MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF CIVIL ENGINEERING

Minutes of Board of Studies Meeting held on 06th October, 2018

The meeting of Board of Studies of the Civil Engineering department was held on Saturday, 06th October, 2018 in the head office of the department. Following members were present:

1. Dr. N. K. Samadhiya — (Subject Expert from outside parent university)
   Professor, Civil Engg. Deptt., IIT Roorkee
2. Dr. R. D. Gupta — (Subject Expert from outside parent university)
   Professor & Head, Civil Engg. Deptt., MNNIT Allahabad
3. Dr. S. K. Saran — (Representative from Industry/corporate/allied area)
   Principal Scientist, CBRI, Roorkee
4. Er. Pradeep Agrawal — (Alumunus of the department)
   CEO, IDSE, New Delhi.
5. Er. Rajendra Chalisgaonkar — (Special Invitee)
6. Prof. (Mrs.) Archana Tiwari — (Chairperson & Head of the department)
7. Dr. S. K. Jain — (Member, BOS)
8. Dr. M. K. Trivedi — (Member, BOS)
9. Dr. R. Kansal — (Member, BOS)
10. Dr. S. Tiwari — (Member, BOS)
11. Prof. D. Rastogi — (Member, BOS)
12. Prof. A. K. Dwivedi — (Member, BOS)
13. Prof. A. K. Saxena — (Member, BOS)
14. Prof. G. Bhadoriya — (Member, BOS)
15. Prof. Aditya K. Agarwal — (Member, BOS)

Following agendas were discussed & deliberated upon

Item No. / CE - 1	**To frame the COs for all core courses from V Semester to VIII Semester to be offered under the Flexible Curriculum based on the present needs of stakeholders and society** The COs for various core courses from V semester to VIII semester which will be offered by the department under flexible curriculum were framed & discussed in the meeting. The external members gave their valuable inputs regarding framing of COs. The COs for these courses are attached in Annexure – I.
Item No. / CE - 2	**To propose the list of Departmental Electives to be offered, under the Flexible Curriculum, semester wise keeping in view the latest developments and trends/thrust areas** The list of departmental electives to be offered under the flexible curriculum was prepared by identifying 6 specialization tracks of Civil Engg. viz. Structures, Water Resource Engg., Geotechnical Engg. Environmental Engg., Transportation Engg., Construction Management & Technology. The courses running under Swayam platform in these 6 tracks were also identified & were subsequently discussed in the meeting. The final list is attached in Annexure – II & the same list is also incorporated in the flexible curriculum scheme too.

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Item No./ CE - 3	**To propose a list of Open Elective Courses (Lab/theory courses for all branches) to be offered which have inter-departmental interest and relevance** The list of open electives courses along with their pre-requisite to be offered under the flexible curriculum was prepared by identifying courses of inter-departmental interest and relevance. The courses running under Swayam platform were also identified & were subsequently discussed in the meeting. The final list is attached in Annexure – III & the same list is incorporated in the flexible curriculum scheme too.
Item No. / CE - 4	**To analyse question papers for Academic Year 2017-18 on the basis of COs and other parameters, separately** Analysis of mid sem & end sem question papers for academic year 2017-18 were carried out on the basis of difficulty level/ numerical/ theoretical questions & on the basis of COs/ LOTs & HOTs separately. The compiled report was discussed in the meeting. The compiled question paper analysis report is attached in Annexure – IV.
Item No. / CE - 5	**To critically review the COs and their attainments for all courses beginning with the Academic Year (2014-15) to (2018-19).** First round of review of COs was done during in house OBE workshop of the department held on 29th September, 2018 & based upon question paper analysis for academic year 2017-18, during the meeting it was decided to make few logical changes in all COs of most of the courses. The revised COs were discussed in the BOS meeting & incorporated in all the three schemes (2014 batch, 2015-16 batch, 2017-18 batch). CO attainment calculations for all the courses were done based upon mathematical model developed by the institute which is followed uniformly by all the departments. The members were apprised about the process of CO attainment calculations by the OBE coordinators and based upon this further discussions were held. The compiled report of CO attainment calculations for all the courses beginning from academic year 2014-15 to 2018-19 batch is attached in Annexure – V.
Item No. / CE - 6	**To Identify gaps in CO attainment levels for Academic Year 2017-18 and propose corrective measures for improvement** The target for CO attainment level for all the courses was fixed at 60% for the academic year 2017-18. The gap analysis in CO attainment level for all the courses was carried on the basis of set target and the report of the same is attached in Annexure – VI. On the basis of this analysis it is observed that in most of the courses the CO attainment level was found to be above 60%, however in few courses some of the COs attainment level was less than 60%. Based upon the detailed analysis of end sem, mid sem question papers & CO attainment calculations following gaps have been identified: 1. Some of COs were not at all mapped with the question paper content in the mid sem exam for most of the courses. 2. Less number of questions were asked pertaining to certain COs in some of courses in the mid sem & end sem exams. 3. Students have not understood properly the concept of giving the feedback of COs. Following corrective measures for improvement in CO attainment have been proposed: 1. More weightage should be put in the CO attainment calculation mathematical model for those COs which are mapped more in question paper as compared to

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	other COs. 2. The mathematical model for CO attainment calculation needs to be improved viz. made more dynamic to incorporate the first suggestion. 3. Students need to be educated more about the COs, their significance in today's education so that they are more serious towards it. 4. Various other indirect methods may be devised for taking feedbacks.
Item No. / CE - 7	**To set attainment targets for all COs for courses being offered in the Academic Year 2018-19)** Based upon the analysis of CO attainment for the academic year 2017-18, the target for CO attainment for all the courses being offered during the academic year 2018-19 have been worked out & discussed in the meeting. The compiled list of the same is attached in Annexure – VII.
Item No. / CE - 8	**To propose "Equivalence of Subjects" for all courses running in the various schemes** The equivalency of subjects for all the courses running in various schemes were prepared and discussed in the meeting. The list of the same is attached in Annexure – VIII.
Item No. / CE - 9	**To review and submit complete syllabi and scheme separately for the 3 schemes which are running presently** ➢ *Batch 2014-18 (Codes beginning with CEL/MEL/EEL/ELL/CSL...etc* ➢ *Batches 2015-19 & 2016-2020 (Codes beginning with BCEL /BMEL /BEEL /BELL /BCSL...etc* ➢ *Batch 2017-2021 & Batch 2018-2022 (Six digit codes; upto IV semester only)* The syllabi & scheme for three batches have been compiled separately and attached in Annexure – IX, X & XI. The same has been uploaded on the department page of institute website.
Item No. / CE - 10	**Other matters:** **1. Value Added Courses developed by the department** The department has developed two value added courses in this academic session 1. Industrial Wastewater Treatment 2. Basic Concepts of Structural Analysis. The contents of these courses were discussed in detail and points of improvements in these courses are as follows: a. Basic Concepts of Structural Analysis course need to be scraped as it is a basic course, instead of this course Pre-engineered Building & Pre-fabricated Structure should be added as value added course and accordingly its contents should be developed. **2. Possibilities of Industrial Collaboration:** It was decided that possibilities of industrial collaboration will be done by opening student chapters such as Defence Infrastructure Planning & Management Council of India and other such technical bodies. **3. Possibilities of Students Internships:** It was decided in the meeting to approach Alumni working in various industries for getting internship for the students. **4. Faculty training in Industry:** It was decided in the meeting that faculty should be encouraged to interact with Industry for meaningful collaboration.

In addition to above agenda's, following valuable suggestions were proposed by the experts during the meeting:

1. Number of departmental core courses in flexible scheme need to be increased from 14 to 18, as it is not fulfilling the present needs of Civil Engg., some of the core courses like Foundation Engg., Steel Design, Irrigation Engg. & Concrete Technology is missing and should be included.

2. In view of point 1, it is decided to modify the syllabus of Geotechnical Engg. to include the basics of Foundation Engg. The modified syllabus was framed & incorporated in the flexible curriculum scheme.

3. The syllabus of mandatory course of Disaster Management should be made with relevance to the specific departments.

4. The mandatory course of Intellectual Property Rights has no relevance for Civil Engg. Undergraduate students.

5. The syllabus of Transportation Engg. should include Highway & Railway Engg.

6. The syllabus of Estimating, Costing & Contracting should include basic knowledge of Contracts.

7. The Credit distribution & syllabus of Surveying needs modification.

8. The Syllabus of Software Lab should include project management etc.

The meeting ended with vote of thanks to the chair.

(Prof. Aditya K. Agarwal) Member, B.O.S.	(Prof. G. Bhadoriya) Member, B.O.S.	(Prof. A. K. Saxena) Member, B.O.S.
(Prof. A. K. Dwivedi) Member, B.O.S.	(Prof. D. Rastogi) Member, B.O.S.	(Dr. S. Tiwari) Member, B.O.S.
(Dr. R. Kansal) Member, B.O.S.	(Dr. M. K. Trivedi) Member, B.O.S.	(Dr. S. K. Jain) Member, B.O.S.
Present (Er. Rajendra Chalisgaonkar) Special Invitee	Present (Er. Pradeep Agrawal) Alumunus	Present (Dr. S. K. Saran) Industry Representative
Present (Dr. R. D. Gupta) Outside Subject Expert	Present (Dr. N. K. Samadhiya) Outside Subject Expert	(Prof. (Mrs.) A. Tiwari) Head of Department & Chairperson, B.O.S.

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DEPARTMENT OF CIVIL ENGINEERING

ANNEXURE – I

COURSE OUTCOMES OF CORE COURSES FROM Vth – VIIIth SEMESTER UNDER FLEXIBLE SCHEME

Course Code: 110501

Course Name: Estimating, Costing & Contracting

Upon completion of the course, the students will be able to:

CO1: Explain the fundamentals of quantity estimation, costing & contracting.

CO2: Illustrate methods to estimate area, volume & cost.

CO3: Evaluate mathematical & numerical models for rate & quantity estimation.

CO4: Measure rates & value.

CO5: Classify different rates of items, contracts & measurement techniques.

Course Code: 110502

Course Name: Structural Design & Drawing (R.C.C.)

Upon completion of the course, the students will be able to:

CO1: Compare various design principles as applicable for design of RCC structures.

CO2: Apply the concepts of working stress method & limit state method on RCC structures.

CO3: Apply recommendations of SP 34 for detailing

CO4: Analyse a given section of RCC structural elements using limit state method.

CO5: Design different elements of RCC structures like beam, slab, column, footing, staircase using IS codes.

05

Course Code: 110503

Course Name: Fluid Mechanics – II

Upon completion of the course, the students will be able to:

CO1: **Differentiate** different types of fluid flow & fluid machinery.

CO2: **Describe** principles of analysis of fluid flow problem.

CO3: **Explain** basic principles for measurement of different forces acting on fluid body.

CO4: **Analyse** pipe flow, open channel flow problems & various characteristics of hydraulic machines.

CO5: **Design** open & closed conduit systems.

Course Code: 110503 (P)

Course Name: Fluid Mechanics – II

Upon completion of the course, the students will be able to:

CO1: **Differentiate** between turbines & pumps.

CO2: **Select** the efficient turbines by studying the performance characteristics of various turbines.

CO3: **Distinguish** the performance characteristics of various pumps.

Course Code: 110504

Course Name: Environmental Engineering – I

Upon completion of the course, the students will be able to:

CO1: **Explain** the concepts of water supply engineering.

CO2: **Determine** the requirements for safe supply of water.

CO3: **Apply** suitable water treatment technique based upon the available data.

CO4: **Analyse** a given water supply scheme.

CO5: **Design** a water supply system based upon the needs of society.

06

Course Code: 110504 (P)

Course Name: Environmental Engineering – I

Upon completion of the course, the students will be able to:

CO1: **Follow** sampling procedure & other guidelines for sampling & analysis of water samples.

CO2: **Check** various water quality parameters.

CO3: **Improve** the water quality by suggesting suitable corrective measures.

CO4: **Train** others on various ways of improving the quality of water.

Course Code: 110505

Course Name: Transportation Engineering

Upon completion of the course, the students will be able to:

CO1: **Explain** the principles of highway & airport planning & their geometrical design.

CO2: **Evaluate** physical properties of suitable highway engineering materials with drainage provisions.

CO3: **Apply** the concepts of traffic engineering in transportation planning.

CO4: **Design** pavements, runway & taxiway system as per regulations.

CO5: **Construct** the layers of pavement along with provisions of its drainage & maintenance.

Course Code: 110505 (P)

Course Name: Transportation Engineering

Upon completion of the course, the students will be able to:

CO1: **Select** suitable aggregate material by testing the physical properties.

CO2: **Determine** properties of bitumen and its grade.

CO3: **Determine** CBR value of material for subgrade and subsequent layers of pavement.

CO4: **Design** job mix formula for bituminous surface using Marshal Stability test.

07

Course Code: 110506

Course Name: Minor Project – I

Upon completion of the course, the students will be able to:

CO1: Recognize various engineering problems and techniques to solve them.

CO2: Develop the solution of the problems upon the need of society.

CO3: Cooperate to work within group.

CO4: Develop the writing and communication skills for various engineering problems.

CO5: Display lifelong learning.

Course Code: 110507

Course Name: Summer Internship Project - II

Upon completion of the course, the students will be able to:

CO1: Observe various activities of civil construction works.

CO2: Examine the utility of general and specific equipments for construction.

CO3: Differentiate the construction projects individually and in team.

CO4: Develop the writing and communication skills for various engineering problems.

CO5: Adapt lifelong learning for benefit of society.

