Metal cutting processes and machining operationsTurning, Milling and Drilling, etc. Additive manufacturing and 3D Printing., Basic CNC programming: Concept of Computer Numerical Controlled machines. **Engineering Mechanisms and their application in Domestic Appliances**: Introduction to Basic mechanisms and equipment: Pumps, blowers, compressors, springs, gears, Belt-Pulley, Chain-Sprocket, valves, levers with its applications in day to day life. Introduction to terms: Specifications, Input, output, efficiency, etc. Applications of: Compressors - Refrigerator, Water cooler, Split AC unit; Pumps - Water pump for overhead tanks, Water filter/Purifier units; Blower - Vacuum cleaner, Kitchen Chimney; Motor - Fans, Exhaust fans, Washing machines.	8
Unit VIntroduction of energy sources & its conversion **Energy sources**: Conventional and Renewable Energy sources, Thermal energy, Power plant,Hydropower energy, Nuclear energy, Solar energy, Geothermal energy, Wind energy, Hydrogen energy, Biomass energy and Tidal energy. **Energy conversion devices**: Introduction of pump, compressor, turbines, wind mills, photovoltaic cells, Two stroke and Four stroke engines (Petrol, Diesel and CNG engines). Steam generators.	8
Unit VI: **Vehicles and their Specifications**: Classification of automobile. Vehicle specifications of two/three wheeler, light motor vehicles, trucks, buses and multi-axle vehicles. Engine components (Introduction). Study of engine specifications, comparison of specifications of vehicles. Cost analysis of the Vehicle. **Vehicle systems:** Introduction of chassis layouts, steering system, suspension system, braking system, cooling system and fuel injection system and fuel supply system. Study of power transmission system, clutch, gear box,propeller shaft, universal joint, differential gearbox and axles. Vehicle active and passive safety arrangements: seat, seat belts, airbags and antilock brake system. Study of Electric and Hybrid Vehicle systems.	8
Total no of hours	48

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(ORGANISATION OF COURSE)**Only for Basic Civil Engineering**		
	Module [No. of Lectures Within brackets]	**Tutorials/Activity**
1	Basic Understanding (1)	Develop a matrix of various disciplines and possible roles for engineers in each
2	History of Civil engineering (1)	Identify 10 ancient monuments and ten modern marvels and list the uniqueness of each
3	Overview of National planning for Construction and Infrastructure Development (1)	Develop a Strategic Plan for Civil Engineering works for next ten years based on past investments and identify one typical on-going mega project in each area
4	Architecture & Town Planning (1)	Identify ten best civil engineering projects with high aesthetic appeal with one possible factor for each; List down the possible systems required for a typical Smart City
5	Building Materials (1)	Identify three top new materials and their potential in Construction
6	Construction Management, Contracts management (1)	Identify 5 typical construction methods and list their advantages/ positive features
7	Environmental Engineering (1)	Write a report on Water Treatment plant and Waste water treatment plant.
8	Geotechnical Engineering (1)	List top five tunnel projects in India and their features; collect and study geotechnical investigation report of any one.
9	Hydraulics, Hydrology &Water Resources Engineering (1)	Identify three river interlinking projects and their Features.
10	Ocean Engineering, Ports & Harbours (1)	Identify 5 typical ports in India and list the structures available in them; Case study report of any one.
11	Power Plant Structures (1)	Collect the typical layout for a large thermal power plant.
12	Structural Engineering (3)	Identify 5 unique features for typical buildings, bridges, tall structures and large span structures; and make a report.
13	Surveying &Geomatics (1)	Identify five location by using Google Earth Map and study.
14	Traffic & transportation (1)	Enlist the NH,SH and their linking and make a report
15	Repairs & rehabilitation of Structures (1)	Identify the major rehabilitation project and make case study report
16	Computational Methods, IT, IoT in Civil Engineering (2)	Visit an AutoCad lab and prepare a report; Identify ten interesting software systems used in Civil Engg and their key
17	Basics of Professionalism (3)	List 5 cases of violation of professional ethics and list preventive measures; Identify 5 interesting projects and their positive features; Write 400 word reports on one ancient monument and a modern marvel of civil engineering
	Total 22 lectures	**In 11 Tutorials or any 17 Activity expected**

