

30/05/2018

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CIVIL ENGINEERING DEPARTMENT

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal

Ref. No. DA/MP/18/682

30.
Date: 26.5.2018

To,

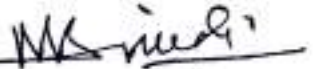
The HOD,
Department of Civil Engineering

Please find enclosed the (i) flexible scheme to be implemented from the academic session 2018-19 (ii) Scheme and syllabi of VII & VIII semester grading system for the students admitted in the session 2014 and (iii) the syllabi of III & IV semester flexible scheme for your department as further checked and verified by the Committee (constituted for this purpose by the director) in the meeting held on 15.5.2018.

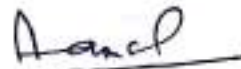
The enclosed scheme and syllabi were approved by the Academic Council on 26.4.2018.


(Dr. Akhilesh Tiwari)


(Dr. Sulochana Wadhvani)


(Dr. M.K. Trivedi)


(Dr. P.K. Singhal)


(Dr. R. Kansal)


(Dr. Manjaree Pandit)
Dean (Academics)

I. MINUTES OF THE BOARD OF STUDIES

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute affiliated to RGPV, Bhopal)

Minutes of the BOS (Civil Engineering) Date: 12/04/2018

Meeting of Board of studies of Civil Engineering held as per schedule on 12-04-2018 (10:30AM onward) in the CTM laboratory of the department. Following is discussed in the meeting.

- 1 Members were appraised about the details of scheme, credits, teaching hour etc.
 - 2 New scheme of all semester & syllabus (III & IV semester) to meet the requirement of new flexible scheme to be implemented from 2018 is discussed.
 - 3 Additional credits for B.E. (Hons.) can be earned by students by opting additional courses mentioned against Department Elective Courses /open courses.
 - 4 Scheme & syllabus of VII & VIII semester admitted under CBCS scheme was also discussed and recommended.
 - 5 Suggestions given by Student OBE coordinators, students of all years & faculty members were incorporated in the scheme & syllabus.
 - 6 Courses to be taught under DE, DC, OC, ESC, BSC etc were also discussed and recommended.
 - 7 Members were also appraised about COs of the courses of current scheme & PO, PEO, PSO of the programme & Vision & Mission of the department.
 - 8 External members could not turn up due to their personnel reasons.
- Meeting ends with the vote of thanks to the chair.



Prof. Aditya K. Agarwal
Member BOS


Prof. G. Bhadoriya
Member BOS


Prof. A.K. Saxena
Member BOS

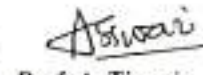

Prof. A.K. Dwivedi
Member BOS


Dr. Sanjay Tiwari
Member BOS


Dr. R. Kansal
Member BOS


Dr. S.K. Jain
Member BOS


Dr. M.K. Trivedi
Member BOS


Prof. A. Tiwari
Chairperson BOS


Dr. M. Pandit
Dean Academics

2. Panel of External Examiners July, 2018 – June, 2019

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

Civil Engineering Department

Panel of External Examiners for Academic Session July, 2018 - June, 2019

B.E. Civil Engineering

S. No.	Name of External Examiner	Designation	Postal Address
1	Dr. S. K. Mittal	Ex - Professor	MANIT Bhopal
2	Dr. Pradeep Kumar	Professor	Civil Engg. Deptt., HBTI Kanpur
3	Dr. R. K. Shrivastava	Professor	Civil Engg. Deptt., SGSITS Indore
4	Dr. A. K. Nigam	Professor	Civil Engg. Deptt., BIET Jhansi
5	Dr. S. S. Bhadoriya	Professor	Civil Engg. Deptt, UIT RGPV
6	Dr. Saleem Akhtar	Professor	Civil Engg. Deptt, UIT RGPV
7	Dr. S. S. Kushwaha	Professor	Civil Engg. Deptt, UIT RGPV
8	Dr. Atul Sthapak	Professor	Civil Engg. Deptt, UEC Ujjain
9	Dr. Anil Sharma	Professor	Civil Engg. Deptt, MANIT Bhopal
10	Dr. Mukesh Shukla	Professor	Civil Engg. Deptt, BIET Jhansi
11	Dr. V. Rode	Professor	Civil Engg. Deptt., SGSITS Indore
12	Dr. S. K. Katiyar	Professor	Civil Engg. Deptt, MANIT Bhopal
13	Dr. A. K. Dwivedi	Professor	Civil Engg. Deptt., RTU, Kota
14	Dr. J. K. Sharma	Professor	Civil Engg. Deptt., RTU, Kota
15	Dr. C. S. Gokhale	Dean	SOCTM, NICMAR, Pune
16	Dr. Rakesh Khare	Professor	Civil Engg. Deptt., SGSITS Indore
17	Dr. K. K. Pathak	Professor	Civil Engg. Deptt., IIT BHU, Varanasi
18	Dr. Shakeel Ahmad	Professor	Civil Engg. Deptt, ZHCET, AMU, Aligarh
19	Dr. M. M. Pande	Retired Professor	H. No. 182, Sector -3, Urban Estate, Kurukshetra
20	Dr. Mileen Laghate	Professor	Civil Engg. Dpett., SGSITS Indore
21	Dr. P. K. Jain	Professor	Civil Engg. Deptt., MANIT Bhopal

Handwritten signatures and dates at the bottom of the page, including "25/11/18" and "25/11/18".

22	Dr. U. B. Choubey	Professor	Civil Engg. Deptt., SGSITS Indore
23	Dr. Sandeep Narulkar	Professor	Civil Engg. Deptt., SGSITS Indore
24	Dr. B. K. Slugh	Director	ITM Gwalior
25	Prof. M. S. Raghuvanshi	Head	Civil Engg. Deptt., BRA Polytechnic, Gwalior
26	Prof. Surendra Singh Sharma	Lecturer (SG)	Govt. Women Polytechnic, Gwalior
27	Prof. T. R. Arora	Head	Civil Engg. Deptt., LNCT Bhopal
28	D. P. S. Kushwah	Head	Civil Engg. Deptt., MPCIT Gwalior
29	Dr. N. K. Jain	Director	ASTRAL Institute of Technology, Indore
30	Dr. Jitendra Goyal	Director	NHAI, New Delhi
31	Dr. Ravindra Kumar	Principal Scientist	CRRI, New Delhi
32	Dr. Binod Kumar	Scientist E	CRRI, New Delhi
33	Dr. Guru Vittal	Scientist F	CRRI, New Delhi
34	Er. P. K. Upmanyu	Executive Engineer, Q / C	WRD, Gwalior
35	Er. B. K. Tyagi	Engineer	Nagar Nigam, Gwalior
36	Er. Manish Yadav	Engineer	Nagar Nigam, Gwalior
37	Er. Raghvendra Gupta	Executive Engineer	NWDA, Gwalior
38	Er. Prabhat Asthana	S. D. O.	PWD, Gwalior
39	Er. Pradeep Agrawal	Director Planning	Chief Engineer Shillong Zone, SE Falls, MES, Shillong
40	Dr. Mahesh Jai	Associate Professor	Civil Engg. Deptt., MNIT Jaipur
41	Dr. S. K. Tiwari	Associate Professor	Civil Engg. Deptt., MNIT Jaipur
42	Dr. P. K. Agrawal	Professor	Civil Engg. Deptt., MANIT Bhopal
43	Dr. Amitabh Shrivastava	Associate Professor	Civil Engg. Deptt., BIET Jhansi
44	Dr. Vimal Gupta	Associate Professor	Civil Engg. Deptt., HCST, Farah, Mathura
45	Prof. R. K. Bhatia	Associate Professor	Civil Engg. Deptt., JEC Jabalpur
46	Prof. A. K. Singhai	Associate Professor	Civil Engg. Deptt., JEC Jabalpur

47	Prof. R. K. Yadav	Associate Professor	Civil Engg. Deptt., JEC Jabalpur
48	Prof. M. K. Koshta	Associate Professor	Civil Engg. Deptt., JEC Jabalpur
49	Prof. S. K. Ahirwar	Assistant Professor	Civil Engg. Deptt., SGSITS Indore
50	Prof. Ruchin Agrawal	Assistant Professor	Civil Engg. Deptt., KNIT Sultanpur
51	Prof. D. C. Rahi	Assistant Professor	Civil Engg. Deptt., JEC Jabalpur
52	Dr. Mukesh Pandey	Head	Civil Engg. Deptt., ITM, Gwalior
53	Dr. Nek Ram Rawal	Assistant Professor	Civil Engg. Deptt, MNNIT Allahabad
54	Er. Rajesh Chaturvedi	Assistant Engineer	WRD, Gwalior
55	Prof. Rakesh Gupta	Assistant Professor	Civil Engg. Deptt., ITM, Gwalior
56	Prof. Uddhava Dwiwedi	Assistant Professor	Civil Engg. Deptt., FET, Agra College, Agra
57	Dr. V. K. Shivhare	Assistant Professor	Civil Engg. Deptt, HCST, Farah, Mathura
58	Prof. Satish Jain	Assistant Professor	Civil Engg. Deptt., UIT RGPV, Bhopal
59	Dr. Amit Vishwakarma	Assistant Professor	Civil Engg. Deptt., UIT RGPV, Bhopal
60	Prof. Aslam Hussain	Assistant Professor	Civil Engg. Deptt., UIT RGPV, Bhopal
61	Prof. Manoj Sharma	Assistant Professor	Civil Engg. Deptt., IPS College, Gwalior
62	Prof. Mohan Kanthariya	Assistant Professor	Civil Engg. Deptt., AMITY University, Gwalior
63	Prof. Ankesh Birthariya	Sub Engineer	Nagar Nigam, Indore
64	Prof. Rohit Sahu	Assistant Professor	Civil Engg. Deptt., ITM University, Gwalior
65	Prof. Aman Ahlawat	Assistant Professor	Civil Engg. Deptt., DCRUST, Murthal, Sonapat
66	Prof. Shalini Mishra	Assistant Professor	Civil Engg. Deptt., Gurgaon College of Engg., Gurgaon
67	Er. Hariom Gera	Structural Consultant	New Delhi
68	Dr. S. P. S. Rajput	Assistant Professor	Civil Engg. Deptt, MANIT Bhopal
69	Dr. J. S. Chauhan	Director	SATI Vidisha
70	Dr. Mangesh Madurwar	Assistant Professor	Civil Engineering Department, VNIT Nagpur