Course Code: 110508

Course Name: Self Learning / Presentation

Upon completion of the course, the students will be able to:

CO1: Identify contemporary issues in civil engineering & its allied areas through literature survey.

CO2: Distinguish state of art & relevance of the topic in national & international arena.

CO3: Demonstrate good oral & written communication skills.

CO4: Develop poster and power point presentations for effective communication.

CO5: Display lifelong learning.

08

Course Code: 110602

Course Name: Environmental Engineering – II

Upon completion of the course, the students will be able to:

CO1: Explain the concepts of waste water engineering.

CO2: Determine the requirements for safe disposal of sewage.

CO3: Apply suitable techniques for sewage treatment & disposal based upon the available data.

CO4: Analyse a given sewerage system.

CO5: Design sewage system for safe disposal of sewage.

Course Code: 110602 (P)

Course Name: Environmental Engineering – II

Upon completion of the course, the students will be able to:

CO1: Follow sampling procedure & other guidelines for sampling & analysis of sewage samples.

CO2: Check various sewage quality parameters.

CO3: Improve the quality of sewage by suggesting suitable corrective measures.

Course Code: 110607

Course Name: Minor Project – II

Upon completion of the course, the students will be able to:

CO1: Recognize various engineering problems and techniques to solve them.

CO2: Reproduce the solution of the problems upon the need of society.

CO3: Cooperate to work within group.

CO4: Develop the writing and communication skills for various engineering problems.

CO5: Display lifelong learning.

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ANNEXURE – II

SUGGESTIVE LIST OF DEPARTMENTAL ELECTIVE COURSES TO BE OFFERED BY CIVIL ENGINEERING DEPARTMENT

SEMESTER - VI		SEMESTER - VII		SEMESTER - VIII
DE – 1	**DE – 2**	**DE – 3**	**DE – 4**	**DE – 5**
1. Structural Design & Drawing (Steel) – Y	1. Irrigation Engineering - N	1. Concrete Technology - Y	1. Advanced Structural Analysis - Y	1. Advanced Structural Design (RCC) - N
2. Airport, Bridge & Tunnel Engineering – N	2. Composite Materials - Y	2. Advanced Structural Design (Steel) - N	2. Earthquake Engineering – N	2. Prestressed Concrete - Y
3. Repair & Rehabilitation of Structures – N	3. Ground Improvement Techniques - Y	3. Principles of Construction Management - Y	3. Infrastructure Project Management - Y	3. Hydraulic Structures - N
4. Solid Waste Management - N	4. Environmental Air Pollution - Y	4. Integrated Waste Management for Smart Cities - Y	4. Foundation Engineering - Y	4. Industrial Waste Treatment – N
5. Engineering Geology – Y	5. Traffic Engineering & Management - Y	5. Urban Transportation Planning – Y	5. Environmental Impact Assessment & Ethics – Y/N	5. Project Planning, Scheduling & Control – Y/N
6. Ground Water Engineering – Y	6. Energy Efficiency, Acoustics & Day lighting in Building – Y	6. Advanced Surveying – N	6. Watershed Management – Y	6. Advanced Hydrology – Y

Y – Available on NPTEL / SWAYAM
N – Not Available on NPTEL / SWAYAM
Y/N – Partially Available on NPTEL / SWAYAM

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ANNEXURE – III

SUGGESTIVE LIST OF OPEN CATEGORY COURSES OFFERED BY CIVIL ENGINEERING DEPARTMENT

SEMESTER - VI	SEMESTER - VII		SEMESTER - VIII	
OC – 1	**OC – 2**	**OC – 3**	**OC – 4**	**OC – 5**
1. Remote Sensing & GIS - N **Prerequisites-** Basic Knowledge of Computer.	1. Quantitative Methods in Engineering Problems – Y **Prerequisites-** Basic Knowledge of Mathematics	1. Sustainable Engineering Concept & Life Cycle Analysis – Y **Prerequisites-** Basic Knowledge of Maintenance & Operation	1. Project Management – Y **Prerequisites-** Basic Knowledge of Management Science	1. Principles & Application of Building Science – Y **Prerequisites-** Basic Knowledge of Building Services
2. Air & Noise Pollution – N **Prerequisites-** Basic Knowledge of EEES.	2. Energy Planning & Management – N **Prerequisites-** Basic Knowledge of Energy & Management	2. Integrated Waste Management – Y/N **Prerequisites-** Basic Knowledge of Environment.	2. Environmental Monitoring – Y/N **Prerequisites-** Basic Knowledge of Environment.	2. Advanced Financial Management – N **Prerequisites-** Basic Knowledge of Financial Management

Y – Available on NPTEL / SWAYAM
N – Not Available on NPTEL / SWAYAM
Y/N – Partially Available on NPTEL / SWAYAM

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Department of Civil Engineering

ANNEXURE – IV

Analysis of Q. Paper on basis of difficulty level
(Mid Semester Examination I, November – December 2017)

S. No	Subject Name	Subject Code	Syllabus Coverage	% of Theoretical Question asked	% of Numerical Question asked	Difficulty Level paper	Time Requirement to solve the paper	Remark
1.	Basic Civil Engineering & Mechanics	100205	40%	80%	20%	Average	Sufficient	Descriptive & Application
2.	Surveying - II	BCEL -302	40%	50%	50%	Average	Sufficient	Descriptive & Application
3	Transportation Engineering - I	BCEL -303	45%	60%	40%	Average	Sufficient	Descriptive & Application
4.	Concrete Technology	BCEL -304	40%	100%	Nil	Moderate	Sufficient	Conceptual
5.	Building Design Drawing & Town Planning	BCEL -305	40%	100%	Nil	Average	Sufficient	Descriptive & Application
6.	Construction Planning & Management	BCEL-501	40%	80%	20%	Moderate	Sufficient	Descriptive & Application
7.	Water Resources Engineering - I	BCEL- 503	50%	60%	40%	Moderate	Sufficient	Descriptive & Application
8.	Fluid Mechanics - I	BCEL -504	40%	30%	70%	Moderate	Sufficient	Analytical & Application
9.	S.D.D. – I (RCC)	BCEL -505	30%	48%	52%	Normal	Sufficient	
10.	Theory of Structure – I	BCEL -506	40%	Nil	100%	Moderate	Sufficient	
11.	Construction Planning & Management	CEL 701	45%	60%	40%	Moderate	Sufficient	Descriptive & Application
12.	Environmental Engineering - I	CEL 702	40%	50%	50%	Moderate	Enough	Conceptual & Balanced
13.	Geotechnical Engineering - I	CEL 703	50%	50%	50%	Moderate	Sufficient	Descriptive & Application
14.	A.S.D. – I (RCC)	CEL 704	25%	33%	67%	Normal	Sufficient	
15.	Industrial Waste Management	CEL 705	40%	100%	Nil	Moderate	Adequate	Theoretical
16.	Management Theory	510101	50%	100%	Nil	Moderate	Sufficient	Descriptive
17.	Materials & Equipments	51/52/530102	40%	80%	20%	Moderate	Sufficient	Descriptive & Application
18.	Quantitative Methods	51/52/530103	40%	20%	80%	Moderate	Sufficient	Analytical
19.	Contract Management	510104	40%	90%	10%	Average	Sufficient	Descriptive & Application

20.	Functional Planning Building & Services	51/52/53010 5	45%	100%	Nil	Moderate	Sufficient	Descriptive
21	Advanced Structural Analysis	520101	20%	15%	85%	Normal	Sufficient	
22	Advanced RCC Design	520104	40%	17%	83%	Normal	Adequate	Design Paper
23	Environmental Chemistry & Microbiology	530101	40%	100%	Nil	Average	Adequate	Conceptual & Descriptive
24	Solid Waste management	530104	40%	100%	Nil	Moderate	Sufficient	Conceptual & Descriptive
25	Infrastructure Project Management	MCTL / MSTL 931	45%	100%	Nil	Moderate	Sufficient	Descriptive
26.	Urban Hydrology & Waste Management	MCTL / MENL 932	40%	85%	15%	Average	Sufficient	Descriptive
27.	Finite Element Method	MSTL 932	40%	NIL	100%	Normal	Sufficient	
28	Principle of Biological Treatment & Design	MENL 931	40%	100%	Nil	Moderate	Sufficient	Conceptual & Descriptive

Analysis of Q. Paper on basis of difficulty level
(Mid Semester Examination II, November – December 2017)

S. No	Subject Name	Subject Code	Syllabus Coverage	% of Theoretical Question asked	% of Numerical Question asked	Difficulty Level paper	Time Requirement to solve the paper	Remark
1	Basic Civil Engineering & Mechanics	100205	80%	70%	30%	Normal	Sufficient	Descriptive & Conceptual
2.	Surveying - II	BCEL -302	80%	50%	50%	Average	Sufficient	Descriptive
3	Transportation Engineering - I	BCEL -303	85%	60%	40%	Average	Sufficient	Descriptive & Application
4.	Concrete Technology	BCEL -304	90%	100%	Nil	Average	Sufficient	Conceptual & Descriptive
5.	Building Design Drawing & Town Planning	BCEL -305	85%	70%	30%	Normal	Sufficient	Descriptive & Application
6.	Construction Planning & Management	BCEL-501	80%	50%	50%	Average	Sufficient	Descriptive & Application
7.	Water Resources Engineering – I	BCEL- 503	90%	50%	50%	Average	Sufficient	Descriptive & Application
8	Fluid Mechanics - I	BCEL -504	80%	10%	90%	Average	Sufficient	Analytical & Application
9.	S.D.D. – I (RCC)	BCEL -505	30%	NIL	100%	Normal	Adequate	Design
10.	Theory of Structure – I	BCEL -506	60%	40%	60%	Moderate	Sufficient	
11	Construction Planning & Management	CEL 701	80%	90%	10%	Moderate	Sufficient	Descriptive & Application
12.	Environmental Engineering - I	CEL 702	85%	50%	50%	Moderate	Enough	Conceptual & Descriptive
13.	Geotechnical Engineering - I	CEL 703	80%	40%	60%	Moderate	Sufficient	Descriptive & Application
14.	A.S.D. – I (RCC)	CEL 704	50%	30%	70%	Normal	Adequate	Design
15.	Industrial Waste Management	CEL 705	90%	100%	Nil	Average	Sufficient	Descriptive
16.	Management Theory	510101	90%	100%	Nil	Normal	Sufficient	Descriptive

17.	Materials & Equipments	51/52/530102	85%	100%	Nil	Normal	Sufficient	Descriptive
18.	Quantitative Methods	51/52/530103	75%	30%	70%	Moderate	Sufficient	Analytical
19.	Contract Management	510104	80%	100%	Nil	Moderate	Sufficient	Descriptive & Application
20.	Functional Planning Building & Services	51/52/530105	90%	100%	Nil	Moderate	Sufficient	Descriptive
21.	Advanced Structural Analysis	520101	50%	29%	71%	Normal	Adequate	
22.	Advanced RCC Design	520104	40%	Nil	100%	Normal	Adequate	Design
23.	Environmental Chemistry & Microbiology	530101	90%	80%	20%	Average	Adequate	Conceptual & Descriptive
24.	Solid Waste management	530104	90%	100%	Nil	Average	Enough	Conceptual & Descriptive
25.	Infrastructure Project Management	MCTL / MSTL 931	75%	100%	Nil	Normal	Sufficient	Descriptive
26.	Urban Hydrology & Waste Management	MCTL / MENL 932	85%	80%	20%	Moderate	Enough	Conceptual & Descriptive
27.	Finite Element Method	MSTL 932	60%	Nil	100%	Normal	Adequate	
28.	Principle of Biological Treatment & Design	MENL 931	80%	100%	Nil	Moderate	Sufficient	Descriptive

Analysis of Q. Paper on basis of difficulty level
(End Semester Examination, November – December 2017)

S. No	Subject Name	Subject Code	Syllabus Coverage	% of Theoretical Question asked			% of Numerical Question asked			Difficulty Level paper	Time Requirement to solve the paper	Remark
				2 mark	3 mark	7 mark	2 mark	3 mark	7 mark			
1	Basic Civil Engineering & Mechanics	100205	100%	100%	100%	50%	NIL	NIL	50%	Average	Sufficient	Conceptual
2.	Surveying - II	BCEL -302	100%	100%	80%	50%	NIL	20%	50%	Moderate	Sufficient	Conceptual & Application
3.	Transportation Engineering - I	BCEL -303	100%	100%	100%	80%	NIL	NIL	20%	Moderate	Sufficient	Descriptive & application
4.	Concrete Technology	BCEL -304	100%	100%	100%	80%	Nil	NIL	20%	Moderate	Enough	Descriptive & Conceptual
5.	Building Design Drawing & Town Planning	BCEL -305	100%	100%	100%	NIL	NIL	NIL	100 %	Average	Sufficient	Application
6.	Construction Planning & Management	BCEL-501	100%	90%	100%	40%	10%	NIL	60%	Moderate	Sufficient	Descriptive & application
7.	Water Resources Engineering – I	BCEL- 503	100%	90%	100%	30%	10%	NIL	70%	Tough	Sufficient	Conceptual & Application
8.	Fluid Mechanics - I	BCEL -504	100%	100%	100%	30%	NIL	NIL	70%	Average	Sufficient	Conceptual & Application
9.	S.D.D. – I (RCC)	BCEL -505	100%	16%			84%			Normal	Adequate	Design paper
10	Theory of Structure – I	BCEL -506	100%	17%	09%	NIL	02%	06%	66%	Normal	Adequate	Conceptual & analytical
11.	Construction Planning &	CEL 701	100%	100%	100%	90%	NIL	NIL	10%	Average	Sufficient	Descriptive