References:

Text Books Recommended:

1. Patil, B.S.(1974), Legal Aspects of Building and EngineeringContract
2. MeenaRao (2006), Fundamental concepts in Law of Contract, 3rd Edn.Professional Offset
3. Chaudhari and Hajra, "Elements of Workshop Technology", Volume I and II, Media Promoters and Publishers, Mumbai
4. Rai ,G.D.,(1999), Nonconventional Energy Sources" Khanna Publisher.
5. Rajput, R.K., (2007), "Basic Mechanical Engineering", Laxmi Publications Pvt. Ltd.
6. Ganeshan, V., (2018), "Internal Combustion Engines", McGraw Hill
7. Agrawal,Basant and Agrawal, C. M., (2008), "Basics of Mechanical Engineering", John

Wiley and Sons, USA

Reference Books Recommended:

1. Pravin Kumar, (2018), " Basic Mechanical Engineering, 2nd Ed.", Pearson (India) Ltd
2. Groover,Mikell P., (1996), "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", Prentice Hall, USA
3. Khurmi, R.S. ,and Gupta, J. K.,"A Textbook of Thermal Engineering", S. Chand & Sons
4. The National Building Code, BIS,(2017)
5. RERA Act,(2017)
6. Chandiramani, Neelima (2000), The Law of Contract: An Outline, 2nd Edn.Avinash PublicationsMumbai
7. Avtarsingh (2002), Law of Contract, Eastern Book Co.
8. Dutt (1994), Indian Contract Act, Eastern LawHouse
9. Anson W.R.(1979), Law of Contract, Oxford UniversityPress
10. Kwatra G.K.(2005), The Arbitration & Conciliation of Law in India with case lawon UNCITRAL Model Law on Arbitration, Indian Council ofArbitration
11. Avtarsingh (2005), Law of Arbitration and Conciliation, Eastern BookCo.
12. Wadhera (2004), Intellectual Property Rights, Universal Law PublishingCo.
13. P. S. Narayan (2000), Intellectual Property Rights, Gogia LawAgency
14. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia LawHouse
15. Bare text (2005), Right to Information Act
16. O.P. Malhotra, Law of Industrial Disputes, N.M. TripathiPublishers
17. K.M. Desai(1946), The Industrial Employment (Standing Orders)Act
18. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia PublishingHouse
19. Vee, Charles &Skitmore, Martin (2003) Professional Ethics in the Construction Industry, Engineering Construction and Architectural management, Vol.10, Iss. 2,pp 117-127, MCB UPLtd
20. American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study andApplication
21. Ethics in Engineering- M.W.Martin&R.Schinzinger,McGraw-Hill
22. Engineering Ethics, National Institute for Engineering Ethics,USA
23. www.ieindia.org
24. Engineering ethics: concepts and cases – C. E. Harris, M.S. Pritchard,M.J.Rabins
25. Resisting Bureaucratic Corruption: Alacrity Housing Chennai (Teaching CaseStudy)
26. -S. Ramakrishna Velamuri -CEIBS
27. CONSTRUCTION CONTRACTS,http://www.jnormanstark.com/contract.htm
28. Internet and Business Handbook, Chap 4, CONTRACTSLAW, http://www.laderapress.com/laderapress/contractslaw1.html
29. Contract&Agreements , http://www.tco.ac.ir/law/English/agreements/General/Contract%20Law/C.htm
30. Contracts,http://206.127.69.152/jgretch/crj/211/ch7.ppt
31. Business & Personal Law. Chapter 7. "How ContractsArise", http://yucaipahigh.com/schristensen/lawweb/lawch7.ppt
32. Types of Contracts,http://cmsu2.cmsu.edu/public/classes/rahm/meiners.con.ppt
33. IV. TYPES OF CONTRACTS AND IMPORTANTPROVISIONS, http://www.worldbank.org/html/opr/consult/guidetxt/types.html
34. Contract Types/Pricing Arrangements Guideline- 1.4.G(11/04/02), http://www.sandia.gov/policy/14g.pd

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