71	Dr. Mukul Kulshreshtha	Professor	Civil Engineering Department, MANIT Bhopal
72	Dr. A. B. Gupta	Professor	Civil Engineering Department, MNIT Jaipur
73	Dr. M. C. Paliwal	Professor	Civil Engg. Deptt., NITTR Bhopal
74	Dr. Nirendra Dev	Professor	Civil Engg. Deptt., DTU, Delhi
75	Dr. Rajeev Chandak	Professor	Civil Engg. Deptt., JEC Jabapur
76	Dr. J. P. Tegar	Professor	Civil Engg. Deptt., NITTR Bhopal
77	Dr. D. K. Jain	Professor	Civil Engg. Deptt., REC, Rewa
78	Dr. Sanjay Bhandari	Professor	Civil Engg. Deptt., SATI Vidisha
79	Dr. Devendra Mohan	Professor	Civil Engg. Deptt., IIT BHU, Varanasi
80	Dr. A. K. Nema	Professor	Civil Engg. Deptt., IIT Delhi
81	Dr. D. J. Killedar	Professor	Civil Engg. Deptt. SGSITS Indore
82	Dr. B. R. Chahar	Professor	Civil Engg. Deptt., IIT Delhi
83	Dr. Uttamasha Gupta	Professor	Civil Engg. Deptt., SGSITS Indore
84	Dr. V. Tare	Professor	Civil Engg. Deptt., SGSITS Indore
85	Dr. R. S. Banshtu	Associate Professor	Civil Engg. Deptt., NIT Hamirpur
86	Dr. Dharmendra	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
87	Dr. Chander Prakash	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
88	Dr. Hemant K. Vinayak	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
89	Dr. Umesh K. Pandey	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
90	Dr. S. S. Katoch	Associate Professor	Energy & Environment Engg. Deptt, NIT Hamirpur
91	Dr. Pardeep Kumar	Associate Professor	Civil Engg. Deptt., NIT Hamirpur
92	Dr. V. S. Dogra	Associate Professor	Civil Engg. Deptt., NIT Hamirpur
93	Prof. A. M. Mathur	Retired Professor	Gwalior
94	Dr. Swapnil Rai	Assistant Professor	Environment Science Deptt., AMITY University, Gwalior
95	Prof. P. K. Jain	Retired Professor	MITS Gwalior

96	Dr. Ankit Gupta	Assistant Professor	Civil Engg. Deptt., IIT BHU
97	Prof. Geeta Batham	Assistant Professor	Civil Engg. Deptt., UIT RGPV Bhopal
98	Prof. Aruna Rawat	Assistant Professor	Civil Engg. Deptt., UIT RGPV Bhopal
99	Dr. Y. P. Mathur	Professor	Civil Engg. Deptt., MNIT Jaipur
100	Dr. R. D. Gupta	Professor	Civil Engg. Deptt., MNNIT Allahabad
101	Dr. A. K. Nigam	Associate Professor	Civil Engg. Deptt., BIET Jhansi
102	Dr. R. K. Kaushal	Assistant Professor	Civil Engg. Deptt., BIET Jhansi
103	Dr. Sunil Ajmera	Associate Professor	Civil Engg. Deptt., SGSITS Indore
104	Prof. Devendra Dohare	Assistant Professor	Civil Engg. Deptt., SGSITS Indore
105	Dr. Y. P. Joshi	Professor	Civil Engg. Deptt., SATI Vidisha
106	Prof. K. K. Punjabi	Associate Professor	Civil Engg. Deptt., SATI Vidisha
107	Dr. Raghvendra Singh	Professor	Civil Engg. Deptt., UEC Ujjain
108	Dr. Sudhir Kumar	Professor	Civil Engg. Deptt., MNIT Jaipur
109	Dr. V. N. Khatri	Assistant Professor	Civil Engg. Deptt., IIT (ISM) Dhanbad
110	Dr. P. K. S. Dikshit	Professor	Civil Engg. Deptt., IIT BHU
111	Dr. R. K. Dutta	Professor	Civil Engg. Deptt., NIT Hamirpur
112	Prof. Sunil Sharma	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
113	Dr. Sohail Ayub	Associate Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh
114	Dr. Suraj Prakash	Scientist F	CRRI, New Delhi
115	Shri Suresh K. Ahirwar	Assistant Engineer	Nagar Nigam, Gwalior
116	Dr. Umesh Maheshwari	Associate Professor	Civil Engg. Deptt., KNIT Sultanpur
117	Usha Choudhary	Assistant Engineer	RES, Ashok Nagar
118	Roopal Katore	Assistant Professor	Govt. Polytechnic, Ashok Nagar
119	Braham Datt Purohit	Assistant Professor	Govt. Polytechnic, Ashok Nagar
120	Prof. H. K. Mahiyar	Professor	Civil Engg. Deptt., SGSITS Indore

121	Dr. S. K. Thakkar	Retired Professor	IIT Roorkee
122	Dr. H. K. Sharma	Professor	Civil Engg. Deptt., NIT Kurukshetra
123	Dr. C. S. P. Ojha	Professor	Civil Engg. Deptt., IIT Roorkee
124	Dr. A. A. Kazmi	Professor	Civil Engg. Deptt., IIT Roorkee
125	Dr. N. K. Samadhiya	Professor	Civil Engg. Deptt., IIT Roorkee
126	Dr. Mahendra Singh	Professor	Civil Engg. Deptt., IIT Roorkee
127	Dr. Achal Mittal	Principal Scientist	CBRI, Roorkee
128	Dr. A. K. Minocha	Director & Head	CBRI, Roorkee
129	Dr. Navjeev Saxena	Principal Scientist	CBRI, Roorkee
130	Dr. Khalid Moin	Professor	Civil Engg. Deptt., Jamia Millia Islamia University, New Delhi
131	Prof. Ziauddin Ahmad	Associate Professor	Civil Engg. Deptt., Jamia Millia Islamia University, New Delhi
132	Dr. Mohammad Arif	Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh
133	Dr. Iqbal Kahleel Khan	Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh
134	Dr. Shamsuddin Jafri	Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh
135	Dr. Pankaj Agarwal	Professor	Civil Engg. Deptt., IIT Roorkee

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

Civil Engineering Department

Panel of External Examiners for Academic Session July, 2018 - June, 2019

PG Programmes in Civil Engineering

S. No.	Name of External Examiner	Designation	Postal Address
1	Dr. N. K. Samadhiya	Professor	Civil Engg. Deptt., IIT Roorkee
2	Dr. A. K. Dwivedi	Professor	Civil Engg. Deptt., RTU, Kota
3	Dr. R. K. Shrivastava	Professor	Civil Engg. Deptt., SGSITS Indore
4	Dr. J. S. Chauhan	Director	SATI Vidisha
5	Dr. J. K. Sharma	Professor	Civil Engg. Deptt., RTU, Kota
6	Dr. S. S. Kushwaha	Professor	Civil Engg. Deptt, UIT RGPV
7	Dr. Pradeep Kumar	Professor	Civil Engg. Deptt., HBTI Kanpur
8	Dr. S. K. Saran	Principal Scientist	NBRI, Roorkee
9	Dr. B. K. Singh	Director	ITM Gwalior
10	Dr. S. K. Tiwari	Associate Professor	Civil Engg. Deptt., MNIT Jaipur
11	Dr. Mahesh Jat	Associate Professor	Civil Engg. Deptt., MNIT Jaipur
12	Dr. Vimal Gupta	Associate Professor	Civil Engg. Deptt, HCST, Farah, Mathura
13	Prof. M. S. Raghuvanshi	Head	Civil Engg. Deptt., BRA Polytechnic, Gwalior
14	Dr. Mukesh Pandey	Assistant Professor	Civil Engg. Deptt., ITM, Gwalior
15	Dr. S. P. S. Rajput	Assistant Professor	Civil Engg. Deptt, MANIT Bhopal
16	Prof. V. K. Shivhare	Assistant Professor	Civil Engg. Deptt, HCST, Farah, Mathura
17	Er. Akhilendra Singh	IES	MES, Bhopal
18	Er. Girraj Goyal	IES	MES, New Delhi
19	Er. S. C. Gupta	IES	MES, Meerut
20	Er. Anil Khare	IES	Indian Railways, Jabalpur
21	Er. S. R. Agrawal	Director	Ministry of Defence, New Delhi
22	Er. Neeraj Agrawal	IES	Indian Railways, New Delhi

23	Dr. C. S. Gokhale	Dean	SOCTM, NICMAR, Pune
24	Dr. Mangesh Madurwar	Assistant Professor	Civil Engineering Department, VNIT Nagpur
25	Dr. K. K. Pathak	Professor	Civil Engineering Department, IIT BHU
26	Dr. A. K. Saxena	Head	Civil Engineering Department, LNCT, Bhopal
27	Dr. Mukul Kulshreshtha	Professor	Civil Engineering Department, MANIT Bhopal
28	Dr. A. B. Gupta	Professor	Civil Engineering Department, MNIT Jaipur
29	Dr. Nirendra Dev	Professor	Civil Engg. Deptt., DTU, Delhi
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31	Dr. J. P. Tegar	Professor	Civil Engg. Deptt., NITTR Bhopal
32	Dr. S. S. Bhadoriya	Professor	Civil Engg. Deptt, UIT RGPV
33	Dr. M. M. Pande	Retired Professor	II. No. 182, Sector -3, Urban Estate, Kurukshetra
34	Dr. Saleem Akhtar	Professor	Civil Engg. Deptt, UIT RGPV
35	Dr. V. Rode	Professor	Civil Engg. Deptt., SGSITS Indore
36	Dr. Shakeel Ahmad	Professor	Civil Engg. Deptt, ZHCET, AMU, Aligarh
37	Dr. M. C. Paliwal	Professor	Civil Engg. Deptt., NITTR Bhopal
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41	Dr. Mileen Laghate	Professor	Civil Engg. Dpett., SGSITS Indore
42	Prof. Uddhava Dwiwedi	Assistant Professor	FET, Agra College of Engg., Agra
43	Dr. Devendra Mohan	Professor	Civil Engg. Deptt., IIT BHU, Varanasi
44	Dr. A. K. Nema	Professor	Civil Engg. Deptt., IIT Delhi
45	Dr. Atul Sthapak	Professor	Civil Engg. Deptt, UEC Ujjain
46	Dr. Anil Sharma	Professor	Civil Engg. Deptt, MANIT Bhopal
47	Dr. Amitabh Shrivastava	Associate Professor	Civil Engg. Deptt, BIET Jhansi
48	Prof. R. K. Bhatia	Associate Professor	Civil Engg. Deptt., JEC Jabalpur