	Management											
12.	Environmental Engineering - I	CEL 702	100%	90%	100%	85%	10%	NIL	20%	Average	Sufficient	Descriptive & Conceptual
13.	Geotechnical Engineering - I	CEL 703	100%	90%	100%	40%	10%	NIL	60%	Moderate	Sufficient	Descriptive & application
14	A.S.D. – I (RCC)	CEL 704	100%		27%			73%		Normal	Adequate	Design paper
15.	Industrial Waste Management	CEL 705	100%	100%	100%	100%	Nil	Nil	Nil	Average	Enough	Descriptive & application
16.	Management Theory	510101	100%	100%	100%	100%	NIL	NIL	NIL	Average	Sufficient	Descriptive
17	Materials & Equipments	51/52/530102	100%	100%	100%	90%	NIL	NIL	10%	Average	Sufficient	Descriptive
18.	Quantitative Methods	51/52/530103	100%	50%	30%	NIL	50%	70%	100 %	Tough	Sufficient	Application
19.	Contract Management	510104	100%	100%	100%	90%	NIL	NIL	10%	Average	Sufficient	Descriptive & application
20.	Functional Planning Building & Services	51/52/530105	100%	100%	100%	100%	NIL	NIL	NIL	Average	Moderate	Descriptive & application
21.	Advanced Structural Analysis	520101	100%	16%	09%	09%	03%	06%	57%	Normal	Adequate	Conceptual & analytical
22.	Advanced RCC Design	520104	100%		10%			90%		Normal	Adequate	Design paper
23.	Environmental Chemistry & Microbiology	530101	100%	100%	90%	70%	Nil	10%	30%	Moderate	Sufficient	Descriptive & Conceptual
24.	Solid Waste management	530104	100%	100%	100%	100%	Nil	Nil	Nil	Average	Adequate	Descriptive & Conceptual
25.	Infrastructure Project Management	MCTL / MSTL 931	100%	100%	100%	100%	NIL	Nil	NIL	Moderate	Sufficient	Descriptive
26.	Urban Hydrology & Waste Management	MCTL / MENL 932	100%	100%	100%	60%	Nil	Nil	40%	Moderate	Within time	Descriptive & Conceptual
27.	Finite Element Method	MSTL 932	100%	19%	06%	NIL	NIL	09%	66%	Normal	Sufficient	Conceptual & analytical
28.	Principle of Biological Treatment & Design	MENL 931	100%	100%	100%	70%	Nil	Nil	30%	Moderate	Sufficient	Descriptive & Conceptual with sufficient Numerical

Analysis of Q. Paper on basis of difficulty level
(End Semester Examination, April - May 2018)

S.N	Subject Name	Subject Code	Syllabus Coverage	% of Theoretical Question asked	% of Numerical Question asked	Difficulty Level paper	Time Requirement to solve the paper	Remark
	BCEL - 401	Quantity Surveying & Costing	100%	55%	45%	Moderate	Sufficient	
2.	BCEL - 402	Fluid Mechanics - I	100%	50%	50%	Moderate	2 hours 40 min	
3.	BCEL - 403	Environmental Engineering - I	100%	50%	50%	Difficult	Adequate	
4.	BCEL - 404	Building Material & Construction	100%	90%	10%	Easy	Adequate	
5.	BCEL - 405	Strength of Materials	100%	35%	65%	Moderate	Adequate	
6.	BCEL - 601	Principles of Management & Economics	Humanities Department					
7.	BCEL - 602	Elective – II * Solid Waste, Air & Noise Pollution	100%	100%	00%	Moderate	Lengthy	Numerical should be added
8.	BCEL - 604	Geotechnical Engineering – I	100%	50%	50%	Moderate	3 hours	

9	BCEL - 605	Structural Design & Drawing – II (Steel)	100%	20%	80%	Moderate	Adequate	
10	BCEL - 606	Theory of Structures – II	100%	50%	50%	Moderate	Adequate	
11.	CEL - 801	Advance Structural Design II (Steel)	100%	15%	85%	Moderate	Adequate	
12	CEL - 802	Hydraulic Structures	100%	70%	30%	Moderate	3 hours	
13.	CEL - 803	Geotechnical Engineering - II	100%	50%	50%	Moderate	2 hours 45 min	
14	CEL - 804	Elective-II (Building Environment & Services)	100%	70%	30%	Moderate	Adequate	
15.	510201	Construction Techniques	100%	100%	00%	Moderate	Sufficient	
16	510202	Construction Economics & Finance	100%	80%	20%	Moderate	Sufficient	
17.	510203	Construction Cost Management	100%	90%	10%	Moderate	2 hours 30 min	
18	510204	Project Management	100%	100%	00%	Moderate	Sufficient	
19	510205	Project Planning Scheduling and Controls	100%	60%	40%	Moderate	Adequate	
20	520101	Advanced Structural Analysis	100%	40%	60%	Moderate	Adequate	
21	520102	Materials & Equipments	100%	100%	00%	Moderate	2 hours 45 min	
22.	520103	Quantitative Methods	Maths Deptt.					
23.	520104	Advanced R.C. Design	100%	15%	85%	Moderate	Adequate	
24.	520105	Functional Planning Building Services & Maintenance Management	100%	100%	00%	Moderate	Adequate	
25.	530201	Air Pollution and Sound Pollution	100%	100%	00%	Moderate	Adequate	Subject is theoretical
26.	530202	Advanced Treatment Process – I (Water Supply Engg.)	100%	100%	00%	Moderate	Adequate	Numerical should be added
27.	530203	Advanced Treatment Process – II (Sanitary Engg.)	100%	60%	40%	Moderate	Adequate	
28.	530204	Project Management	100%	100%	00%	Moderate	Adequate	
29.	530205	Environmental Impact Assessment & ethics	100%	100%	00%	Moderate	Sufficient	Subject is Theoretical
30.	100205	Basic Civil Engg. & Mech.	100%	40%	60%	Moderate	Sufficient	

Analysis of Q. Paper on basis of difficulty level
(Mid Semester Examination II, Jan – May 2018)

S.No	Subject Name	Subject Code	Syllabus Coverage	% of Theoretical Question asked	% of Numerical Question asked	Difficulty Level paper	Time Requirement to solve the paper	Remark
1	Quantity Surveying & Costing	BCEL - 401	100%	40	60	Medium	Appropriate	
2.	Fluid Mechanics - I	BCEL - 402	100%	30	70	Medium	Adequate	
3.	Environmental Engineering - I	BCEL - 403	100%	100	00	Moderate	Adequate	Numerical Must be Added
4.	Building Material & Construction	BCEL - 404	100%	100	00	Moderate	Adequate	Theoretical subject
5	Strength of Materials	BCEL - 405	100%	00	100	Moderate	Adequate	
6.	Elective – II * Solid Waste, Air & Noise Pollution	BCEL - 602	100%	60	40	Moderate	Sufficient	
7.	Geotechnical Engineering – I	BCEL - 604	100%	40	60	Moderate	Sufficient	
8.	Structural Design & Drawing – II (Steel)	BCEL - 605	100%	00	100	Moderate	Sufficient	
9.	Theory of Structures – II	BCEL - 606	100%	00	100	Moderate	Sufficient	
10.	Advance Structural Design II (Steel)	CEL - 801	100%	00	100	Moderate	Sufficient	
11.	Hydraulic Structures	CEL - 802	100%	80	20	Moderate	Sufficient	
12.	Geotechnical Engineering - II	CEL - 803	100%	50	50	Medium	Sufficient	
13.	Elective-II (Building Environment & Services)	CEL - 804	100%	75	25	Moderate	Sufficient	
14.	Basic Civil Engineering and Mechanics	100205	100%	80	20	Moderate	Adequate	

Analysis of Q. Paper on basis of difficulty level
(Mid Semester Examination I, Jan – May 2018)

S. No	Subject Name	Subject Code	Syllabus Coverage	% of Theoretical Question asked	% of Numerical Question asked	Difficulty Level paper	Time Requirement to solve the paper	Remark
1.	Quantity Surveying & Costing	BCEL - 401	100%	60	40	Moderate	Sufficient	
2.	Fluid Mechanics - I	BCEL - 402	100%	30	70	Average	Adequate	
3.	Environmental Engineering - I	BCEL - 403	100%	75	25	Moderate	Sufficient	
4.	Building Material & Construction	BCEL - 404	100%	100	00	Easy	Adequate	Theoretical subject
5.	Strength of Materials	BCEL - 405	100%	20	80	Moderate	Adequate	
6.	Elective – II * Solid Waste, Air & Noise Pollution	BCEL - 602	100%	75	25	Easy	Sufficient	
7.	Geotechnical Engineering – I	BCEL - 604	100%	50	50	Moderate	Sufficient	
8.	Structural Design & Drawing – II (Steel)	BCEL - 605	100%	25	25	Moderate	Sufficient	
9.	Theory of Structures – II	BCEL - 606	100%	20	80	Moderate	Adequate	
10.	Advance Structural Design II (Steel)	CEL - 801	100%	00	100	Moderate	Sufficient	
11.	Hydraulic Structures	CEL - 802	100%	80	20	Moderate	Sufficient	
12.	Geotechnical Engineering - II	CEL - 803	100%	80	20	Average	Adequate	
13.	Elective-II (Building Environment & Services)	CEL - 804	100%	75	25	Moderate	Sufficient	
14.	Basic Civil Engineering and Mechanics	100205	100%	80	20	Moderate	Adequate	

Analysis of Question Paper on the Basis of CO, LOTS & HOTS
(Mid Semester Examination -I, April - May 2018)

S.No.	Subject Name	Subject Code	LOTS %	HOTS %	CO 1%	CO 2 %	CO 3 %	CO 4 %	CO 5 %	CO 6%
1.	BCEL - 401	Quantity Surveying & Costing	75	25	50	25	25	-	-	-
2.	BCEL – 402	Fluid Mechanics - I	80	20	50	50	-	-	-	-

3	BCEL - 403	Environmental Engineering - I	80	20	40	30	30	-	-	-
4.	BCEL - 404	Building Material & Construction	33.33	66.66	42	0	57.2	-	-	-
5	BCEL - 405	Strength of Materials	10	90	100	-	-	-	-	-
6.	BCEL - 602	Elective – II * Solid Waste, Air & Noise Pollution	60	40	20	20	20	-	20	20
7.	BCEL - 604	Geotechnical Engineering – I	40	60	66	83	-	-	-	-
8.	BCEL - 605	Structural Design & Drawing – II (Steel)	40	60	40	-	60	-	-	-
9.	BCEL - 606	Theory of Structures – II	20	80	-	20	-	-	80	-
10.	CEL - 801	Advance Structural Design II (Steel)	25	75	-	-	-	-	-	100
11.	CEL - 802	Hydraulic Structures								
12.	CEL - 803	Geotechnical Engineering - II	83	17	60	40	-	-	-	-
13.	CEL - 804	Elective-II (Building Environment & Services)	66.66	33.33	72	-	-	28	-	-
14.	100205	Basic Civil Engineering and Mechanics	83.34	16.66	66.66	-	-	-	16.66	16.66

Analysis of Question Paper on the Basis of CO, LOTS & HOTS
(Mid Semester Examination -II, April - May 2018)

S.No.	Subject Name	Subject Code	LOTS %	HOTS %	CO 1%	CO 2 %	CO 3 %	CO 4 %	CO 5 %	CO 6%
1.	BCEL - 401	Quantity Surveying & Costing	90	10	20	30	10	40	-	-
2	BCEL - 402	Fluid Mechanics - I	33.33	66.66	-	-	66.66	33.33	-	-
3.	BCEL - 403	Environmental Engineering - I	85	15	37.5	-	62.5	-	-	-
4.	BCEL - 404	Building Material & Construction	71.42	28.58	28.57	28.57	14.28	-	28.57	-
5.	BCEL - 405	Strength of Materials	40	60	-	-	57	-	43	-
6.	BCEL - 602	Elective – II * Solid Waste, Air & Noise Pollution	85	15	20	20	20	20	20	-
7.	BCEL - 604	Geotechnical Engineering – I	73.33	26.66	-	6	94	-	-	-
8.	BCEL - 605	Structural Design & Drawing – II (Steel)	50	50	16.66	33.33	16.66	16.66	16.66	-

9	BCEL - 606	Theory of Structures – II	10	90	-	-	-	60	40	-
10	CEL - 801	Advance Structural Design II (Steel)	15	85	33 33	-	-	-	-	66.66
11	CEL - 802	Hydraulic Structures	83.33	16.66	100	-	-	-	-	-
12	CEL - 803	Geotechnical Engineering - II	46 62	53 57	-	-	50	50	-	-
13	CEL - 804	Elective-II (Building Environment & Services)	80	20	-	40	52	8	-	-
14	100205	Basic Civil Engineering and Mechanics	75	25	-	-	33 33	33 33	33 33	-

Analysis of Question Paper on the Basis of CO, LOTS & HOTS
(END Semester Examination, April - May 2018)

S.No.	Subject Name	Subject Code	LOTS %	HOTS %	CO 1%	CO 2 %	CO 3 %	CO 4 %	CO 5 %	CO 6%
	BCEL - 401	Quantity Surveying & Costing	70	30	20	10	10	30	10	20
2.	BCEL - 402	Fluid Mechanics - I	51.4	48.6	20	20	20	20	20	-
3.	BCEL - 403	Environmental Engineering - I	91.5	8.5	20	20	20	20	20	-
4.	BCEL - 404	Building Material & Construction	90.5	9.5	17	20	21	-	36	5
5.	BCEL - 405	Strength of Materials	50.5	49.50	20	20	20	20	20	-
6.	BCEL - 602	Elective – II * Solid Waste, Air & Noise Pollution	80	20	20	20	20	20	20	-
7.	BCEL - 604	Geotechnical Engineering – I	48.6	51.4	20	20	20	20	20	-
8.	BCEL - 605	Structural Design & Drawing – II (Steel)	8.5	91.5	10	10	20	20	20	20
9.	BCEL - 606	Theory of Structures – II	58.1	41.9	20	10	10	20	20	20
10.	CEL - 801	Advance Structural Design II (Steel)	20	80	10	10	20	20	20	20
11	CEL - 802	Hydraulic Structures	73.33	26.67	20	20	20	20	20	-
12	CEL - 803	Geotechnical Engineering - II	60	40	16.67	16.67	16.67	16.67	16.67	16.67
13.	CEL - 804	Elective-II (Building Environment & Services)	80	20	20	20	20	20	10	10
14.	100205	Basic Civil Engineering and Mechanics	47.62	52.38	20	-	20	20	20	20

Analysis of Question Paper on the Basis of CO, LOTS & HOTS
(END Semester Examination, NOV - DEC 2017)

S.No.	Subject Name	Subject Code	LOTS %	HOTS %	CO1%	CO2%	CO3%	CO4 %	CO5%	CO6%
1	100205	Basic Civil Engineering & Mechanics	45	55	20	10	10	20	20	20
2.	BCEL -302	Surveying - II	57.14	42.85	20	20	20	20	20	-
3	BCEL -303	Transportation Engineering - I	86.66	13.33	20	20	20	20	20	-
4.	BCEL -304	Concrete Technology	86.66	13.33	20	20	20	20	20	-
5.	BCEL -305	Building Design Drawing & Town Planning	46.66	53.33	20	20	20	20	20	-
6	BCEL-501	Construction Planning & Management	86.66	13.33	16.66	16.66	16.66	16.66	16.66	-
7.	BCEL- 503	Water Resources Engineering - I	73.33	26.66	16.66	16.66	16.66	16.66	16.66	-
8	BCEL -504	Fluid Mechanics - II	77.14	22.85	20	20	20	20	00	10
9.	BCEL -505	S.D.D – I (RCC)	12.85	87.14	20	20	20	20	20	-
10	BCEL -506	Theory of Structure – I	27.61	72.38	20	20	20	20	20	-
11	CEL 701	Construction Planning & Management	93.33	6.66	10	10	20	20	20	20
12.	CEL 702	Environmental Engineering - I	82	18	16.66	16.66	16.66	16.66	16.66	16.66
13.	CEL 703	Geotechnical Engineering - I	80	20	20	20	10	10	20	20
14.	CEL 704	A.S.D. – I (RCC)	30.47	69.52	20	20	20	20	20	-
15.	CEL 705	Industrial Waste Treatment	86.66	13.33	20	20	20	20	20	-

Analysis of Question Paper on the Basis of CO, LOTS & HOTS
(Mid Semester Examination- I, NOV - DEC 2017)

S.N	Subject Name	Subject Code	LOTS %	HOTS %	CO1%	CO2%	CO3%	CO4 %	CO5%	CO6%
1.	100205	Basic Civil Engineering & Mechanics	81	19	66.66	-	-	-	16.66	16.66
2.	BCEL -302	Surveying - II	66.67	33.33	100	-	-	-	-	-
3.	BCEL -303	Transportation Engineering - I	60	40	100	-	-	-	-	-
4	BCEL -304	Concrete Technology	90	10	100	-	-	-	-	-
5.	BCEL -305	Building Design Drawing & Town Planning	95	05	50	50	-	-	-	-
6.	BCEL-501	Construction Planning & Management	80	20	33.33	33.33	33.33	-	-	-

7.	BCEL- 503	Water Resources Engineering - I	75	25	45	15	40	-	-	-
8.	BCEL -504	Fluid Mechanics - II	67.5	32.5	-	-	50	50	-	-
9.	BCEL -505	S.D.D. – I (RCC)	83.33	16.67	60	40	-	-	-	-
10.	BCEL -506	Theory of Structure – I	30	70	66.66	33.33	-	-	-	-
11.	CEL 701	Construction Planning & Management	70	30	50	50	-	-	-	-
12.	CEL 702	Environmental Engineering - I	60	40	30	70	-	-	-	-
13.	CEL 703	Geotechnical Engineering - I	60	40	83.33	16.67	-	-	-	-
14.	CEL 704	A.S.D. – I (RCC)	20	80	50	-	-	-	50	-
15.	CEL 705	Industrial Waste Treatment	86	14	-	50	50	-	-	-

Analysis of Question Paper on the Basis of CO, LOTS & HOTS
(Mid Semester Examination- II, NOV - DEC 2017)

S.N	Subject Name	Subject Code	LOTS %	HOTS %	CO 1%	CO 2 %	CO 3 %	CO 4 %	CO 5 %	CO 6%
1	100205	Basic Civil Engineering & Mechanics	62	38	-	-	33	27	40	-
2.	BCEL -302	Surveying - II	57.25	42.85	-	50	20	30	-	-
3.	BCEL -303	Transportation Engineering - I	72	28	-	33.33	33.33	33.33	-	-
4.	BCEL -304	Concrete Technology	93.33	6.66	30	30	40	-	-	-
5.	BCEL -305	Building Design Drawing & Town Planning	82.15	17.85	20	20	60	-	-	-
6.	BCEL-501	Construction Planning & Management	75	25	50	50	-	-	-	-
7.	BCEL- 503	Water Resources Engineering - I	45	55	-	-	-	80	20	-
8.	BCEL -504	Fluid Mechanics - II	20	80	30	20	50	-	-	-
9.	BCEL -505	S.D.D. – I (RCC)	10	90	-	40	40	20	-	-
10.	BCEL -506	Theory of Structure – I	12	88	-	-	45	30	25	-
11.	CEL 701	Construction Planning & Management	83.33	16.67	-	20	30	20	30	
12.	CEL 702	Environmental Engineering - II	26.67	73.33	-	-	33.33	33.33	33.33	-
13.	CEL 703	Geotechnical Engineering - I	73.33	26.67	-	33.33	-	33.33	-	33.33
14.	CEL 704	A.S.D. – I (RCC)	08	92	-	40	60	-	-	-
15.	CEL 705	Industrial Waste Treatment	94	06	-	-	40	40	20	-

ANNEXURE – V

CO Attainment for all batches

BATCH: 2014-2018			CO Attainment		
	Subject Code/ Subject Name	Subject Name /Course Outcome	Direct % Attainment	Indirect % Attainment	Total % Attainment
Semester 1	CEL 111 T	Engineering Physics	71.80	78.80	73.20
	CEL 112 T	Energy Environment, Ecology & Society	64.80	55.20	62.88
	CEL 113 T	Basic Computer Engg.	55.16	36.40	51.41
	CEL 114 T	Basic Mech. Engg.	53.00	25.60	47.52
	CEL 115 T	Basic Civil Engg. &Engg. Mechanics	60.76	47.60	58.13
	CEL 111 P	Engineering Physics Lab	82.64	100.00	86.11
	CEL 113 P	Basic Computer Engg. Lab	71.92	94.40	76.42
	CEL 114 P	Basic Mech. Engg. Lab	63.44	68.80	64.51
	CEL 115 P	Basic Civil Engg. &Engg. Mechanics Lab	80.64	100.00	84.51
	CEP 116 P	Language Lab & Seminar	52.80	12.80	44.80
Semester 2	CEL 101 T	Engg. Chemistry	51.64	26.80	46.67
	CEL 102 T	Engg. Mathematics-I	57.20	50.00	55.76
	CEL 103 T	Communication Skills	63.96	75.60	66.29
	CEL 104 T	Basic Electrical & Electronic Engg.	63.44	65.20	63.79
	CEL 105 T	Engg. Graphics	56.12	37.20	52.34
	CEL 101 P	Engg. Chemistry Lab	80.32	97.60	83.78
	CEL 103 P	Communication Skills Lab	60.32	54.40	59.14
	CEL 104 P	Basic Electrical & Electronic Engg. Lab	80.08	97.60	83.58
	CEL 105 P	Engg. Graphics Lab	70.88	80.80	72.86
	CEL 106 P	Workshop Practice	72.32	99.20	77.70
Semester 3	CEL 301 T	Mathematics II	57.80	51.20	56.48
	CEL 302 T	Quantity Surveying & Costing	74.52	97.20	79.06
	CEL 303 T	Strength of Materials	70.40	74.80	71.28
	CEL 304 T	Engg. Geology	62.24	48.80	59.55
	CEL 305 T	Bldg. Design & Drawing	86.68	100.00	89.34
	CEL 303 P	Strength of Materials Lab	85.68	100.00	88.54
	CEL 304 P	Engg. Geology Lab	70.80	98.40	76.32
	CEL 305 P	Bldg. Design & Drawing Lab	88.40	100.00	90.72
	CEP 306 P	Computer Programming – III	74.48	89.60	77.50
	CES 307	Self Study	94.16	100.00	95.33
	CES 308	Seminar / Group Discussion	68.00	84.00	71.20
Semester 4	CEL 401 T	Mathematics III	64.12	57.60	62.82
	CEL 402 T	Concrete Tech.	67.60	69.20	67.92
	CEL 403 T	Fluid Mech.-I	59.04	52.40	57.71
	CEL 404 T	Surveying	72.44	77.60	73.47
	CEL 405 T	Transportation Engg.-I	79.92	97.20	83.38
	CEL 402 P	Concrete Tech. Lab	73.76	99.20	78.85
	CEL 403 P	Fluid Mech.-I Lab	63.92	77.60	66.66

	CEL 404 P	Surveying Lab		88.48	100.00	90.78
	CEP 406 P	Computer Programming – IV		77.28	100.00	81.82
	CES 407	Self Study		96.32	100.00	97.06
	CES 408	Seminar / Group Discussion		90.24	100.00	92.19
Semester 5	CEL 501 T	Transportation -II		76.08	83.60	77.58
	CEL 502 T	Water Resources Engg.		51.48	26.00	46.38
	CEL 503 T	Fluid Mechanics-II		55.68	44.40	53.42
	CEL 504 T	Structural Design & Drawing - I		61.72	58.00	60.98
	CEL 505 T	Theory of Structures-I		71.56	85.60	74.37
	CEL 501 P	Transportation -II Lab		74.16	100.00	79.33
	CEL 503 P	Fluid Mechanics-II Lab		72.80	100.00	78.24
	CEL 504 P	Structural Design & Drawing - I Lab		66.24	76.80	68.35
	CEL 505 P	Theory of Structures-I Lab		81.36	100.00	85.09
	CEP 506 P	Surveying Practice		63.04	76.00	65.63
	CET 507	Tour/Training		63.04	76.00	65.63
	CES 508	Seminar / Group Discussion		63.04	76.00	65.63
Semester 6	CEL 601 T	Engineering Economics & Management		63.08	71.60	64.78
	CEL 602 T	Theory of Structure-II		62.92	62.40	62.82
	CEL 603 T	Irrigation Engineering.		60.08	58.80	59.82
	CEL 604 T	Environmental Engg-I		55.08	28.40	49.74
	CEL 605 T	Structural Design & Drawing II		70.16	76.40	71.41
	CEL 603 P	Irrigation Engineering. Lab		73.20	92.80	77.12
	CEL 604 P	Environmental Engg-I Lab		59.68	53.60	58.46
	CEL 605 P	Structural Design & Drawing II Lab		70.56	79.20	72.29
	CEP 606 P	Minor Project-I		82.78	97.60	85.74
	CES 607	Self Study		79.20	100.00	83.36
	CES 608	Seminar / Group Discussion		80.96	100.00	84.77
Semester 7	CEL – 701: Construction Planning & Management	CO1	Illustrate significance of construction management and planning process.	40	83.2	49
		CO2	Develop schedule of activities by bar charts and milestone charts.	45	92.0	54
		CO3	Develop time cost relationship using network techniques.	62	86.4	67
		CO4	Develop tender & contract document for a construction project.	48	75.2	53
		CO5	Identify the equipment used in construction and safety practices.	59	71.2	61
		CO6	Adapt the resource management including manpower, equipment and material.	65	72.8	67
	CEL – 702: Environmental Engineering – II	CO1	Design sewerage system according to the quantity of sewage generation.	81	80.8	81
		CO2	Determine various sewage characteristics.	41	74.4	48
		CO3	Analyse various possible options for effective disposal of effluents.	42	78.4	49
		CO4	Explain various sewage treatment methods.	59	74.8	62
		CO5	Design sewage treatment plant.	48	71.2	53