49	Prof. M. K. Koshta	Associate Professor	Civil Engg. Deptt., JEC Jabalpur
50	Prof. Surendra Singh Sharma	Principal	Govt. Women Polytechnic, Gwalior
51	Dr. Nek Ram Rawal	Associate Assistant Professor	Civil Engg. Deptt., MNNIT Allahabad
52	Dr. Uttamasha Gupta	Professor	Civil Engg. Deptt., SGSITS Indore
53	Dr. R. S. Banshtu	Associate Professor	Civil Engg. Deptt., NIT Hamirpur
54	Dr. Dharmendra	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
55	Dr. Chander Prakash	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
56	Dr. Hemant K. Vinayak	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
57	Dr. Umesh K. Pandey	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
58	Dr. S. S. Katoch	Associate Professor	Energy & Environment Engg. Deptt., NIT Hamirpur
59	Dr. Pardeep Kumar	Associate Professor	Civil Engg. Deptt., NIT Hamirpur
60	Dr. Ankit Gupta	Assistant Professor	Civil Engg. Deptt., IIT BHU
61	Prof. Aruna Rawat	Assistant Professor	Civil Engg. Deptt., UIT RGPV Bhopal
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63	Dr. R. K. Kaushal	Assistant Professor	Civil Engg. Deptt., BIET Jhansi
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66	Dr. Raghvendra Singh	Professor	Civil Engg. Deptt., UEC Ujjain
67	Dr. Sudhir Kumar	Professor	Civil Engg. Deptt., MNIT Jaipur
68	Dr. V. N. Khatri	Assistant Professor	Civil Engg. Deptt., IIT (ISM) Dhanbad
69	Dr. P. K. S. Dikshit	Professor	Civil Engg. Deptt., IIT BHU
70	Dr. R. K. Dutta	Professor	Civil Engg. Deptt., NIT Hamirpur
71	Prof. Sunil Sharma	Assistant Professor	Civil Engg. Deptt., NIT Hamirpur
72	Dr. Sohail Ayub	Associate Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh

73	Dr. Suraj Prakash	Scientist F	CRRI, New Delhi
74	Dr. Umesh Maheshwari	Associate Professor	Civil Engg. Deptt., KNIT Sultanpur
75	Prof. H. K. Mahiyar	Professor	Civil Engg. Deptt., SGSITS Indore
76	Dr. S. K. Thakkar	Retired Professor	IIT Roorkee
77	Dr. H. K. Sharma	Professor	Civil Engg. Deptt., NIT Kurukshetra
78	Dr. C. S. P. Ojha	Professor	Civil Engg. Deptt., IIT Roorkee
79	Dr. A. A. Kazmi	Professor	Civil Engg. Deptt., IIT Roorkee
80	Dr. N. K. Samadhiya	Professor	Civil Engg. Deptt., IIT Roorkee
81	Dr. Mahendra Singh	Professor	Civil Engg. Deptt., IIT Roorkee
82	Dr. Achal Mittal	Principal Scientist	CBRI, Roorkee
83	Dr. A. K. Minocha	Director & Head	CBRI, Roorkee
84	Dr. Navjeev Saxena	Principal Scientist	CBRI, Roorkee
85	Dr. Khalid Moin	Professor	Civil Engg. Deptt., Jamia Millia Islamia University, New Delhi
86	Prof. Ziauddin Ahmad	Associate Professor	Civil Engg. Deptt., Jamia Millia Islamia University, New Delhi
87	Dr. Mohammad Arif	Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh
88	Dr. Iqbal Kahleel Khan	Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh
89	Dr. Shamsuddin Jafri	Professor	Civil Engg. Deptt., ZHCET, AMU, Aligarh
90	Dr. Pankaj Agarwal	Professor	Civil Engg. Deptt., IIT Roorkee

3. Scheme of B.Tech Civil Engg. 1st to 8th Sem under AICTE flexible scheme to be implemented from July 2018

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

Scheme Structure & Semester-wise credit distribution (under flexible curriculum design)
Reference Course Scheme Structure & Semester-wise credit distribution[#]

[#]This is a suggestive structure, departments may adopt it with required variation, as per the need and demand of their discipline/branch

General Definition:

L	Lecture
T	Tutorial
P	Practical
HSMC	Humanities and Social Sciences including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
DC	Departmental Core Courses ^{MC}
DE	Departmental Elective Courses ^{MC}
OC	Open Category Courses ^{MC}
DLC	Departmental Laboratory Courses
MC	Mandatory Courses

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Definition of Credit:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
2 Hours Practical(Lab)/week	1 credit

Range of Credits:

A student will be eligible to get Under Graduate degree after earning minimum 170 credits. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering Specialization, if he/she completes 190 credits. These could be acquired through MOOCs.

Note: In partial fulfillment of flexible curriculum design, a mandate provision to earn credits through E-Learning (NPTEL/MOOC etc.) based Departmental Core/Elective (DC/DE) has been introduced. Additionally, to give the students more flexibility to orient themselves as per their interest while retaining the discipline specific knowledge and capabilities, provision for Open Category (OC) Courses have been made.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Structure of Undergraduate Engineering program:

S. No.	Category	Suggested Breakup of Credits (Total 160) (as proposed by AICTE)	Component wise credit allotment	No. of Courses
1	Humanities and Social Sciences including Management Courses (HSMC)	12**	12	04
2	Basic Science Courses (BSC)	26**	20	05
3	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc. (ESC)	29**	21	06
4	Departmental Core Courses (DC)	47**	56	14
5	Departmental Elective Courses relevant to specialization/branch (DE)	23**	16	05
6	Open Category- Electives from other technical and /or emerging subjects (OC)	11**	15	05
7	Project work, seminar and internship in industry or appropriate work place/ academic and research in-situations (DLC/SWAYAM/NPTEL/MOOC-Practical Slot)	12**	22	13
8	Mandatory Courses (MC)		8	03
	Total	160**	170	55

**Minor variation is allowed as per need of the respective disciplines.













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

Scheme of Examination
GROUP B: I Semester

B. Tech. I Semester (Civil Engineering)

For batches admitted in academic session 2018-19 onwards (V.A.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Contact Hours per Week			Total Credits	
				Theory Slot		Practical Slot		Total Marks	L	T	P		
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.						Lab work / Sessional
1.	100101	BSC-1	Engineering Chemistry (BSC-1)	70	20	10	30	20	150	3	-	2	4
2.	100102	BSC-2	Engineering Mathematics - I (BSC-2)	70	20	10	-	-	100	3	1	-	4
3.	100103	HSMC-1	Technical English (HSMC-1)	70	20	10	30	20	150	3	-	2	4
4.	100104	ESC-1	Basic Electrical & Electronics Engineering (ESC-1)	70	20	10	30	20	150	3	-	2	4
5.	100105	ESC-2	Engineering Graphics (ESC-2)	70	20	10	30	20	150	3	-	2	4
6.	100106	ESC-3	Manufacturing Practices (ESC-3)	-	-	-	30	20	50	-	-	2	1
			Total	350	100	50	150	100	750	15	1	10	21

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

NSS / NCC

Qualifier

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

01 Theory Period=1 Credit; 01 Tutorial Period = 1 Credit; 02 Practical Periods =1 Credit

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

Scheme of Examination

GROUP B: II Semester

B. Tech. II Semester (Civil Engineering)

For batches admitted in academic session 2018 - 19 onwards (W.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted					Total Marks			Contact Hours per Week			Total Credits
				Theory Slot		Quiz /Assignment	Practical Slot		Total Marks	L	T	P			
				End Sem.	Mid Sem.		End Sem.	Lab work / Sessional							
1.	100201	BSC - 3	Engineering Physics (BSC-3)	70	20	10	30	20		150	2	1	2	4	
2.	100202	HSMC - 2	Energy, Environment, Ecology & Society (HSMC-2)	70	20	10	-	-		100	3	-	-	3	
3.	100203	ESC - 4	Basic Computer Engineering (ESC-4)	70	20	10	30	20		150	3	-	2	4	
4.	100204	ESC - 5	Basic Mechanical Engineering (ESC-5)	70	20	10	30	20		150	3	-	2	4	
5.	100205	ESC - 6	Basic Civil Engineering & Mechanics (ESC-6)	70	20	10	30	20		150	3	-	2	4	
6.	100206	HSMC - 3	Language Lab. & Seminars (HSMC-3)	-	-	-	30	20		50	-	-	4	2	
			Total	350	100	50	150	100		750	14	1	12	21	
Summer Internship Project - I (Institute Level) (Qualifier): Minimum two-week duration : Evaluation in III Semester.															
NSS / NCC															
Qualifier															

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

B. Tech. III Semester (Civil Engineering)

For batches admitted in academic session 2017 – 18 & 2018 – 19 onwards (W.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted				Contact Hours per Week			Total Credits	
				Theory Slot		Practical Slot		Total Marks	L	T		P
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.					
1.	100001	BSC - 4	Engineering Mathematics - II (BSC-4)	70	20	10	-	-	3	1	-	4
2.	110302	DC - 1	Building Planning & Design (DC-1)	70	20	10	-	-	3	1	-	4
3.	110303	DC - 2	Building Materials & Construction (DC-2)	70	20	10	30	20	3	-	2	4
4.	110304	DC - 3	Surveying (DC-3)	70	20	10	30	20	3	-	2	4
5.	110305	DC - 4	Strength of Materials (DC-4)	70	20	10	30	20	3	-	2	4
6.	110306	DLC - 1	Software Lab (DLC-1)*	-	-	-	30	20	-	-	2	1
7.	110307	Seminar / Self Study	Self Learning / Presentation (Through Swayam / NPTEL / MOOC)*	-	-	-	-	25	-	-	2	1
8.	110308	DLC - 2	Summer Internship Project - I (Institute Level) (Evaluation) (DLC-2)	-	-	-	-	25	-	-	4	2
Total				350	100	50	120	130	15	2	14	24
				NSS / NCC								Qualifier

*Compulsory registration for one online course using SWAYAM / NPTEL / MOOC, evaluation through attendance, assignment and presentation.

*Virtual Lab to be conducted along with traditional Lab.

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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 - Middle right: *Shivam*
 - Bottom left: *Subhanshu*
 - Bottom center: *Shivam*
 - Bottom right: *Shivam*

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

B. Tech. IV Semester (Civil Engineering)

For batches admitted in academic session 2017 - 18 & 2018 - 19 onwards (W.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Contact Periods per Week			Total Credits	
				Theory Slot			Practical Slot			Total Marks	L	T		P
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.	Lab Work / Sessional						
1.	100003	BSC - 5	Engineering Mathematics - III (BSC-5)	70	20	10	-	-	-	100	3	1	-	4
2.	110402	DC - 5	Geotechnical Engineering (DC-5)	70	20	10	30	20	150	2	1	2	4	
3.	110403	DC - 6	Fluid Mechanics - I (DC-6)	70	20	10	30	20	150	2	1	2	4	
4.	110404	DC - 7	Structural Analysis (DC-7)	70	20	10	-	-	100	3	1*	-	4	
5.	110405	DC - 8	Engineering Hydrology (DC-8)	70	20	10	-	-	100	3	1*	-	4	
6.	100004	MC - 2	Cyber Security (MC)	70	20	10	-	-	100	2	1	-	3	
7.	110407	DLC - 3	Survey Practice Lab (DLC-3)*	-	-	-	30	20	50	-	-	4	2	
Total				420	120	60	90	60	750	15	6	8	25	
8.	100002 ⁵	MC - 1	Biology for Engineers (Audit Course) (MC)	70	20	10	-	-	100	3	-	-	03	
NSS / NCC				Qualifier										
Summer Internship Project - II (Software Based) for two weeks duration: Evaluation in V Semester														

⁵ This course will run for Group B/A in IV/III semester respectively. (Marks will not be included in the aggregate, but it is compulsory to obtain pass marks in this course).

*Virtual Lab to be conducted along with traditional Lab.