	CO6	Analyse various options for disposal of solid waste including sludge.	42	68.8	47
CEL – 703: Geotechnical Engineering – I	CO1	Evaluate various properties of soil and accordingly classify them.	55	88.0	62
	CO2	Analyse the flow properties and stresses of soil.	85	71.2	82
	CO3	Apply theory of consolidation for the settlement analysis.	67	68.8	67
	CO4	Apply the Mohr coulomb's theory of shear failure for determination shear strength properties of soils & its verification.	46	70.4	51
	CO5	Analyse the stability of various types of earthen slopes.	41	73.6	48
	CO6	Analyse earth pressures and its effects on different types of structures.	41	76.8	48
CEL – 704: Advanced Structural Design – I (RCC)	CO1	Design various shapes of underground water-tanks as per codal provisions.	70	72.8	71
	CO2	Design various shapes of elevated water tanks as per codal provisions.	75	70.4	74
	CO3	Design retaining walls as per codal provisions.	59	83.2	64
	CO4	Design bridges as per IRC loading provisions.	42	60.0	46
	CO5	Apply the concepts of prestressed concrete.	63	88.0	68
CEL – 705: Industrial Waste Treatment	CO1	Evaluate the effects of waste on streams as per the standards.	57	76.0	61
	CO2	Determine various sewage characteristics.	54	76.8	59
	CO3	Explain various waste treatment methods.	61	80.0	65
	CO4	Apply municipal regulations in operation & maintenance of waste water treatment plant.	50	74.4	55
	CO5	Illustrate waste management methods of different industries.	44	67.2	49
CEL – 702 (P): Environmental Engineering – II	CO1	Determine pH, acidity & alkalinity of sewage sample & establish the relationship among them	96.9	75.2	93
	CO2	Determine DO & BOD of sewage sample & establish the relationship among them	96.9	71.2	92
	CO3	Determine COD of sewage sample & establish relationship with ThOD	96.9	61.6	90
	CO4	Determine solids (fixed & volatile) content of sewage sample	96.9	69.6	91
CEL – 703 (P): Geotechnical Engineering – I	CO1	Determine physical properties of soil.	98.4	80.0	95
	CO2	Determine strength properties of soil.	98.4	76.8	94
	CO3	Determine the flow properties and stresses of soil.	98.4	63.8	91
	CO4	Determine shear strength of soil.	98.4	64.0	92

	CEL – 704(P): Advanced Structural Design – I (RCC)	CO1	Develop underground & elevated water tanks as per codal provisions.	96.2	68.8	91
		CO2	Develop retaining walls as per codal provisions.	96.2	76.0	92
		CO3	Design bridges as per codal provisions.	96.2	54.4	88
	CEP – 706: Minor Project – II	CO1	Recognize various engineering problems and techniques to solve them.	98.8	72.8	94
		CO2	Reproduce the solution of the problems upon the need of society.	98.8	68.0	93
		CO3	Cooperate to work within group.	98.8	72.0	93
		CO4	Develop the writing and communication skills for various engineering problems.	98.8	58.4	91
		CO5	Display lifelong learning.	98.8	80.8	95
	CET – 707: Tour / Training	CO1	Observe various activities of civil construction works.	97.7	78.4	94
		CO2	Examine the utility of general and specific equipments for construction.	97.7	77.6	94
		CO3	Differentiate the construction projects individually and in team.	97.7	72.8	93
		CO4	Develop the writing and communication skills for various engineering problems.	97.7	67.2	92
		CO5	Adapt lifelong learning for benefit of society.	97.7	68.0	92
	CES – 708: Seminar / Group Discussion	CO1	Analyze contemporary issues in civil engineering & its allied areas through literature survey.	97.7	65.6	91
		CO2	Illustrate state of art & relevance of the topic in national & international arena.	97.7	63.2	91
		CO3	Demonstrate good oral & written communication skills.	97.7	73.6	93
		CO4	Develop poster and power point presentations for effective communication.	97.7	72.8	93
Semester 8	CEL – 801: Advanced Structural Design – II (Steel)	CO1	Design roof truss as per codal provisions.	48	78.4	54
		CO2	Design gantry girder as per codal provisions.	46	81.6	53
		CO3	Design plate girder bridges and bearings as per IRC loadings.	57	76.8	61
		CO4	Design trussed girder bridges as per IRC loadings.	56	71.2	59
		CO5	Design various shapes of steel water tanks as per codal provisions	66	73.6	68
		CO6	Design chimneys as per codal provisions.	62	72.0	64
	CEL – 802: Hydraulic Structures	CO1	Evaluate various design criteria of gravity dams.	65	80.8	68
		CO2	Design elements of earthen dams and carry out seepage and stability analysis.	56	77.6	60
		CO3	Design different types of cross drainage works.	61	74.4	64

	CO4	Design energy dissipators and spillways.	49	72.0	54
	CO5	Explain various elements of hydropower plants.	41	69.6	47
CEL – 803: Geotechnical Engineering – II	CO1	Apply various soil improvement techniques.	64	78.4	67
	CO2	Illustrate the methods of soil exploration.	58	78.4	62
	CO3	Distinguish expansive, collapsible soils and treatments.	53	74.4	57
	CO4	Evaluate the bearing capacity of shallow foundations using various theories.	48	65.6	52
	CO5	Evaluate the bearing capacity of various pile foundations in individual & group.	55	68.8	58
	CO6	Analyse the elements of machine foundation & sheet piles.	51	60.8	53
CEL – 804: Building Environment & Services	CO1	Evaluate acoustics & ventilation of a building.	59	80.8	63
	CO2	Develop building maintenance.	44	77.6	51
	CO3	Develop system of distribution of electrical energy in buildings & illumination in buildings.	50	74.4	55
	CO4	Plan various services like air condition, thermal insulation & lift installation in a building.	49	72.0	54
	CO5	Plan fire safety for a building.	38	69.6	44
	CO6	Develop sanitation system in a building.	38	70.4	44
CEL – 801 (P): Advanced Structural Design – II (Steel)	CO1	Design roof truss as per codal provisions.	99.6	78.4	95
	CO2	Design gantry girder as per codal provisions.	99.6	81.6	96
	CO3	Design plate girder bridges and bearings as per IRC loadings.	99.6	76.8	95
	CO4	Design trussed girder bridges as per IRC loadings.	99.6	71.2	94
	CO5	Design various shapes of steel water tanks as per codal provisions.	99.6	73.6	94
	CO6	Design chimneys as per codal provisions.	99.6	72.0	94
CEL – 802 (P): Hydraulic Structures	CO1	Evaluate various design criteria of dams	98.9	72.8	94
	CO2	Design different types of cross drainage works	98.9	74.4	94
	CO3	Design energy dissipators and spillways	98.9	68.8	93
CEL – 803 (P): Geotechnical Engineering – II	CO1	Determine the shear parameters by triaxial shear test.	95.5	69.6	90
	CO2	Perform SPT test.	95.5	66.4	90
	CO3	Perform plate load test.	95.5	64.0	89
CEP – 805: Major Project	CO1	Recognize various engineering problems and techniques to solve them.	99.6	79.2	96
	CO2	Reproduce the solution of the problems upon the need of society.	99.6	76.2	95
	CO3	Cooperate to work within group.	99.6	72.5	94

		CO4	Develop the writing and communication skills for various engineering problems.	99.6	76.0	95
		CO5	Display lifelong learning	99.6	85.6	97
	CEP – 806: General Proficiency	CO1	Demonstrate the knowledge and skills of civil engineering	100	80.8	96
		CO2	Develop the habit of working in groups	100	72.8	95
		CO3	Develop the ethical and professional sense	100	70.4	94
		CO4	Examine the innovative skills	100	63.6	93

BATCH: 2015-2019

	Subject Code/ Subject Name	Subject Name /Course Outcome	CO Attainment		
			Direct % Attainment	Indirect % Attainment	Total % Attainment
Semester 1	BCEL-101 T	Mathematics-I	73.44	82.00	75.15
	BCEL-102 T	Chemistry	65.64	61.60	64.83
	BCEL-103 T	English	59.12	56.00	58.50
	BCEL-104 T	Engineering Mechanics	77.56	90.40	80.13
	BCEL-105 T	Basic Computer Progg	58.96	46.00	56.37
	BCEL-102 P	Chemistry Lab	75.84	93.60	79.39
	BCEL-103 P	English Lab	64.80	72.00	66.24
	BCEL-104 P	Engineering Mechanics Lab	69.52	76.80	70.98
	BCEL-105 P	Basic Computer Progg Lab	70.56	84.00	73.25
	BCES-106	Environmental Sciences	67.68	84.00	70.94
	BCES-107	Introduction to Civil Engineering	84.28	100.00	87.42
	BCES-108	Communication	67.24	88.00	71.39
Semester 2	BCEL-201 T	Mathematics-II	68.24	65.20	67.63
	BCEL-202 T	Physics	68.48	77.20	70.22
	BCEL-203 T	Surveying I	77.20	89.20	79.60
	BCEL-204 T	Engineering Graphics	66.08	70.00	66.86
	BCEL-205 T	Concept in Engineering Design	67.28	81.60	70.14
	BCEL-202 P	Physics Lab	78.96	100.00	83.17
	BCEL-203 P	Surveying I Lab	81.76	96.00	84.61
	BCEL-204 P	Engineering Graphics Lab	80.08	96.00	83.26
	BCES-206	Manufacturing Practices Lab	81.28	88.00	82.62
	BCES-207	Language Lab	66.28	76.00	68.22
	BCES-208	Civil Engg Field Visit	83.73	100.00	86.99
Semester 3	BCEL 301 T	Mathematics-III	70.12	71.60	70.42
	BCEL 302 T	Surveying – II	69.28	68.40	69.10
	BCEL 303 T	Transportation Engineering - I	56.68	50.00	55.34
	BCEL 304 T	Concrete Technology	74.08	86.40	76.54
	BCEL 305 T	Building Design Drawing & Town Planning	71.68	69.20	71.18
	BCEL 302 P	Surveying - II Lab	85.84	100.00	88.67
	BCEL 303 P	Transportation Engineering - I Lab	81.36	100.00	85.09

	BCEL 304 P		Concrete Technology Lab	78.88	100.00	83.10
	BCEP 306		Civil Engineering Drawing Lab	87.36	100.00	89.89
	BCES 307		Seminar/ Presentation/ GD	89.68	100.00	91.74
	BCES 308		Integrated Ethics and Attitude	57.68	52.00	56.54
Semester 4	BCEL 401 T		Quantity Surveying & Costing	80.32	84.40	81.14
	BCEL 402 T		Fluid Mechanics - I	62.24	64.40	62.67
	BCEL 403 T		Environmental Engineering - I	59.84	56.40	59.15
	BCEL 404 T		Building Material & Construction	79.76	94.40	82.69
	BCEL 405 T		Strength of Materials	67.20	68.40	67.44
	BCEL 402 P		Fluid Mechanics - I Lab	73.44	90.40	76.83
	BCEL403 P		Environmental Engineering - I Lab	69.92	79.20	71.78
	BCEL 404 P		Building Material & Construction Lab	83.36	100.00	86.69
	BCEP 406		Material Testing Lab	82.56	100.00	86.05
	BCES 407		Idea Generation	82.88	100.00	86.30
	BCES 408		Communication Skills	53.60	36.00	50.08
Semester 5	BCEL—501: Construction Planning & Management	CO1	Illustrate significance of construction management and planning process.	51	84.8	58
		CO2	Develop schedule of activities by bar charts and milestone charts.	55	88.8	62
		CO3	Develop time cost relationship using network techniques.	79	88.0	81
		CO4	Develop tender & contract document for a construction project.	60	83.2	65
		CO5	Identify the equipment used in construction and safety practices.	41	72.8	47
		CO6	Adapt the resource management including manpower, equipment and material.	46	81.6	53
	BCEL 503: Water resource engg.	CO1	Explain the hydrological cycle and its elements with estimation & measurement	60	88.8	66
		CO2	Apply various methods for stream gauging to develop stage discharge relationships.	52	80.0	58
		CO3	Explain various forms of sub surface water and derive equations for steady flow in well.	45	80.0	52
		CO4	Develop various types of hydrographs for runoff at various durations.	61	82.4	65
		CO5	Explain various methods for estimation of floods for design.	61	83.2	65
		CO6	Apply flood routing techniques to control floods.	59	74.4	62
	BCEL 504: Fluid Mechanics - II	CO1	Apply the theories of laminar & turbulent flow to solve various pipe flow problems.	49	80.0	55
		CO2	Apply the theory of boundary layer to estimate lift & drag on various shapes of the objects.	44	84.8	52
		CO3	Develop design criteria for open channel section for uniform and non uniform flow.	57	85.6	63
		CO4	Apply concepts of critical flow & hydraulic jump in solving problems of gradually and rapidly varied flow.	41	86.4	50
		CO5	Apply the working principles of turbines.	55	78.4	60

	CO6	Apply the working principles of pumps	55	75.2	59
BCEL – 505: Structural Design & Drawing – I (R.C.C.)	CO1	Apply the concepts of working stress method & limit state method for RCC structures.	42	84.8	51
	CO2	Design singly and doubly reinforced beams for various end conditions & codal provisions.	56	87.2	62
	CO3	Design slabs spanning in both directions and circular slabs as per codal provisions.	41	83.2	49
	CO4	Design columns & footings for different end conditions subjected to axial loads and bending moments.	41	80.8	49
	CO5	Design staircase with different support conditions and flight	41	74.4	48
BCEL – 506: Theory of Structures – I	CO1	Determine deflections of beams & frames by classical methods.	66	83.2	69
	CO2	Determine deflections of trusses by energy methods.	59	80.0	63
	CO3	Analyse statically indeterminate structures by classical force / flexibility / compatibility methods.	58	88.8	64
	CO4	Analyse statically indeterminate structures by displacement approach.	58	81.6	63
	CO5	Analyse arch structures using various methods.	56	72.8	59
BCEL – 504 (P): Fluid Mechanics – II	CO1	Distinguish the performance characteristics of various turbines.	87.6	79.2	86
	CO2	Distinguish the performance characteristics of various pumps.	87.6	72.8	85
BCEL – 505 (P): Structural Design & Drawing – I (R.C.C.)	CO1	Develop reinforcement details for singly & doubly reinforced beams at different end conditions	96.7	84.8	94
	CO2	Develop reinforcement details for columns at different end conditions	96.7	83.2	94
	CO3	Develop reinforcement details for slabs in one way & two way directions.	96.7	80.0	93
	CO4	Develop reinforcement details of footings.	96.7	79.2	93
	CO5	Develop reinforcement details of staircase.	96.7	77.6	93
BCEL – 506 (P): Theory of Structures – I	CO1	Verify Maxwell's theorem of reciprocal deflection for truss and beam.	97.4	82.4	94
	CO2	Determine the horizontal displacement of roller end of 2 hinged arch.	97.4	79.2	94
	CO3	Determine the horizontal thrust in 3 hinged arch for a given system & loads.	97.4	76.0	93
	CO4	Analyse the frame using STAAD Pro software.	97.4	81.6	94
BCEP – 507: Civil Lab	CO1	Design concrete mix for various target mean strength.	97.4	80.0	94
	CO2	Design job mix formula for bituminous mix using Marshall stability test.	97.4	68.8	92
	CO3	Determine the bearing capacity of soil by various tests.	97.4	73.6	93

	BCES – 508: Self Study	CO4	Apply non destructive test to measure residual strength of old existing buildings.	97.4	74.4	93
		CO1	Analyze contemporary issues in civil engineering & its allied areas through literature survey.	98.6	74.4	94
		CO2	Illustrate state of art & relevance of the topic in national & international arena.	98.6	70.4	93
		CO3	Display lifelong learning	98.6	73.1	94
	BCES – 509: Seminar & Group Discussion	CO1	Analyze contemporary issues in civil engineering & its allied areas through literature survey.	97.8	78.4	94
		CO2	Illustrate state of art & relevance of the topic in national & international arena.	97.8	70.4	92
		CO3	Demonstrate good oral & written communication skills.	97.8	72.2	93
		CO4	Develop poster and power point presentations for effective communication.	97.8	74.4	93
Semester 6	BCEL-601: Principle of management and managerial economics	CO1	To impart knowledge and awareness regarding internal and external environment of management	65		52
		CO2	To develop spoken ability in a student so that he may acquire the ability to organise and express his ideas	45		36
		CO3	To predict the situation and to be good decision maker through the case studies and role plays based on actual situation	51		41
		CO4	To develop a sound knowledge about economy and economics and to be able to understand how money and finance is to be handled	56		45
		CO5	To be able to work out needs so as to develop a working knowledge about starting and managing an enterprise	3		2
		CO6	To be able to find out ways of solving / overcoming hurdles that crop up while establishing / managing his own enterprise	0		0
	BCEL – 602: Solid Wastes, Air & Noise Pollution	CO1	Apply the concepts of solid waste management system.	68	80.8	71
		CO2	Assess the requirements of collection, treatment & disposal of solid waste.	58	79.2	62
		CO3	Determine the parameters of air quality and their effects on pollutant dispersion.	59	68.8	61
		CO4	Analyze various techniques required to control the air pollution.	55	71.2	58
		CO5	Evaluate the effects of noise pollution and its control.	43	80.8	51
		CO6	Assess the impacts of various pollutants on environment through laws.	44	74.4	50
	BCEL – 604: Geotechnical Engineering – I	CO1	Evaluate various properties of soil and accordingly classify them.	61	80.8	65
		CO2	Analyse the flow properties and stresses of soil.	64	77.6	67
		CO3	Apply theory of consolidation for the settlement analysis.	71	74.4	72

BCEP – 607: Minor Project – I	CO1	Recognize various engineering problems and techniques to solve them.	99.2	76.8	95
	CO2	Reproduce the solution of the problems upon the need of society.	99.2	72.8	94
	CO3	Cooperate to work within group.	99.2	78.4	95
	CO4	Develop the writing and communication skills for various engineering problems.	99.2	77.6	95
	CO5	Display lifelong learning.	99.2	75.2	94
BCES – 608: Self Study	CO1	Analyze contemporary issues in civil engineering & its allied areas through literature survey.	90	70.4	86
	CO2	Illustrate state of art & relevance of the topic in national & international arena.	90	68.8	86
	CO3	Display lifelong learning.	90	70.4	86
BCES – 609: Seminar & Group Discussion	CO1	Analyze contemporary issues in civil engineering &its allied areas through literature survey.	90	68.8	86
	CO2	Illustrate state of art & relevance of the topic in national & international arena.	90	64.8	85
	CO3	Demonstrate good oral & written communication skills.	90	67.2	85
	CO4	Develop poster and power point presentations for effective communication.	90	64.0	85

BATCH: 2016-2020

	Subject Code/Subject Name	Subject Name /Course Outcome	CO Attainment		
			Direct % Attainment	Indirect % Attainment	Total % Attainment
Semester 1	BCEL-101 T	Mathematics-I	53.80	42.40	51.52
	BCEL-102 T	Chemistry	62.88	68.40	63.98
	BCEL-103 T	English	54.80	38.40	51.52
	BCEL-104 T	Engineering Mechanics	69.80	78.00	71.44
	BCEL-105 T	Basic Computer Progg	50.76	34.00	47.41
	BCEL-102 P	Chemistry Lab	66.56	66.40	66.53
	BCEL-103 P	English Lab	62.72	75.20	65.22
	BCEL-104 P	Engineering Mechanics Lab	69.68	86.40	73.02
	BCEL-105 P	Basic Computer Progg Lab	83.60	100.00	86.88
	BCES-106	Environmental Sciences	81.48	100.00	85.18
	BCES-107	Introduction to Civil Engineering	82.96	100.00	86.37
	BCES-108	Communication	60.80	56.00	59.84
Semester 2	BCEL-201 T	Mathematics-II	52.92	32.40	48.82
	BCEL-202 T	Physics	61.92	64.00	62.34
	BCEL-203 T	Surveying I	64.32	64.00	64.26
	BCEL-204 T	Engineering Graphics	61.04	56.80	60.19
	BCEL-205 T	Concept in Engineering Design	69.80	82.40	72.32
	BCEL-202 P	Physics Lab	85.60	100.00	88.48
	BCEL-203 P	Surveying I Lab	71.84	91.20	75.71

BCEL-204 P		Engineering Graphics Lab	77.04	92.00	80.03
BCES-206		Manufacturing Practices Lab	71.24	84.00	73.79
BCES-207		Language Lab	54.16	40.00	51.33
BCES-208		Civil Engg Field Visit	85.15	100.00	88.12
Semester 3					
Engg. Mathematics-III (BCEL 301)	CO1	Retrieve the engineering application problems to related course content	54	75	58
	CO2	Describe the basic concept of Complex Variable , Linear Programming Problem and Numerical Methods	61	76	64
	CO3	Classify Complex Variable , Linear Programming Problem and Numerical Methods so as to apply the knowledge in solving routine problems	51	71	55
	CO4	Inculcate analytical and computational skill to interpret the topics for engineering problems	41	80	49
	CO5	Analyze the Complex Variable, Linear Programming Problem and Numerical Methods to examine the real world problem	23	65	31
	CO6	Evaluate and Implement suitable techniques relevant for industries and contribute to the society	23	60	30
BCEL – 302: Surveying – II	CO1	Apply the theodolite observations for traverse computations and trigonometric levelling.	43	77.6	50
	CO2	Apply principles of tacheometry for linear and angular measurements.	64	64.0	64
	CO3	Practice curve setting of various types by offsets and theodolite for the horizontal and vertical alignment.	56	75.2	60
	CO4	Apply the principle of triangulation for alignment of roads, canal, railway line and other civil engineering works.	40	57.6	44
	CO5	Apply the principles of photographic surveying & GIS for computations and plotting of civil engineering works.	42	56.8	45
BCEL – 303: Transportation Engineering – I	CO1	Determine cross sectional elements of the alignment of straight, horizontal & vertical curves for highway with IRC specifications.	52	72.8	56
	CO2	Design flexible and rigid pavements according to IRC codes followed by all maintenance criteria.	61	77.6	64
	CO3	Evaluate physical properties of suitable highway engineering materials with drainage provisions.	79	72.8	78
	CO4	Assess the channelized and unchannelized intersection at the junction according to traffic flow and provision of marking, signs and signals.	52	74.4	56
	CO5	Design runway, taxiway system of the	69	70.4	69

	BCEP– 306: Civil Engineering Drawing Lab	CO1	Draw plan, elevation & section of various components of a residential and institutional building.	68.6	79.2	71
		CO2	Apply AutoCAD software in civil engineering drawing.	68.6	77.6	70
		CO3	Develop the skills of professional town planning.	68.6	72.0	69
	BCES – 307: Seminar/ Presentation/ Group Discussion	CO1	Analyze contemporary issues in civil engineering & its allied areas through literature survey.	97.7	71.2	92
		CO2	Distinguish state of art & relevance of the topic in national & international arena.	97.7	67.2	92
		CO3	Demonstrate good oral & written communication skills.	97.7	67.2	92
		CO4	Develop poster and power point presentations for effective communication.	97.7	67.2	92
Semester 4	BCEL – 401: Quantity Surveying & Costing	CO1	List the fundamentals of quantity survey and valuation to prepare estimates.	63	74.4	65
		CO2	Develop rate analysis for different construction activities.	73	71.2	73
		CO3	Estimate the quantities of building materials for various construction works.	73	81.6	75
		CO4	Estimate the cost of works including overhead charges, contingencies and charges for services.	51	76.0	56
		CO5	Adapt the basic principles, methods and requirements of valuation of real properties.	50	82.0	56
	BCEL – 402: Fluid Mechanics – I	CO1	Explain various fluid properties.	40	84.8	49
		CO2	Analyze problems of static fluid flow.	41	68.8	47
		CO3	Analyze problems of fluid in motion and develop fluid flow equations.	69	81.6	72
		CO4	Apply dimensional analysis for examining model and its prototype.	55	73.6	59
		CO5	Apply dimensional analysis for examining model and its prototype.	60	67.2	61
		CO6	Apply the concepts of laminar flow in solving various fluid flow problems.	60	75.2	63
	BCEL – 403 Environmental Engineering – I	CO1	Estimate the water requirement for various purposes.	42	80.8	50
		CO2	Estimate the quantity of ground water by various methods.	52	81.6	58
		CO3	Analyse water supply systems including intake structures, conduits and pump.	44	75.2	50
		CO4	Explain various water treatment methods.	67	69.6	68
		CO5	Design various water treatment units.	55	72.0	58
		CO6	Develop water distribution systems by solving distribution networks for rural and urban water supply.	52	75.2	57

		airport as per zoning regulations with traffic control system.			
BCEL – 304: Concrete Technology	CO1	Analyse properties and role of ingredients like cement, aggregate, admixtures etc. to produce better quality concrete.	52	79.2	57
	CO2	Evaluate the properties of fresh and hardened concrete for construction.	54	81.6	60
	CO3	Estimate the strength properties of concrete by various tests for quality control.	71	72.8	71
	CO4	Design standard concrete mixes by IS code methods.	75	75.2	75
	CO5	Appraise high strength concrete like RMC, pumped concrete, polymer concrete etc. and their use	59	72.0	62
BCEL – 305: Building Design Drawing & Town Planning	CO1	Develop the drawings of various building elements like doors, windows, frames etc.	50	82.4	56
	CO2	Apply the principles of planning and bylaws for building planning.	72	83.2	74
	CO3	Develop the plan section and elevation of building drawings.	48	80.0	54
	CO4	Develop 2-D drawings of buildings.	48	70.4	52
	CO5	Explain the concepts of development of cities and town planning.	60	75.2	63
BCEL – 302 (P): Surveying – II	CO1	Measure horizontal & vertical angle by theodolite for traversing and levelling.	97.70	81.6	94
	CO2	Determine tachometric constants for linear measurements by tacheometry.	97.70	77.6	94
	CO3	Set a simple circular curve by using Rankine's method for alignment.	97.70	82.4	95
	CO4	Use total station for traversing & preparing contour maps.	97.70	75.2	93
BCEL – 303 (P): Transportation Engineering – I	CO1	Select suitable aggregate material by testing the physical properties.	95.5	89.6	94
	CO2	Determine properties of bitumen and its grade.	95.5	86.4	94
	CO3	Determine CBR value of material for subgrade and subsequent layers of pavement.	95.5	79.2	92
	CO4	Design job mix formula for bituminous surface using Marshal Stability test.	95.5	64.8	89
BCEL – 304 (P): Concrete Technology	CO1	Determine the properties of cement, sand & aggregate as per IS code.	92.5	87.2	91
	CO2	Determine the workability of concrete for suitability of concrete mix in different construction works.	92.5	89.6	92
	CO3	Determine compressive strength of various concrete mixes and its application.	92.5	84.0	91
	CO4	Evaluate compressive strength of concrete by rebound hammer test (NDT).	92.5	80.0	90