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination
B. Tech. V Semester (Civil Engineering)

For batches admitted in academic session 2017-18 & 2018-19 onwards (W.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks			Contact Periods per Week			Total Credits	
				Theory Slot			Practical Slot			L	T	P	L	T	P		
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.	Lab work / Sessional									
1.	110501	DC-9	Estimating, Costing & Contracting (DC-9)	70	20	10	-	-	-	3	1	-	100	3	1	-	4
2.	110502	DC-10	Structural Design & Drawing (RCC) (DC-10)	70	20	10	-	-	-	3	1	-	100	3	1	-	4
3.	110503	DC-11	Fluid Mechanics - II (DC-11)	70	20	10	30	20	-	2	1	2	150	2	1	2	4
4.	110504	DC-12	Environmental Engineering - I (DC-12)	70	20	10	30	20	-	2	1	2	150	2	1	2	4
5.	110505	DC-13	Transportation Engineering (DC-13)	70	20	10	30	20	-	2	1	2	150	2	1	2	4
6.	110506	DLC-4	Minor Project - I** (DLC-4)	-	-	-	30	20	-	-	-	-	50	-	-	2	1
7.	110507	DLC-5	Summer Internship Project - II (Evaluation) (DLC-5)	-	-	-	25	-	-	-	-	-	25	-	-	6	3
8.	110508	Seminar / Self Study	Self Learning / Presentation (Through Swayam / NPTEL / MOOC)*	-	-	-	-	25	-	-	-	-	25	-	-	2	1
Total				350	100	50	145	105	50	12	5	16	750	12	5	16	25
9.	Additional Courses for Honours or Minor Specialization			Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization													

** The Minor Project - I may be evaluated by an internal committee for awarding sessional marks.

* Compulsory registration for one online course using SWAYAM / NPTEL / MOOC, evaluation through attendance, assignment and presentation

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication) *Handwritten signature*
GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile) *Handwritten signature*

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination
B. Tech. VI Semester (Civil Engineering)

For batches admitted in academic session 2017-18 & 2018-19 onwards (W.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Contact Periods per Week			Total Credits
				Theory Slot		Practical Slot		Total Marks	L	T	P		
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.					Lab work / Sessional	
1.	100005*	HSMC-4	Ethics, Economics, Entrepreneurship & Management (HSMC-4)	70	20	10	-	-	100	3	-	-	3
2.	110602	DC-14	Environmental Engineering - II (DC-14)	70	20	10	30	20	150	2	1	2	4
3.	110603	DE-1	(DE-1)*	70	20	10	-	-	100	3	1	-	4
4.	110604	DE-2	(DE-2)*	70	20	10	-	-	100	3	1	-	4
5.	110605	OC-1	(OC-1)*	70	20	10	-	-	100	2	1	-	3
6.	110007	MC-4	Disaster Management (MC)	70	20	10	-	-	100	3	-	-	3
7.	110607	DLC-6	Minor Project - II (DLC-6)	-	-	-	50	70	100	-	-	4	2
8.	100006 ⁵	MC-3	Indian Constitution & Traditional Knowledge (Audit Course) (MC)	420	120	60	80	70	750	16	4	6	23
9.			Additional Courses for Honours or Minor Specialization	70	20	10	-	-	100	3	-	-	03
				Department Level activity / workshop / awareness programme to be conducted; certificate of compliance to be submitted by HoD to the Exam controller through Dean Academics									
				Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization									
				Summer Internship Project - III (On Job Training) for Four Weeks Duration : Evaluation in VII Semester									

* This course will run for Group B/A in VI/V semester respectively.

⁵ This course will run for Group B/A in VI/V semester respectively. (Marks will not be included in the aggregate, but it is compulsory to obtain pass marks in this course).

* At least one of these courses must be run through SWAYAM / NPTEL / MOOC.

GROUP A: (Electrical, Electronics, Computer Science, Information Technology, Electronics & Telecommunication)

GROUP B: (Civil, Mechanical, Chemical, Biotech, Automobile)

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination
B. Tech. VII Semester (Civil Engineering)

For batches admitted in academic session 2017-18 & 2018-19 onwards (W.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Periods per Week			Total Credits
				Theory Slot		Practical Slot		Total	L		T	P		
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.						Lab Work/Sessional	
1.	110701	DE-3	(DE-3)*	70	20	10	-	-	100	3	-	-	3	
1.	110702	DE-4	(DE-4)*	70	20	10	-	-	100	2	-	-	2	
1.	110703	OC-2	(OC-2)*	70	20	10	-	-	100	2	1	-	3	
1.	110704	OC-3	(OC-3)*	70	20	10	-	-	100	3	-	-	3	
1.	100008	MC-5	Intellectual Property rights (IPR) (MC)	70	20	10	-	-	100	2	-	-	2	
1.	110706	DLC-7	Software Application for Solving Civil Engineering Problems (DLC-7)	-	-	-	50	-	100	-	-	4	2	
1.	110707	DLC-8	Summer Internship Project - III (04 weeks) (Evaluation) (DLC-8)	-	-	-	50	-	100	-	-	4	2	
1.	110708	DLC-9	Creative Problem Solving (Evaluation) (DLC-9)	-	-	-	25	-	50	-	-	2	1	
Total				350	100	50	125	125	750	12	1	10	18	
Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization														

* At least one of these courses must be run through SWAYAM/NPTEL/MOOC.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

B. Tech. VIII Semester (Civil Engineering)

For batches admitted in academic session 2017 - 18 & 2018 - 19 onwards (W.E.F. JULY 2018)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Periods per Week			Total Credits
				Theory Slot			Practical Slot				L	T	P	
				End Sem.	Mid Sem.	Quiz/Assignment	End Sem.	Lab Work / Sessional						
1.	110801	DE-5	(DE-5)*	70	20	10	-	-	-	3	-	-	3	
2.	110802	OC-4	(OC-4)*	70	20	10	-	-	-	3	-	-	3	
3.	110803	OC-5	(OC-5)*	70	20	10	-	-	-	3	-	-	3	
4.	110804	DLC-10	Internship / Project (DLC-10)	-	-	-	250	150	-	-	-	-	6	3
5.	110805	DLC-11	Innovative Technical Contributions*	-	-	-	-	50	-	-	-	-	2	1
Total				210	60	30	250	200	250	750	9	-	8	13

Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization

* At least one of these courses must be run through SWAYAM / NPTEL / MOOC.
* Evaluation will be based on participation/laurels brought by the students to the institution in national/state level technical events during the complete tenure of the UG program.






MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Civil Engineering Semester wise Credit Distribution

S.No.	Semesters	Credit Distribution
1	Semester – I	21
2	Semester – II	21
3	Semester – III	24
4	Semester – IV	25
5	Semester – V	25
6	Semester – VI	23
7	Semester – VII	18
8	Semester – VIII	13
Total		170

1st year

4. Syllabus of B.Tech Civil Engg. 2nd Year (3rd & 4th Sem.) to be implemented from July 2018

Course Code: 100205
Course Name: Basic Civil Engineering & Mechanics

L	T	P	Credit
3	0	2	4

Course Objectives:

1. To understand the utility of various types of building materials.
2. To understand the location, construction detail and suitability of various building elements.
3. To determine the location of object on ground surface.
4. To stabilize the position of various object.
5. To understand the effects of system of forces on rigid body in static conditions.
6. Analysis of determinate structure (beam & truss)

Syllabus:

Unit- I

Building Materials: Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & Laboratory tests on concrete, curing of concrete and mortar Materials.

Unit- II

Surveying & Positioning: Introduction to surveying, Survey stations, Measurement of distances- conventional and EDM methods, Measurement of directions by different methods, Measurement of elevations by different methods, reciprocal leveling.

Unit- III

Mapping & Sensing : Mapping details and contouring, Plane tables and related devices. Introduction of Theodolite. Measurement of areas and volumes, application of measurements in quantity computations, Introduction of remote sensing and its applications.

Unit- IV

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non concurrent coplanar forces, free body Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses, method of joints, method of Sections. Frictional force in equilibrium problems.

Unit -V

Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment of Inertia of Composite section , Radius of Gyration, Introduction to product of Inertia and Principle Axes.

Support Reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

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Course Outcomes:

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

- CO1: Identify suitable building materials according to IS code and its engineering application.
- CO2: Measure the linear distance & directions by conventional & EDM methods for traverse
- CO3: Estimate area and volume of field using theodolite and plane table for graphical representation.
- CO4: Analyse plane truss by method of joints and sections and analysis of concurrent & non concurrent co-planar forces.
- CO5: Determine location of centre of gravity and moment of inertia for different shapes
- CO6: Draw SF & BM diagram for simply supported and cantilever beams subjected to various loadings.

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

- CO1: Measure the linear distance by chain, tape & dumpy level.
- CO2: Determine R.L. of known points of different terrain by dumpy level
- CO3: Observe horizontal & vertical angle by theodolite.
- CO4: Determine area of known terrain & estimate earthwork.
- CO5: Calculate Shear force & Bending moment by graphical method

Books Recommended:

1. S. Ramamurtam & R. Narayan; Basic Civil Engineering. Dhanpat Rai Pub.
2. Prasad I.B., Applied Mechanics, Khanna Publication
3. Punmia, B.C., Surveying, Standard book dept.
4. Shesha Prakash and Mogaveer, ; Elements of Civil Engg. & Engg. Mechanics; PHI
5. S.P. Timoshenki. Mechanics of structure, East West press Pvt.Ltd.
6. Surveying by Duggal – Tata Mc Graw Hill New Delhi
7. Global Positioning System Principles and application – Gopi, TMH
8. R.C. Hibbler – Engineering Mechanics – Statics & Dynamics
9. A. Borelli & Schmidt – Engineering Mechines - statics dynamics, Thomson Books
- 10 R.K. Rajput, Engineering Mechanics S. Chand & Co.

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Amit Kumar, MS, Anand, A, L, M, J. Srinivas

Course Code: 110302

Course Name: Building Planning & Design

L	T	P	Credit
3	1	0	4

Course Objectives:

1. To make aware the student with sustainability aspects of building
2. To impart knowledge to students about significance of building bye-laws & rules & regulation regarding building planning.
3. To impart knowledge to students regarding specific consideration required to be considered under Indian condition for planning & designing of building.
4. To appraise students about the rules & consideration to get adequate ventilation, lighting & sound insulation for improved energy efficiency of building.
5. To make students understand about various essential requirements of different type of building.
6. To make aware students about green building rating for enhanced sustainability.

Syllabus:

Unit I

Natural Environment & Built environment, Ecology, Ecosphere - sustainable development, Dimensions of sustainability, Built Environment & liveability, Integrated approach in design, challenges in sustainable development, Green environment, expectations from green building, IGBC, LEED, GRIHA, SVA, GRIHA.

Unit II

Building Bye - laws, functions of local authority, Terminology i.e. (Building line, control line, AB, flight plane etc.) Principles underlying building bye- laws, classification of building, requirements of parts of Buildings, site section of building, orientation, factors affecting orientation, orientation criteria's for Indian conditions, Provisions of NBC.