BCEL – 404: Building Materials & Construction	CO1	Select suitable building material for construction.	79	79.2	79
	CO2	Manage quality of the construction of civil structures.	66	71.2	67
	CO3	Demonstrate field test & laboratory test on common materials.	50	64.0	53
	CO4	Select suitable foundation on different type of soils to prevent defects in buildings.	61	68.0	62
	CO5	Illustrate various service elements of buildings.	75	65.6	73
	CO6	Apply various techniques for damp prevention, water proofing & anti termite resistance.	57	68.8	59
BCEL – 405: Strength of Materials	CO1	Analyze simple and compound stresses and strains for elastic bodies.	44	71.2	49
	CO2	Analyze 2-D stress system using Mohr's circle method and Theory of Failure.	46	74.4	52
	CO3	Evaluate the stresses in bending, shear and torsion	64	76.0	66
	CO4	Analyze sections of column with loads and end conditions.	56	64.0	58
	CO5	Analyze stresses due to internal pressures for thin cylinders and spheres.	56	66.4	58
	CO6	Analyze statically determinate structures by geometrical methods & virtual work method.	58	65.6	60
BCEL – 402 (P): Fluid Mechanics – I	CO1	Determine coefficient of discharge of venturimeter for measurement of discharge.	98.2	79.2	94
	CO2	Determine various coefficients of circular orifice, orifice meter and mouth piece for the measurement of discharge.	98.2	72.8	93
	CO3	Determine friction factor for pipe to estimate pipe losses.	98.2	72.8	93
	CO4	Apply Stoke's law to calculate terminal velocity.	98.2	64.8	92
BCEL – 403 (P): Environmental Engineering – I	CO1	Determine pH, acidity, alkalinity of water sample & establish relationship among them.	84.3	80.8	84
	CO2	Determine hardness of water sample & establish relationship with alkalinity.	84.3	80.0	83
	CO3	Determine chloride content of water sample.	84.3	77.6	83
	CO4	Determine solids content of water sample.	84.3	70.4	82
	CO5	Determine optimum dosage of coagulant for treatment of water.	84.3	68.0	81
	CO6	Determine D. O. content of water sample.	84.3	71.2	82

BCEL – 404 (P): Building Materials & Construction	CO1	Determine physical properties of brick by experiment and practice accordingly.	92.5	72.8	89
	CO2	Find the physical properties of stone and its engineering applications.	92.5	74.4	89
	CO3	Determine the properties of the cement mortar for various elements of the buildings.	92.5	68.8	88
BCEP – 406: Material Testing Lab	CO1	Evaluate properties of material by impact test.	92.8	66.4	88
	CO2	Evaluate properties of material by hardness test.	92.8	64.8	87
	CO3	Evaluate properties of material by tensile test.	92.8	72.8	89
	CO4	Determine compressive & flexural strength of materials.	92.8	64.8	87
BCES – 407: Idea Generation	CO1	Explain contemporary issues in civil engineering and its allied areas.	79.3	73.6	78
	CO2	Illustrate state of art & relevance of the topic in national & international arena.	79.3	68.0	77
	CO3	Determine problems and accordingly speak and defend their ideas.	79.3	75.2	78

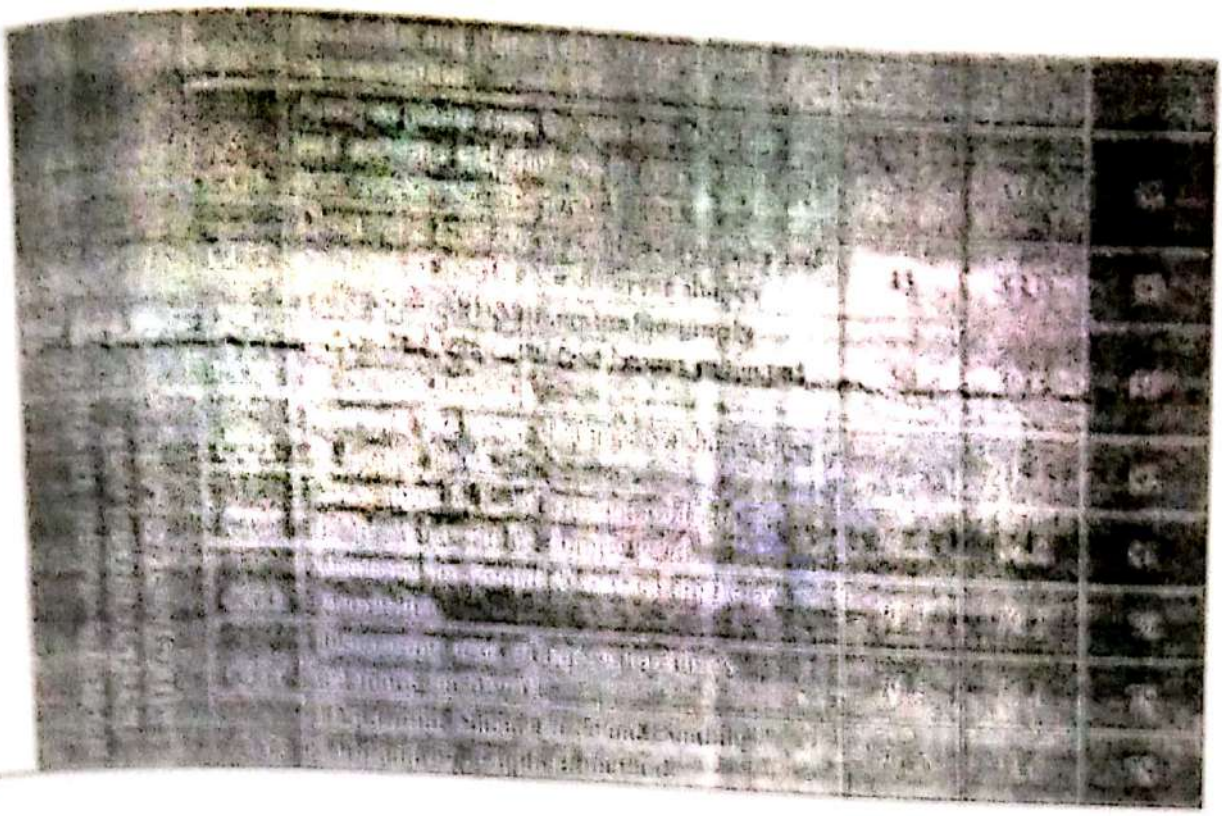
BATCH: 2017-2021			CO Attainment		
	Subject Code/Subject Name	Subject Name /Course Outcome	Direct % Attainment	Indirect % Attainment	Total % Attainment
Semester 1	Engineering Chemistry (100101)	CO1 Acquire the knowledge and importance of water treatment for domestic and Industrial purpose	52	45	50.6
		CO2 Acquire the knowledge of types, properties and application of lubricants, fuels advanced polymer materials, cement, refractories, dye and advance Engineering material	54	50	53.2
		CO3 Develop an ability to apply knowledge in solving numerical problems.	55	37	51.4
		CO4 Use the concept of chromatography and spectroscopy for varied engineering applications related to day to day life.	55	33	50.6
		CO5 Correlate and characterize the subjective knowledge with the real time problems.	55	41	52.2
		CO6 Correlate and characterize the subjective knowledge with the real time problems.	55	45	53.0

	CO4	Apply the Mohr coulomb's theory of shear failure for determination shear strength properties of soils & its verification.	62	72.0	64
	CO5	Analyse the stability of various types of earthen slopes.	53	69.6	56
	CO6	Analyse earth pressures and its effects on different types of structures.	58	70.4	60
BCEL – 605: Structural Design & Drawing – III (Steel)	CO1	Evaluate the structural behaviour of different steel structure elements & connections.	58	78.4	62
	CO2	Design welded and bolted connections as per codal provisions.	56	78.4	60
	CO3	Design tension members as per codal provisions.	55	74.4	59
	CO4	Design compression members & base foundation as per codal provisions.	61	65.6	62
	CO5	Design laterally supported & unsupported beams as per codal provisions.	55	68.8	58
	CO6	Design plate girders as per codal provisions.	50	60.8	52
BCEL – 606: Theory of Structures – II	CO1	Analyse statically indeterminate structures using classical methods.	58	79.2	62
	CO2	Determine preliminary sizes of multi-storeyed buildings using approximate analysis methods & standard codes for load calculations	60	78.4	64
	CO3	Analyse statically indeterminate structures using matrix (stiffness) method.	53	65.3	55
	CO4	Draw the influence lines diagram for statically determinate & indeterminate structures.	69	76.0	70
	CO5	Analyze beams & frames using plastic analysis	70	85.6	73
BCEL – 604 (P): Geotechnical Engineering – II	CO1	Determine physical properties of soil.	96.1	83.2	94
	CO2	Determine strength properties of soil.	96.1	77.6	92
	CO3	Determine the flow properties and stresses of soil.	96.1	73.3	92
	CO4	Determine shear strength of soil.	96.1	79.2	93
BCEL – 605 (P): Structural Design & Drawing – II (Steel)	CO1	Develop bolted & welded connections of steel structural members.	98.6	69.6	93
	CO2	Develop tension members & compression members of steel structure.	98.6	66.4	92
	CO3	Develop beams & plate girders.	98.6	60.0	91
BCEL – 606 (P): Theory of Structures – II	CO1	Develop statically indeterminate structures using various methods.	98.2	75.2	94
	CO2	Develop multi-storeyed buildings using approximate analysis methods & standard codes for load calculations.	98.2	72.8	93
	CO3	Draw the influence lines diagram for statically determinate & indeterminate structures.	98.2	77.6	94

Engg. Mathematics I (100102)	CO1	Understand the basic concept of differential calculus, integral calculus, ordinary differential equation, matrix and Boolean algebra	60	70	62
	CO2	Describe the basics of Differential Calculus, Integral Calculus, Differential Equation, Matrix theory, Boolean Algebra	41	65	46
	CO3	Apply the concepts of the studied topics to solve the routine problems.	70	73	71
	CO4	Analyze and illustrate the techniques imparted through course content to solve engineering problems.	29	69	37
	CO5	Evaluate the application of studied topics and applying suitable mathematical techniques to solve them.	39	70	45
	CO6	Devise newer ideas and logical skills to solve real world problems	60	73	63
Technical English (100103)	CO1	Speak clearly, effectively and appropriately in a public forum to a variety of audiences and purposes. (LOT2)	58	61	59
	CO2	Prepare and deliver oral presentations and arguments acceptable within the Engineering Profession effectively. (LOT3)	50	56	51
	CO3	→ Demonstrate knowledge and comprehension of major text and traditions in language as well as its social, cultural, and historical context.	52	53	52
	CO4	Read a variety of Text critically and analytically so as to demonstrate in writing and/or speech the interpretation of those texts.	61	56	60
	CO5	Evaluate and interpret text written in English assessing the results in written and oral arguments using appropriate material for support.	51	54	52
	CO6	Develop professional work habit including those necessary for effective collaboration and cooperation with others.	51	56	52
100104: Basic Electrical & Electronics Engineering	CO1	Explain the basic concepts of DC, AC, magnetic circuits, transformer and electronic circuits	58	68	60
	CO2	Describe the behavior of any electrical and magnetic circuits.	62	64	63
	CO3	Identify the type of electrical machine used for that particular application	63	58	62
	CO4	Explain the working principle, construction, applications of transformer	65	68	65
	CO5	Classify the logic gates and flip flops for various applications in digital electronic circuits	64	59	63

	CO6	Explain of characteristics of Diode and Transistor	52	54	53
Engineering Graphics(100105)	CO1	Imagine and visualize the geometric details of engineering objects	81	73	79
	CO2	Translate the geometric information of engineering objects into engineering drawings.	81	71	79
	CO3	Use computer aided drafting in their respective engineering field.	70	61	68
	CO4	Develop knowledge to read, understand and explanation of drawing.	82	71	80
	CO5	Improve their skills so that they can apply these skills in developing new products.	82	69	79
	CO6	Prepare simple layout of factory, machine and buildings.	76	63	73
Manufacturing Practices(100106)	CO1	Discuss the hand tools, machine tools and power tools.	58	68	60
	CO2	Identify appropriate tools required for specific operation.	62	64	63
	CO3	Estimate safety measures required to be taken while using the tools in floor shops, Machine ships and carpentry shop.	63	58	62
	CO4	Use the techniques, skills, and modern engineering tools necessary for manufacturing and production engineering.	65	68	65
	CO5	Conduct experiments in the field of Production engineering.	64	59	63
	CO6	Design a system, components, or process to meet desired needs, ethical, health and safety, manufacturability and sustainability.	52	54	53
Semester 2 Engineering Physics (100201)	CO1	Develop a conceptual approach towards classifying the multifarious contents of Modern Engineering Physics at ground level.	63.0	55.0	61
	CO2	Comprehend their analytical skills to interpret the topics related to Quantum Physics, Nuclear Sciences, Optics, Solid State Physics and Laser Systems	78.0	52.0	73
	CO4	Evaluate and Apply the various topics in the course content and distinguish between them in terms of their specialized applications.	53	50	52
	CO5	Enhance their logical and computational skills to counter real time problem solving techniques	27	54	32
	CO6	Apply the concepts of the studied topics to the various industries of relevance and contribute to the society.	16	51	23