Unit III

Principles of planning of buildings (Aspects, prospect, Furniture requirement, rooming, grouping, privacy, circulation etc.). Principles of architectural composition (Unity, contrast, scale, proportion, balance, Rhythm, character, etc.). Massing, Sun and the Building, Sunpath, Sun shading & devices, Design of sun shades.

Unit IV

Thermal insulation, Heat transfer in building, Thermal insulation materials, methods of thermal insulation, ventilation: natural & artificial, necessity & functional requirement of ventilation, system of ventilation, types of mechanical ventilation, air conditioning, functional requirement of air conditioning, essentials of air conditioning, acoustic and sound insulation, Behaviour of sound, acoustical defects, Sabine formulae, acoustical design of various spaces, sound insulation methods & materials, illumination (natural & artificial).

Unit V

Design and planning consideration for various types of building i.e. Residential Building, Education buildings, Hospitals & Dispensaries, Hotels, Commercial building, recreational buildings, government offices & other, standards specified by Bye-laws, various aspects of sustainability & energy efficiency applied to various types of Building, green building concept applied to various types of building.

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Course Outcomes:

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

- CO1: Apply sustainability aspects of building
- CO2: Implement the principles of planning and bye laws for building practice
- CO3: Explain various essential requirements of different type of building
- CO4: Apply various rules & consideration to get adequate ventilation, lighting & Sound insulation for improved energy efficiency of building
- CO5: Examine green building rating for enhanced sustainability

Books Recommended:

- Building Drawing (Built Environment) by Sah, Kaly and Pathi
- Building Planning, Designing and Scheduling by Gernickian Singh
- Building Design and drawing by Y.S. Sane
- N.B.C (Latest Edition)
- Building Construction by B.C. Punmia
- Building Design and Drawing by Mallick and Mani

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Course Code: H0303

Course Name: Building Materials & Construction

L	T	P	Credit
3	3	2	4

Course Objectives:

7. To study the properties of concrete ingredients i.e. cement, sand and coarse aggregate and to conduct different tests.
8. To select of different types of admixtures to improve the properties of concrete for different field applications.
9. To conduct the field and laboratory tests on concrete in fresh and hardened state.
10. To provide knowledge about various types of bricks, stones, woods & timber, ferroly & non ferroly construction material & their applications.
11. To provide knowledge on design of foundation, including selection of appropriate foundation.
12. To understand laying & construction of brick & stone masonry and various methods of damp proofing etc.
13. To provide knowledge about stairs, floors & roofs in various types of buildings.

Syllabus:

Unit-I

Types of Foundation & its design, masonry construction, masonry classification, stone & brick masonry, joints in stone masonry, brick masonry (bonds in brick masonry, characteristics of bonds, type of bond & typical structures in brickwork, Damp prevention (causes, effects, control & prevention techniques, material used for damp proofing), Anti termite treatment, water proofing treatment, Arches & lintels, stair & stair case, (types & design of stair case), Types of floor & flooring, Roof & roof covering.

Unit - II Ingredients of Concrete:

Portland Cement: Chemical composition of cement, Hydration of cement, setting of cement, tests on physical properties of cement, Types of Portland cement - Ordinary Portland cement - Rapid Hardening Portland cement - low heat Portland cement- Sulphate Resisting cement - Portland Blast furnace cement- Super Sulphated cement- Portland Pozzolana cement and Pozzolanas, Fly ash, use of pozzolanas, white cement, Expansive cements - High alumina cement.

Aggregates: General classification of aggregates, natural and artificial aggregates, particle shape and texture, bond of aggregate, strength of aggregate, Mechanical properties of aggregate (specific gravity, bulk density, porosity and absorption of aggregate, moisture content of aggregate, Bulking of sand, deleterious substances in aggregates, organic impurities, Soundness of aggregates, Alkali-aggregate reaction, Alkali carbonate reaction, sieve analysis - Grading curves, Fineness modulus, Grading requirements, Grading of fine and coarse aggregates and Gap graded aggregates, Thermal properties of aggregates.

Admixtures: Introduction, functions of admixtures, classification of admixtures, Accelerators, Retarders, Water Reducing Agents, Super plasticisers.

Unit - III Fresh and Hardened Concrete:

Fresh Concrete: Workability of concrete, factors affecting workability, measurement of workability (slump test, compaction factor test, Flow test, Ve- Bee Test, Ball penetration test, Nasson Test, the test, Segregation and Bleeding of concrete, Mixing of concrete, Vibration of concrete, Different types of forms and casters, Concreting in Hot weather and Cold weather.

Hardened Concrete: Compressive & Flexural strength of concrete, stress and strain characteristics of concrete, drying shrinkage of concrete, Creep of concrete, Permeability and durability of concrete, Durability.

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Resistance of concrete, Thermal properties of concrete, Micro-cracking of concrete, methods of control, Influence of temperature on strength, Fatigue & Impact strength of concrete.

Unit IV

Stones (classification, characteristics, manufacturing, testing, types) Stones (classification, Quarrying, seasoning characteristics, testing, selection & uses, preservation), Wood & Timber (Classification, Structure & Characteristics, seasoning and its methods, defects & diseases, preservation & various treatments, testing, wood products and their applications)

Unit V

Mortar (Classification, characteristics, functions of ingredients) Types of mortar and their uses, ground, pigments, ferrous material (Pig iron, CL Mild steel, wrought iron, stainless steel compositions & production) Reinforced steel bars (classification, types, designation), Aluminium (its alloys & uses) Copper (its alloys & uses), Ceramics (classification, properties, commercial forms) Paint varnishes & enamels (Types, composition, method of application, defects)

Course Outcomes:

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

- CO1: Analyse properties and role of ingredients like cement, aggregate, admixtures etc. to produce better quality concrete.
- CO2: Evaluate the properties of fresh and hardened concrete for quality control in construction.
- CO3: Select suitable building material for construction.
- CO4: Assess the properties of ferrous & non ferrous material for suitability of building material.
- CO5: Distinguish various elements of building like foundation, masonry work, floors, roofs, stairs etc.
- CO6: Apply various techniques for damp prevention, water proofing & anti-termite resistance.

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

- CO1: Determine the properties of cement, sand & aggregate as per IS code.
- CO2: Determine the workability of concrete for suitability of concrete mix in different construction works.
- CO3: Evaluate compressive strength of various concrete mixes.
- CO4: Determine physical properties of brick by experiment and practice accordingly.
- CO5: Examine the properties of the cement mortar for various elements of buildings.

Books Recommended:

1. Concrete Technology By :- M. L. Gambhir, Tata Me-graw Hill education Pvt. Ltd.
2. Concrete Technology By :- M.S. Shetty, S. Chand Publications.
3. Properties of Concrete By :- Neville, ELBS.
4. Building materials By :- Mr. M.L. Gambhir, Tata Me-graw Hill education Pvt. Ltd.
5. Building material By :-Mr. S.K. Duggal, New Age Publishers.
6. Building construction By:- Mr. B.C. Punmia, A.K.Jain, Laxmi Publishers New Delhi

List of Experiments:

1. Determination of properties of cement, sand & aggregate.
2. Determination of workability of concrete by slump test.
3. Determination of workability of concrete by compacting factor apparatus.
4. Determination of workability by Vee Bee consistometer.
5. Water absorption & efflorescence of brick.
6. Field testing on bricks.
7. Crushing strength of bricks.

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Course Code: 110304

Course Name: Surveying

L	T	P	Credit
3	0	2	4

Course Objectives:

- 1) To understand the working of theodolite
- 2) To understand the determination of heights & distances by tachometry
- 3) To understand various types of curves used in practice.
- 4) To provide knowledge on setting out civil engineering works & detailed field surveying.
- 5) To understand the concepts of hydrographic & photographic surveying.

Syllabus:

Unit-I ✓

Traversing by theodolite, Fieldwork checks, traverse computations, latitude and departures, computations of co-ordinates, plotting & adjustment of traverse, Omitted measurements, Trigonometrical levelling, precise levelling.

Unit II: Tacheometry ✓

Tacheometric systems and principles, stadia system, uses of anallactic lens, tangential system, subtense system, instrument constant, field work reduction, direct reading tachometers, use of tachometry, accuracy.

Unit III: Curves: ✓

Classification and use, elements of circular curves, setting out curves by offsets and by theodolites, obstacles and special problems, compound curves, reverse curves, transition curves, cubic spiral and for large scale vertical curves, computation and setting out.

Unit IV: Control Surveys ✓

Providing frame work of control points, triangulation principle, forms of framework, reconnaissance survey, selection and making of stations, Control line, baseline measurement & corrections, flexible apparatus and corrections, computation of sides, precise traversing.

Unit V: Photographic Surveying & GIS:

Principles of photographic surveying – aerial photography, tilt and height distortions, uses, Basics of GIS & GPS

Course Outcomes:

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

- CO1: Apply the theodolite observations for traverse computations and trigonometric levelling.
- CO2: Demonstrate principles of tacheometry for linear and irregular measurements.
- CO3: Set curves of various types by offsets and theodolite for the horizontal and vertical alignment.
- CO4: Illustrate the principle of triangulation for alignment of roads, canal, railway line and other civil engineering works.

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CO2: Adapt the principles of photographic surveying & GIS for computations and plotting of civil engineering works.

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

- CO1: Measure horizontal & vertical angles by theodolite for traversing.
- CO2: Determine tachometric constants for linear measurements by tacheometry.
- CO3: Set a simple circular curve by using Rankine's method for alignment.
- CO4: Use total station for traversing & preparing contour maps.

Books Recommended:

- i) R.L. Devise, Surveying theory & Practice, Mc Graw Hill, New York.
- ii) David Clark & J.Cleminning, Plane & Geodetic surveying Vol. I & II, Constable & Co. London.
- iii) S.L. Roy, Fundamentals of surveying, Prentice-Hall of India New Delhi.
- iv) H.C. Poonia, Surveying Vol. I, II, III, Laxmi Publications New Delhi.
- v) K.R. Arora, Surveying Vol. I & II, Standard book House, New Delhi.

List of Experiments:

- 1. Measurement of horizontal and vertical angle by Vernier theodolite.
- 2. Theodolite traversing.
- 3. Determination of R.L. of a point whose base is accessible by Trigonometrical levelling.
- 4. Determination of R.L. of a point whose base is inaccessible by Trigonometrical levelling.
- 5. Determination of tachometric contents in field.
- 6. Determination of height & distance by using Tangential tachometry.
- 7. Determination of height & distance by Stadia method of tachometry.
- 8. Measurement of base line by using Substance Bar.
- 9. Setting out of a simple circular curve by using Rankine's method.
- 10. Setting out of a simple circular curve by using Offset from the chord method of deflection distance.
- 11. Determination of horizontal & Vertical position of a point by Total Station.
- 12. Traversing by Total Station.

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Course Code: 110305

Course Name: Strength of Materials

L	T	P	Credit
3	0	2	4

Course Objectives:

- 1) To understand the concepts of simple and compound stresses and strains.
- 2) To understand the behaviour of elastic materials in bending, shear and torsion.
- 3) To understand the stability behaviour of long columns under axial load.
- 4) To understand the power transmission by shaft.
- 5) To understand stresses & strain developed in storage vessels.
- 6) To calculate stresses / strain in statically indeterminate structures.

Syllabus:

Unit-I

Stress and Strains

Concept of Elastic body, stress and strain, Hooke's law various types of stress and strain, Poisson's ratio and their relation. Stresses in compound bars, composite and tapering bars, temperature stresses. Two-dimensional stress system, Normal and tangential stresses, Mohr's circle of stresses and strains, Mohr's circle of stresses, Strain energy and theories of failure.

Unit - II

Theory of simple bending

Concept of pure bending and bending stress, equation of bending, Neutral axis, Section Modulus, Bending stress distribution across a section, Shear Stresses in Beams, beams of uniform strength, shear centre.

Unit-III

Torsion of Shafts

Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist in shafts of circular section, Hollow circular shafts, Combined bending and torsion, Close and closed springs, Helical spring.

Pressure Vessels

Thin cylinders and spheres, Stress due to internal pressure, Change of diameter, etc. (optional)

Unit-IV

Columns and Struts

Euler's buckling load for uniform section, various end conditions, Slenderness Ratio, Rankine's Buckling Formulae, Eccentric loading on columns.

Unit-V

Deflection of statically determinate structure by Geometrical methods & Introduction of method of virtual work.

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Course Outcomes:

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

- CO1: Explain simple and compound stresses and strains for elastic materials.
- CO2: Analyze 2-D stress system using Mohr's circle method and predict failure.
- CO3: Evaluate the stresses in bending, shear and torsion.
- CO4: Select sections of column with loads and end conditions.
- CO5: Analyze stresses due to internal pressures for thick cylinders.
- CO6: Analyze statically determinate structures by geometrical method and virtual work method.

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

- CO1: Examine properties of material by impact test.
- CO2: Evaluate properties of material by hardness test.
- CO3: Evaluate properties of material by tensile test.
- CO4: Determine compressive & flexural strength of materials.

Books Recommended:

- 1. Strength of Materials by Timoshenko
- 2. Strength of Materials by Higdon Style
- 3. Strength of Materials by Sadhu Singh
- 4. Strength of Materials by R. K. Bansal
- 5. Strength of Materials Vol. I & II by B.C. Punmia

List of Practical's:

- 1. Impact Test
- 2. Brinell Hardness Test
- 3. Behaviour of columns with Different End Conditions
- 4. Tensile test
- 5. Compression test
- 6. Castor test
- 7. Shear test

Course Code: 11B3106

Course Name: Software Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To draw plan, elevation & section of various components of a building.
- 2) To prepare sketches of various components of building like doors, windows etc.
- 3) To expose students to use software's like Auto cad.

Syllabus: List of Practical's:

1. One drawing sheet containing Foundations and Footing using Auto cad.
2. One drawing sheet containing Doors, Windows, Ventilations using Auto cad.
3. One drawing sheet containing Lintels, Trusses and Arch over using Auto cad.
4. One drawing sheet containing detailed planning of one two room residential building. (Common to all students)
5. Drawing sheets one each of residential building using Auto cad.
6. One Drawing sheet of Institutional / Commercial building (Hospital etc) using Auto cad.
7. Sketches of various building components i.e. masonry, brick, stone, Floor, wall & roof drawings.

Course Outcomes:

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

- CO1: Draw plan, elevation & section of various components of a building.
- CO2: Use AutoCAD software in civil engineering drawing.
- CO3: Prepare drawing sheets of various types of buildings like residential, institutional, commercial etc.

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Course Code: 110307

Course Name: Self Learning / Presentation

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To encourage students to read, study & understand different topics of civil engineering published in articles, literatures.
- 2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge gained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:-

1. Any relevant topic related to civil engineering from within or beyond the syllabus through Swayam / NPTEL / MOOC.

Course Outcomes:

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

- CO1: Analyze 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.

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Course Code: 110308

Course Name: Summer Internship Project - I

L	T	P	Credit
0	0	4	2

Course Objectives:

- 1) To encourage students to read, study & understand different topics of civil engineering published in articles, literatures.
- 2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge gained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

Each candidate shall have to undergo 15 days inhouse summer internship at the institute after the completion of their 2nd Semester exams (in summer vacations). Candidate can choose from various modules which are offered by the institute and after successful completion of internship they have to submit detailed report.

Course Outcomes:

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

- CO1: Observe various activities in field.
- CO2: Examine the utility of general and specific equipments.
- CO3: Develop the writing and communication skills for various engineering problems.
- CO4: Adapt lifelong learning for benefit of society.

Course Code: 110402
Course Name: Geotechnical Engineering

L	T	P	Credit
2	1	2	4

Course Objectives:

- 1) To inculcate the basic knowledge of soil such as its identification and classification, determination of various engineering properties and its suitability as a foundation/ subgrade material.
- 2) To develop an understanding of the relationships between physical characteristics and mechanical properties of soils by experimentally measuring them.
- 3) To explain role of water in soil behaviour and how soil stresses, permeability and quantity of seepage including flow net are estimated.
- 4) To determine shear parameters and stress changes in soil due to foundation loads & estimate the magnitude and time-rate of settlement due to consolidation.
- 5) To apply the principles of soil mechanics in stability analysis of slopes and settlement calculations.
- 6) To explain various types of foundations.

Syllabus:

Unit-I Basic Definitions & Index Properties:

Introduction-Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Basic Definitions and their relationships - Soil as three-phase system, Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits. Clay mineralogy & their Influence on engineering behavior, Expansive soils, their Characteristics & Challenges.

Unit-II Permeability, Seepage and Consolidation:

Darcy's law & its validity, Determination of coefficient of permeability: Laboratory methods: constant-head & falling-head method. Effective and total stresses, Effect of water table & capillary action. Seepage pressure, Quick sand condition. Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one-dimensional consolidation. Consolidation tests, Fitting of curves. Normally and over consolidated clays. Determination of consolidation pressure settlement analysis. Calculation of total settlement.

Unit-III Stress Distribution in Soils and Shear Strength of Soils:

Stress distribution beneath loaded areas by Boussinesq and Westergaard's analysis. Newmark's influence chart. Contact pressure distribution. Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

Unit - IV Stability of Slopes & Earth Pressure:

Infinite and finite slopes. Types of slope failure, Stress path. Stability curves. Effect of ground water, Analytical and graphical methods of stability analysis. Earth Pressure at active, passive and at rest conditions. Rankine, Coulomb, Terzaghi and Culmann's

theories. Analytical and graphical methods of determination of earth pressures on cohesionless and cohesive soils. Effect of surcharge, water table etc

Unit - V Soil Foundations

Shallow Foundation - Types of foundations. Bearing capacity of foundation on cohesionless and cohesive soils. General & local shear failures. Factors affecting bearing capacity. Theories of bearing capacity - Terzaghi, Vesic, Skempton, Meyerhof and I.S. code on bearing capacity.

Deep Foundation - Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesionless and cohesive soils. Static and dynamic formulae. Settlement of pile group. Negative skin friction. Under Ream Piles, Plate load test

Course Outcomes:

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

- CO 1: Evaluate different properties of soil, types of foundations and its classification.
- CO 2: Examine the flow and shear parameters & their effects on various types of soil.
- CO 3: Determine the stress distribution & shear strength parameters of soil by various methods.
- CO 4: Analyse the stability of slopes, earth pressures & retaining walls using analytical methods.
- CO 5: Evaluate suitable foundation system for various site conditions.

Text Books:

1. Soil Mech. & Found. Engg., Dr. K. R. Arora, Std. Publishers Delhi, 7th edition 2014
2. Soil Mech. & Foundation, Dr. B. C. Punmia, Laxmi Publications, Delhi, 16th edition 2017
3. Soil Mech. & Found Engg., S. K. Garg, Khanna Publishers, Delhi, 1st edition, 2003
4. Basic & Applied Soil Mechanics, Gopal Ranjan & ASR Rao, New Age International Publisher, 2016

Reference Books:

1. Modern Geotech Engg., Dr. Aram Singh, IBT Publishers, Delhi, 8th edition, 2016
2. Geotech Engg., C. Venkatramiah, New Age International Publishers, Delhi, 16th edition, 2018
3. Soil Testing for Engg., T.W. Lambe, John Wiley & Sons. Inc., 1969

List of Experiments:

1. Moisture Content Determination. Oven Drying Method.
2. Grain Size Analysis - Mechanical Method.
3. Grain Size Analysis - Hydrometer Method.
4. Liquid & Plastic Limit Tests.
5. In-Place Density tests - Core Cutter Method, Sand Replacement Method.
6. Specific Gravity Tests.
7. Permeability Tests, Variable Head Method.
8. Compaction Test.
9. Unconfined Compression Test.
10. Direct Shear Test.
11. Triaxial Shear Test (Demonstration)

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

- CO 1: Check physical properties of soil.
- CO 2: Check strength properties of soil.
- CO 3: Differentiate the flow properties and stresses of soil.
- CO 4: Check shear strength of soil.

7. Permeability Tests, Variable Head Method.
8. Compaction Test.
9. Unconfined Compression Test.
10. Direct Shear Test.
11. Triaxial Shear Test (Demonstration)

Tests
1. 2. 3.
4. 5. 6.
7. 8. 9.
10. 11.

Course Code: 110403

Course Name: Fluid Mechanics - I

L	T	P	Credit
2	1	2	4

Course Objectives:

- 1) To understand fluid properties and concept of fluid continuum.
- 2) To understand the concepts of kinematics & dynamics of fluid flow.
- 3) To apply fluid flow principles to various fluid flow problems.
- 4) To understand the mechanism of fluid measurement.
- 5) To understand the method of simulation & dimensional analysis.
- 6) To understand the concepts of laminar flow.

Syllabus:

Unit I

Review of Fluid Properties

Engineering units of measurement, density, specific weight, specific volume, specific gravity, surface tension, capillary, viscosity, bulk modulus of elasticity, pressure and vapour pressure.

Fluid Statics

Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems - gravity dams and Tainter gates), buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit II

Kinematics of Flow

Types of flow-ideal & real, steady and unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streamlines, streamlines and stream tubes, continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flownets-their utility & method of drawing flownets.

Unit III

Dynamics of Flow

Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum equation, forces of fixed and moving vanes, velocity triangles.

Fluid Measurements

Velocity measurement, flow measurement (Orifices, nozzles, mouth pieces, orifice meter, Nozzle meter, venturimeter, weirs and notches).

Unit IV

Dimensional Analysis and Hydraulic Similitude

Dimensional analysis, dimensional homogeneity, use of Buckingham-pie theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, etc.)

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Unit V

Laminar Flow

Introduction to laminar, transition & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, Bach wash processing, Instability of laminar flow to turbulent flow.