100202: Energy, Ecology, Environment & Society	CO1	Describe various energy resources, their conversion to electrical power and role in technological & economic development	59	64	60
	CO2	Update with national/international power status and renewable power development targets & missions	62	54	61
	CO3	Recognize the impact of pollution on the ecosystem and control policies adopted at national/international levels	65	61	64
	CO4	Illustrate the concepts of ecosystems and their conservation	60	60	60
	CO5	Solve practical problems of society in a sustainable and ethical manner	68	54	65
	CO6	Fulfill professional duties keeping in mind the environmental safety, health, and welfare of public	66	60	65
Basic Computer Engineering - 100203	CO1	Illustrate the basic fundamental, generation, evolution of computer	65	80	68
	CO2	Explain hardware's and software's component of computer and perform conversion between numbers systems	63	90	68
	CO3	Develop the ability to write computer programs to solve real word problems	25	85	37
	CO4	Analyze the various functions of operating system	85	75	83
	CO5	Explain various terminologies of DBMS.	62	55	61
	CO6	Build the concept of internet based and e-commerce	44	75	50
Basic Mechanical Engineering(100204)	CO1	State the working of IC and steam engines and thermodynamic cycles.	76	70	75
	CO2	Discuss the fluid properties, pumps, compressors, turbines, various types of boilers, the mountings and accessories and able to calculate the boiler efficiency and to design the chimney dimensions.	77	68	75
	CO3	Operate the machine tools like lathe, shaper and drilling machine	62	65	62
	CO4	Conduct experiments, as well as to analyze and interpret data.	68	67	67
	CO5	Design and realize a physical system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	77	74	76
	CO6	Implement modifications in the area of mechanical systems and thermal systems.	65	65	65
100205 - BASIC CIVIL ENGINEERING AND MECHANICS	CO1	Identify suitable building materials according to IS code and its engineering application.	66	83.2	69
	CO2	Measure the linear distance and directions by conventional and EDM methods for traverse	66	75.2	68
	CO3	Measure area and volume of field using	63	77.6	66



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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A UGC-Autonomous Institute affiliated to RGPV, Bhopal)

B.E. V Semester Civil Engineering

W.E.F JULY 2017

For batches admitted in July, 15 & July, 16 (to be implemented in July, 2017)

Subject wise distribution of marks and corresponding credits

S.No.	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Periods per week			Total Credits
			Theory Slot			Practical Slot						
			End Sem	Mid Sem	Quiz / Assignment	End Sem	Lab work & Sessional		L	T	P	
1.	BCEL - 501	Elective - I* (Construction Planning and Management)	70	20	10	-	-	100	3	1	-	4
2.	BCEL - 502	Elective - I* Traffic Engineering										
3.	BCEL - 503	Water Resources Engineering - I	70	20	10	-	-	100	3	1	-	4
4.	BCEL - 504	Fluid Mechanics – II	70	20	10	30	20	150	3	1	2	5
5.	BCEL - 505	Structural Design & Drawing – I (RCC)	70	20	10	30	20	150	3	1	2	5
6.	BCEL - 506	Theory of Structures – I	70	20	10	30	20	150	3	1	2	5
7.	BCEP - 507	Civil Lab	-	-	-	30	20	50	-	-	2	1
8.	BCES - 508	Self Study (Internal Assessment)	-	-	-	-	50	50	-	-	2	1
9.	BCES - 509	Seminar & Group Discussion (Internal Assessment)	-	-	-	-	50	50	-	-	2	1
		Total	**350**	**100**	**50**	**120**	**180**	**800**	**15**	**5**	**12**	**26**

*** Out of given elective course only one course will be opted by the student**

Note: 01 Theory period = 01 Credit; 02 Practical Periods = 01 Credit

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A UGC-Autonomous Institute affiliated to RGPV, Bhopal)

B.E. VI Semester Civil Engineering

W.E.F JULY 2017

For batches admitted in July, 15 & July, 16 (to be implemented in July, 2017)

Subject wise distribution of marks and corresponding credits

S. No.	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Periods per week			Total Credits
			Theory Slot			Practical Slot						
			End sem	Mid Sem	Quiz/ Assignment	End Sem	Lab work & Sessional		L	T	P	
1.	BCEL - 601	Principles of Management & Economics	70	20	10	-	-	100	3	1	-	4
2.	BCEL - 602	Elective – II * Solid Waste, Air & Noise Pollution	70	20	10	-	-	100	3	1	-	4
3.	BCEL - 603	Elective – II * Environmental Impact Assessment & Ethics										
4.	BCEL - 604	Geotechnical Engineering – I	70	20	10	30	20	150	3	1	2	5
5.	BCEL - 605	Structural Design & Drawing – II (Steel)	70	20	10	30	20	150	3	1	2	5
6.	BCEL - 606	Theory of Structures – II	70	20	10	30	20	150	3	1	2	5
7.	BCEP - 607	Minor Project	-	-	-	30	20	50	-	-	2	1
8.	BCES - 608	Self Study (Internal Assessment)	-	-	-	-	50	50	-	-	2	1
9.	BCES - 609	Seminar & Group Discussion (Internal Assessment)	-	-	-	-	50	50	-	-	2	1
		Total	350	100	50	120	180	800	15	5	12	26

*** Out of given elective course only one course will be opted by the student**

Note: 01 Theory period = 01 Credit; 02 Practical Periods = 01 Credit

7/7/17

Course Code: BCEL – 502

Course Name: Traffic Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To introduce the concepts of traffic engineering.

2) To provide a broad knowledge on traffic characteristics & various studies conducted in traffic engineering.

3) To analyze various requirements of traffic operation & control system & effectively design traffic signal.

4) To effectively design street light system.

5) To provide knowledge on concepts of accident studies & mass transportation system.

Syllabus:

Unit –I Traffic Characteristics:

(i) Road user's characteristics – general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design – width, height, length and other dimensions. Weight, power, speed and braking capacity of a vehicle.

Unit –II Traffic Studies:

(i) Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies-purpose, causes of delay, methods of conducting speed and delay studies (iii)Origin and Destination Studies (O&D): Various methods, collection and interpretation of data, planning and sampling (iv) Traffic capacity Studies: Volume, density, basic practical and possible capacities, level of service (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices.

Unit – III Traffic Operations and Control:

(i) Traffic regulations and various means of control. (ii) One-Way streets-advantages and limitations. (iii) Traffic signals-isolated signals coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal. Signs, markings and islands channelization of intersections Traffic rotary. Grade separated intersections and fly over and clover leaf function.

Unit-IV Street Lighting:

(i) Methods of light distribution (ii) Design of street lighting system (iii) Definitions-Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting (v) Fundamental factors of night vision.

Unit-V Accident Studies & Mass Transportation:

(i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

Course Outcomes:

Upon completion of the course, the students will be able to:

1) Estimate basic characteristics of traffic stream.

2) Conduct traffic studies and estimate traffic data.

3) Analyze various requirements of effective traffic operation & control system.

4) Design traffic signal system.

5) Understand the concepts of street lighting system & design an efficient street lighting system.

6) Conduct accident studies & plan for preventive measures.

7) Get an insight into various existing forms of mass transportation in India.

Reference Books:

i) Traffic Engineering and transport Planning by L.R. Kadiyali, Khanna Publishers Delhi

ii) Traffic Engineering by Matson, W.S. Smith & F.W. Hurd

iii) G.J. Pingnataro, Principles of Traffic Engineering

iv) D.R. Drew, Traffic Flaw Theory

v) W.R. Mchsne and R.P.Roess "Traffic Engg"

vi) Wohl & Martin Traffic System Analysis for Engineering & Planners

vii) Highway Engg. by Justo & Khanna

Course Code: BCEP – 507

Course Name: Civil Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To make student conversant with the concepts of mix design of concrete.
2) To make student conversant with various tests performed on road materials.
3) To make student conversant with various tests performed on soil.

Syllabus: List of Practical's:

1. Mix design of concrete.
2. Job mix formula of bituminous aggregate mix by Marshall stability method.
3. Determination of bearing capacity of soil by Triaxial method.
4. Determination of bearing capacity of soil by plate load test.
5. Determination of bearing capacity of soil by SPT.
6. NDT using various methods for estimation of strength of old structure.

Course Outcomes:

Upon completion of the course, the students will be able to:

1) Analyze & Design mix of concrete
2) Carry out Marshall Stability test on bitumen & determine its value.
3) Determine the bearing capacity of soil by various tests.
4) Student will be able to access residual strength of old existing building.

Course Code: BCEL – 602

Course Name: Solid Wastes, Air & Noise Pollution

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To provide broad knowledge on various aspects of planning & implementation of a solid wastes management system in a city/ town.

2) To provide a broad knowledge on various sources & effects of air pollution, air pollutants, existing air quality standards in India, various techniques to reduce the air pollutants in atmosphere.

3) To provide a basic knowledge on sources, effects of noise pollution & also how to reduce the pollution.

4) To provide an insight into various existing laws on air, noise & solid wastes in India.

5) To provide a basic knowledge on environment impact assessment.

Syllabus:

Unit I: Solid Wastes: Introduction, Classification, Municipal Solid Waste: Generation, Characterization (Physical, Chemical & Biological), Nuisance associate with solid wastes, Functional elements of solid waste management system, 3R policy, Waste reduction at source, On site storage - collection of waste at source, containers, bins, Material & resource recovery / recycling.

Unit II: Collection systems, Transportation of solid wastes, Routing & scheduling, Transfer stations, Transformations, Processing & Treatment options including Composting, Vermicomposting, Incineration, Refuse Derived Fuels, Pyrolysis, Biological digestion & Sanitary landfill, Existing solid waste management laws in India.

Unit III: Air Pollution: Sources and classification of air pollutants; Standards and guidelines for Air Quality Parameter, Existing air pollution laws in India, Effects of air pollutants on man, material, vegetation, art treasurers. Air pollution disasters, Economic effects, Global effects, Introduction to Indoor air pollution.

Unit IV: Meteorology & Air Pollution, Factors influencing air pollution, wind roses, atmospheric stability, plume behavior, estimation of plume rise, Control of air pollution: types of equipments, settling chambers, cyclones, separators, filters, ESP, scrubbers/ wet collectors, towers, Gaseous pollution control equipments.

Unit V: Noise Pollution: Sources, Effects, Scales of noise, Noise standards, Noise rating systems, Sound level meter, Control & prevention of noise pollution, Existing noise pollution laws in India, Introduction to environmental impact assessment: Necessity, Process of impact assessment, case study.

Course Outcomes:

Upon completion of the course, the students will be able to:

1) Understand the basic concepts of solid waste management system.

2) Analyze the requirements of treatment & disposal of solid waste in a sustainable manner.

3) Understand the basic concepts of air pollution, its effects & pollutant dispersion theory.

4) Analyze various techniques required to control the air pollution.

5) Acquire knowledge about noise pollution, its effects & its control.

6) Acquire knowledge about various existing environmental legislations in India.

7) Understand the basics of environmental impact assessment.

Books Recommended:

1) Rowe, Peavy & Tchobanogolous, Environmental Engineering, Tata McGraw Hill Publications.

2) M. N. Rao & H. V. N Rao, Air pollution & Control, Tata McGraw Hill Publications.

3) Iqbal H. Khan and Nayed Ahsan, Text Book of Solid Wastes Management, CBS Publishers.

4) S.K. Garg, Sewage Disposal & Air Pollution Engineering, Khanna Publishers.

Course Code: BCEL – 603

Course Title: Environmental Impact Assessment & Ethics

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To develop an understanding about the requirements of environment impact assessment in modern day.

2) To provide a broad knowledge on the process of environmental impact assessment.

3) To provide a broad knowledge on various methods used in impact assessment.

4) To provide a practical knowledge on how to carry out environmental impact assessment process through various case studies.

5) To provide an insight into various existing environmental laws in India

Detailed Syllabus:

Unit I: Environment and its components, Concept of Ecological imbalances, Carrying capacity and Sustainable development, EIA: Definitions, Necessity of EIA, Historical Evolution of EIA: Global, Indian EIA rules 1994 & 2006, Environmental clearance process in India, Step by step detailed procedure for carrying out EIA: Screening, Scoping, Baseline Studies, Impact Assessment, Public Consultation, Documentation, Mitigation, EMP, EIS, Life Cycle Assessment, Risk Assessment.

Unit II: Environmental Impact Assessment Methodologies: Characteristics of EIA Methods, Ad-hoc method, Checklist, Matrices, Networks, Overlays, Environmental Quality Index, Predictive Models, Comparative study of EIA Methodologies.

Unit III: Prediction and assessment of impact on water & air environment: Basic information of air & water quality, Data requirements for impact assessment, Existing standards for air & water quality (surface & subsurface), Identification of impacts, Prediction & assessment of impacts, Mitigation measures. Case Studies - Environmental Impacts of Road, Rail, Dam and thermal power projects.

Unit IV: Prediction and assessment of impact on cultural & socio-economic environment: Basic information on cultural resources like archaeological, historical structures, Cultural system, Basic information of socio-economic environment, Description of existing socio-economic environment, Identification of impacts, Prediction & assessment of impacts, Mitigation measures, R & R study.

Unit V: Environmental Legislations: List of prevalent environmental acts in India, Brief about provisions in Water Act 1974, Air Act 1981, EPA 1986, Objective of Ethics, Importance of Ethics, Environmental ethics in India, Environmental Audit: Introduction, Necessity, Types, and Process of audit.

Course Outcomes:

Upon completion of the course, the students will be able to:

1) Understand the importance & concepts of carrying out EIA.

2) Acquire knowledge of current EIA process in India

3) Acquire knowledge of various methods & data requirements for conducting EIA.

4) Analyze Impact's associated with various components of environment.

5) Plan for mitigation of the impacts & monitor the mitigation measures.

6) Acquire knowledge about Environmental Legislation, Ethics & Environmental Audit.

Books Recommended:

1) Y. Anjaneyulu & Valli Manickam, Environmental Impact Assessment Methodologies, B S Publishers

2) O. V. Nandimath, Handbook of Environmental Decision Making in India: An EIA Model, Oxford University Press.

3) R. L. Canter, Environmental Impact Assessment, Mc Graw Hill International Publishers International Edition.

4) R. R. Barthwal, Environmental Impact Assessment, New Age International Publishers.

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