Course Outcomes:

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

- CO1: Explain various fluid properties.
- CO2: Analyze problems of static fluid flow.
- CO3: Analyze problems of fluid in motion and develop fluid flow equations.
- CO4: Develop governing principles, equations for dynamic fluid flow & apply them to measure discharge.
- CO5: Implement dimensional analysis for examining model and its prototype.
- CO6: Apply the concepts of laminar flow in solving various fluid flow problems.

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

- CO1: Determine coefficient of discharge of venturimeter for measurement of discharge.
- CO2: Compute various coefficients of circular orifice, orifice meter and mouth piece for the measurement of discharge.
- CO3: Determine friction factor for pipe to estimate pipe losses.
- CO4: Apply Stoke's law to calculate terminal velocity.

Books Recommended:

- i) Fluid Mechanics by Modi & Seth – Standard Book House, Delhi
- ii) Fluid Mechanics by A.K. Jain – Khanna Publishers, Delhi
- iii) Fluid Mechanics by Streeter – Mc Graw Hill
- iv) Fluid mechanics by Girde & Mirazgaonkar – SCI Tech Publishers
- v) Fluid Mechanics by R.K. Bansal – Laxmi Publishers

List of Experiments:

1. Calibration of Venturimeter
2. Determination of C_c , C_d , C_v of Circular Orifice
3. Calibration of Mouth Piece
4. Calibration of Orifice Meter
5. Reynolds experiment for demonstration of stream lined & turbulent flow
6. Determination of Friction Factor for a pipe
7. Verification of Stoke's law.

Course Code: 110404

Course Name: Structural Analysis

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To develop an understanding of the behavior of structure under serviceability load.
- 2) To understand the mechanics of the material behavior of different type of structures.
- 3) To understand the concepts of analysis of indeterminate structures by various classical methods.
- 4) To make student aware of different methods of structural analysis.

Syllabus:

Unit-I

Deflection of beams

Double Integration method. Area Moment Method and Slope-Deflection Method. Beam of variable cross section, M/EI diagram, Conjugate Beam Method.

Unit-II

Virtual work and Energy Principles

Principles of Virtual work applied to deformable bodies. Maxwell's Reciprocal theorems, Energy theorems, Application to pin jointed frames only.

Unit - III Indeterminate Structures - I

Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by Theorem of three moments, Effect of sinking and rotation of supports.

Unit-IV Indeterminate Structures - II

Analysis of beams and analysis of frames (with and without sway) by slope Deflection method.

Unit-V Moment Distribution Method

Moment distribution method for analysis of beams and analysis of frames (without sway) Three hinged arches of different shapes, Eddy's Theorem. Two Hinged and Fixed Arches.

Course Outcomes:

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

CO1: Evaluate deflections of beams & frames by classical methods.

CO2: Compute deflections of trusses by energy methods.

CO3: Analyse statically indeterminate structures by classical force / flexibility / compatibility methods.

CO4: Analyse statically indeterminate structures by displacement approach.

CO5: Analyse arch structures using various methods.

Reference Books:

- i) Ghali A & Neville M. Structural Analysis - A Unified classical and matrix Approach Chapman and Hall, New York.
- ii) Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
- iii) Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
- iv) Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
- v) Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.

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Course Code: 110405

Course Name: Engineering Hydrology

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To develop an understanding of various components of hydrological cycle, their behaviors & factors affecting it & solve problems on measurement on rainfall, infiltration, evaporation.
- 2) To understand concepts of Hydrometry & ground water hydrology.
- 3) To discuss the importance of estimation of runoff, analysis of rainfall data and various hydrographs and analyze various problems off runoff using various hydrograph theories.
- 4) To develop an understanding of various methods of flood estimation in general & flood frequency in detail.
- 5) To develop the concept of flood routing through reservoir & channel and its application in flood forecasting & flood control.

Syllabus:

Unit -I Hydrology:

Hydrological cycle, Precipitation and its measurement, Recording and non recording rain gauges, Estimating missing rainfall data, Rain gauge net works, Mean depth of precipitation over a drainage area, Mass rainfall curves, Intensity - duration curves, Depth - Area Duration curve, Infiltration and infiltration indices, Evaporation, evapormeters, evapotranspiration & estimation.

Unit - II

Hydrometry and Ground Water:

Methods of Stream gauging, Direct and Indirect methods, Area - velocity method, Dilution technique methods, Ultrasonic method, Stage - Discharge Relationship (Rating curves).

Forms of subsurface water, Aquifer properties, Geological formations as aquifers, Hydraulics of wells, Steady flow into a well, Well loss, Introductions to ground water recharge methods and Rain water harvesting.

Unit-III

Hydrographs:

Runoff, Flow duration curve, Flow mass curve, Estimation of runoff, Rainfall - Runoff relationship, Hydrograph and its analysis, Unit hydrograph and its derivation for isolated and complex storms, S-curve hydrograph, Instantaneous unit hydrograph, Synthetic unit hydrograph.

Unit-IV

Floods: Floods and its estimation by different methods, Design flood by Unit hydrograph and Design Storm, Flood frequency studies: Gumbel's Method, Log Pearson Types - III Distribution, Lognormal distribution, Limitations of Frequency studies.

Unit-V

Floods Routing: Hydrologic Routing: Reservoir Routing – Modified Pul's method, Goodrich method. Channel Routing - Muskingum method

Hydraulic Routing: Numerical methods. Introduction to Time series models, Flood control measures.

Course Outcomes:

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

- CO1: Explain the hydrological cycle and its elements with estimation & measurement.
- CO2: Implement various methods for stream gauging to develop stage discharge relationships.
- CO3: Explain various forms of sub surface water and derive equations for steady flow in well.
- CO4: Develop various types of hydrographs for runoff at various durations.
- CO5: Examine various methods for estimation of floods for design.
- CO6: Apply flood routing techniques to control floods.

Reference Books:

- i) Engineering. Hydrology – J. NEMEC – Prentice Hall.
- ii) Hydrology for Engineers Linsley, Kohler, Paulnus – Tata Mc Graw Hill.
- iii) Engineering. Hydrology by K. Subhramanya – Tata Mc Graw Hills Publ. Co.
- iv) Hydrology & Flood Control by Santosh Kumar – Khanna Publishers.
- v) Engineering. Hydrology by H.M. Raghunath.

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Course Code: 110407
Course Name: Survey Practice Lab

L	T	P	Credit
0	0	4	2

Field Work:

- 1 Profile leveling & cross sectioning
- 2 Prepare contour map by using Tachometric method
- 3 Locating details by Plane Table surveying
- 4 Setting out of simple circular curves
- 5 Triangulation - Adjustment of quadrilateral by least square method
- 6 Use of Total Station in surveying

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

- CO1:** Prepare longitudinal & cross section profiles
- CO2:** Develop contour map by using tachometer.
- CO3:** Prepare the details of features using Plane table surveying.
- CO4:** Set a simple circular curve by using Rankine's method for alignment.
- CO5:** Use total station for traversing & preparing contour maps.

Reference Books:

- i) B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
- ii) K.R. Arora, Surveying Vol. I & II, Standard book House, New Delhi
- iii) R.E. Devise, Surveying theory & Practice, Mc Graw Hill, New York
- iv) S.K. Roy, Fundamentals of surveying, Prentice - Hall of India New Delhi

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**1. Scheme & Syllabus of B.E. Civil Engg. 7th & 8th Sem under
CBCS scheme batches admitted in July 15 & 16 to be
implemented from July 2018**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute affiliated to RGPV, Bhopal)

Minutes of the BOS (Civil Engineering) Date: 12/04/2018

Meeting of Board of studies of Civil Engineering held as per schedule on 12-04-2018 (10:30AM onward) in the CEM laboratory of the department. Following is discussed in the meeting

1. Members were apprised about the details of scheme, credits, teaching hours etc.
 2. New scheme of all semester & syllabus (III & IV semester) to meet the requirement of new flexible scheme to be implemented from 2018 is discussed.
 3. Additional credits for B.E. (Hons.) can be earned by students by opting additional courses mentioned against Department Elective Courses /open courses
 4. Scheme & syllabus of VII & VIII semester admitted under CBCS scheme was also discussed and recommended.
 5. Suggestions given by Student OBE coordinators, students of all years & faculty members were incorporated in the scheme & syllabus.
 6. Courses to be taught under DE, DC, OC, ESC, BSC etc were also discussed and recommended.
 7. Members were also apprised about COs of the courses of current scheme & PO, PEO, PSO of the programme & Vision & Mission of the department.
 8. External members could not turn up due to their personnel reasons.
- Meeting ends with the vote of thanks to the chair.


Prof. Anitya K. Agarwal
Member BOS

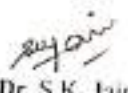

Prof. G. Bhardariya
Member BOS

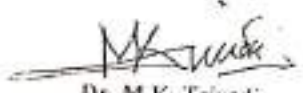

Prof. A.K. Saxena
Member BOS

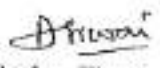

Prof. A.K. Dwivedi
Member BOS


Dr. Sanjay Tiwari
Member BOS


Dr. R. Kansal
Member BOS


Dr. S.K. Jain
Member BOS


Dr. M.K. Trivedi
Member BOS


Prof. A. Tiwari
Chairperson BOS

Dr. M. Pandit
Dean Academics

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

WACE JULY 2018
For batches admitted in July, 15 & July, 16 (to be implemented in July, 2018)

Scheme of Examination
B.E. VII Semester (Civil Engineering)
Subject wise distribution of marks and corresponding credits

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Contact Periods per week			Total Credits	
			Theory Slot			Practical Slot			Total Marks	L	T		P
			End Sem.	Mid Sem.	Quiz / Assignment	End Sem.	Lab Work & Sessional						
1.	BCEL - 701	Geotechnical Engineering - II	70	20	10	30	20	150	3	1	2	5	
2.	BCEL - 702	Environmental Engineering - II	70	20	10	30	20	150	3	1	2	5	
3.	BCEL - 703	Advance Structural Design - I (RCC)	70	20	10	-	-	100	3	1	-	4	
4.	BCEL - 704	Elective - III	70	20	10	-	-	100	3	1	-	4	
5.	BCEL - 705	Elective - IV	70	20	10	-	-	100	3	1	-	4	
6.	BCEL - 706	Training / Internship	-	-	-	30	20	50	-	-	2	1	
7.	BCEP - 707	Major Project - I	-	-	-	60	40	100	-	-	4	2	
8.	BCES - 708	Seminar / Group Discussion (Swayam)	-	-	-	-	50	50	-	-	2	1	
Total			350	100	50	150	150	800	15	5	12	26	

Elective - III	BCEL - 704 A	Railway, Bridge & Tunnel Engineering	BCEL - 704 B	Modern Surveying Techniques	BCEL - 704 C	Energy Planning & Management
Elective - IV	BCEL - 705 A	Irrigation Engineering	BCEL - 705 B	Fluid Dynamics	BCEL - 705 C	Fluid Transportation Engineering



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W.E.F. JULY 2018
For batches admitted in July, 15 & July, 16 (to be implemented in July, 2018)

Scheme of Examination
B.E. VIII Semester (Civil Engineering)
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				L	T	P	
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem.	Lab Work & Sessional	Total					
1.	BCEL - 801	Advance Structural Design - II (Steel)	70	20	10	-	-	100	3	1	-	4	
2.	BCEL - 802	Hydraulic Structure	70	20	10	30	20	150	3	1	2	5	
3.	BCEL - 803	Elective - V	70	20	10	-	-	100	3	1	-	4	
4.	BCEL - 804	Elective - VI	70	20	10	-	-	100	3	1	-	4	
5.	BCEP - 805	Major Project - II	-	-	-	200	100	300	-	-	12	6	
6.	BCEP - 806	Seminar / Group Discussion (Swayam)	-	-	-	-	50	50	-	-	2	1	
Total			280	80	40	260	140	800	12	4	16	24	

Elective - V	BCEL - 803 A	Industrial Waste Treatment	BCEL - 803 B	Construction Techniques	BCEL - 803 C	Earthquake Engineering
Elective - VI	BCEL - 804 A	Building Environment & Services	BCEL - 804 B	Modern Foundations	BCEL - 804 C	Pavement Design

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Course Code: BCEI, -- 701

Course Name: Geotechnical Engineering - II

L	T	P	Credit
3	1	2	5

Course Objectives:

- 1) To understand the concepts of compaction & soil stabilization.
- 2) To emphasize on the importance of soil investigations & to determine the soil parameters needed to carry out foundation design.
- 3) To learn the subsurface exploration techniques and apply them to design the foundations.
- 4) To apply the principles of soil mechanics to design of shallow and deep foundations including bearing capacity, stability analysis of slopes and settlement calculations
- 5) To explain in what circumstances pile is needed and how do analysis the pile and pile group under various soil conditions
- 6) To explain fundamentals of soil dynamics and its application to machine foundation analysis including codal provisions

Syllabus:

Unit-I Soil Improvement Techniques:

Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control Lift thickness.

Soil stabilization: Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilisation and stabilization by grouting. Geo-synthetics, types, functions, materials and uses.

Unit-II Soil Exploration and Foundations of Expansive and Collapsible Soils:

Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them.

Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

Unit-III Shallow Foundations:

Type foundations shallow and deep. Bearing capacity of foundation on cohesionless and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerhof and Hansan. I.S. code on B.C. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

Unit-IV Deep Foundation:

Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesionless and cohesive soils. Static and dynamic formulae. Pile load test, Settlement of pile group, Negative skin friction, under-reamed piles and their design. Piles under tension, inclined and lateral load

Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

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Unit-V Sheet piles/Bulkheads and Machine Foundation:

Classification of sheet piles/bulkheads Cantilever and anchored sheet pile-, Cofferdams, materials types and applications.

Modes of vibration, Mass-spring analogy, Natural frequency, Effect of Vibration on soils Vibration isolation, Criterion for design, Design of block foundation for impact type of machines.

Course Outcomes:

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

- CO1: Apply various soil improvement techniques
- CO2: Illustrate the methods of soil exploration.
- CO3: Distinguish expansive, collapsible soils and treatments.
- CO4: Evaluate the bearing capacity of shallow foundations using various theories
- CO5: Evaluate the bearing capacity of various pile foundations in individual & group.
- CO6: Analyse the elements of machine foundation & sheet piles.

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

- CO1: Determine the shear parameters by triaxial shear test.
- CO2: Perform SPT test.
- CO3: Perform plate load test.

Reference Books:

- i) Soil Mechanics & Foundation Engg. By Dr. K. R. Arora- Std. Publishers Delhi
- ii) Soil Mechanics & Foundation Engg. By B.C. Punmia - Laxmi Publications Delhi
- iii) Modern Geotech. Engg. By Dr. Alam Singh -IBT Publishers Delhi
- iv) Geotech. Engg. By C.Venkatramaiah-New Age International Publishers, Delhi
- v) Foundation Engineering. By Galeonards Mc Graw Hill Book Co. Inc.
- vi) Found Design & Const. by MJ Towlinbou - Sor Pitman & Soms London

List of Practical's:

1. Triaxial Shear Test
2. Standard penetration test.
3. Demonstration of plate load test.
4. Vane shear test
5. Static core penetration test
6. Consolidation test

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Course Code: BCEL - 702

Course Name: Environmental Engineering - II

L	T	P	Credit
3	1	2	5

Course Objectives:

- 1) To impart basic knowledge on sewerage system including estimation of sewage quantity & design of sewers.
- 2) To provide a broad knowledge on sewage composition & its characteristics
- 3) To provide information on disposal standards of effluents & also about various methods of sewage disposal.
- 4) To provide broad knowledge on various techniques of sewage treatment including advanced processes

Syllabus:

Unit - I

Sewerage schemes & sewerage system and their importance, collection & conveyance of sewage, Estimation of and sewage storm water quantity, fluctuation in sewage flow, Flow through sewer, Design of sewer, Construction & maintenance of sewer, Testing of sewer, Sewer appurtenances, Pumps & pumping stations.

Unit - II

Characteristics and analysis of wastewater Physical, chemical & biological parameters Cycles of decomposition, Oxygen demand i.e. BOD & COD, TOC, TOD, ThO, relative Stability, Population equivalent, Instrumentation involved in analysis, Natural methods of waste water disposal i.e. by land treatment & by dilution, Self purification capacity of stream, Oxygen sag analysis.

Unit-III

Unit operations for waste water treatment, Preliminary treatment such as screens, grit chamber, floatation tank, sedimentation etc. and chemical clarification, Role of micro-organism in biological treatment, Sewage filtration - theory & design. Testing filter its design & constructions, modifications in trickling filter.

Unit-IV

Methods of Biological Treatment (Theory & Design) - Activated Sludge Process, Oxidation ditch, Stabilization Ponds, Aerated Lagoon, Anaerobic Lagoons, Septic Tank & Imhoff tank, Rotating Biological contactor Sources & treatment of sludge, sludge thickening and digestion, sludge drying beds, sludge disposal.

Unit-V

Advanced Waste Water treatment - Need of advanced treatment, Diatomaceous earth filters, Ultra filtration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment,

Sewage treatment plants using MBBR and SBR technology.


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Course Outcomes:

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

CO1: Design sewerage system according to the quantity of sewage generation.

CO2: Determine various sewage characteristics.

CO3: Analyse various possible options for effective disposal of effluents.

CO4: Explain various sewage treatment methods.

CO5: Design sewage treatment plant.

CO6: Analyse various options for disposal of solid waste including sludge.

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

CO1: Determine pH, acidity & alkalinity of sewage sample & establish the relationship among them.

CO2: Determine DO & BOD of sewage sample & establish the relationship among them.

CO3: Determine COD of sewage sample & establish relationship with ThOD.

CO4: Determine solids (fixed & volatile) content of sewage sample.

Reference Books:

- i) Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi
- ii) Waste Water Engg. By B.C Punmia - Laxmi Publication (P) Ltd. New Delhi
- iii) Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
- iv) Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi.
- v) Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
- vi) Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi

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Course Code: BCEL - 703

Course Name: Advanced Structural Design - I (R.C.C.)

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the design concepts of various structures & detailing of reinforcements.
- 2) To understand the design of underground & elevated liquid retaining structures.
- 3) To understand the design of retaining walls.
- 4) To study the design of bridges according to IRC loadings.
- 5) To provide knowledge on basic concepts of prestressed concrete.

Syllabus:

Unit-I

Design of Water Tanks:

Design requirements, Design of Tanks resting on ground and underground tanks, Rectangular and circular tanks.

Unit-II

Design of Over Head Water tanks:

Rectangular, Circular & intze type (Membrane analysis only), Design of staging.

Unit-III

Earth Retaining Structures:

Types of retaining walls, Stability of retaining walls, Design of retaining walls (Cantilever and counter fort type)

Unit-IV

Design of Bridges:

IRC loading for highway bridges, Slab bridges and T-beams bridges for highway loading (IRC Loads)

Unit-V

Prestressed Concrete:

Prestressing concepts, materials, systems of prestressing & prestress losses. Introduction to working & limit state design method.

Course Outcomes:

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

CO1: Design various shapes of underground water tanks as per codal provisions.

CO2: Design various shapes of elevated water tanks as per codal provisions.

CO3: Design retaining walls as per codal provisions.

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CO4: Design bridges as per IRC loading provisions.

CO5: Apply the concepts of prestressed concrete.

Reference Books:

- i) Plain and Reinforced Concrete by O.P. Jain and Jai Krishna Vol. I & II
- ii) R.C.C. Structures by B.C. Punmia
- iii) Advance R.C. Design by N.K. Raju
- iv) Essentials of Bridge Engineering by D.J. Victor.
- v) Design of Bridge Structures by T.R. Jagadeesh & M.A. Jayaram
- vi) Design of Bridges by N.K. Raju
- vii) Prestressed Concrete by N.K. Raju
- viii) Advanced Reinforced Concrete Design by PC Varghese

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A signature on the right, possibly "D.J. Victor".

Course Code: BCEL - 704 (A)

Course Name: Railway, Bridge & Tunnel Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the geometrical elements of railway track.
- 2) To understand the properties of good ballast.
- 3) To understand the track alignment, superelevation, turnout, yards.
- 4) To understand the principles of signalling & interlocking.
- 5) To understand bridge site investigation and planning.
- 6) To understand the Indian loading standards for bridge.
- 7) To understand the construction of tunnels.

Syllabus:

Unit I Introduction:

Tractive resistance & Permanent way, Principles of Transportation, Transportation by Road, Railways, Airways, Waterways, their importance and limitations. Route surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort.

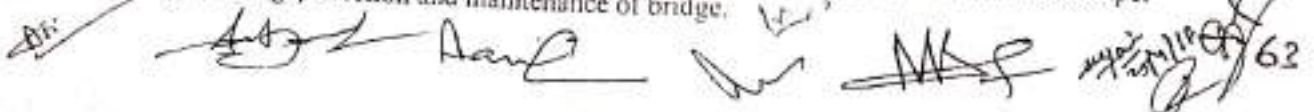
- i) Rails- types, welding of rails, wear & tear of rails, rail creep ultrasonic Testing of Rails.
- ii) Rail fastenings- types - Fishplates, spikes bearing plates, chairs, keys, check and guard rails, Elastic Rail Clips (ERC), Vossloh fastening.
- iii) Sleepers, types & comparison, requirement of a good sleeper, sleeper density, Turnouts.
- iv) Ballast -Requirement of good ballast, various materials used as ballast, quantity of ballast, Ballast Cleaning.
Different methods of plate laying, material trains, calculation of materials required, relaying of track.

Unit - II

Track alignment, Geometrical Design, Gradient & grade compensation, Super Elevation, Equilibrium, Cant and Cant deficiency, relationship of superelevation, gauge, speed & radius of curves, speed on curves, Limits of superelevation, Cant deficiency, Negative superelevation, curves, transition curves, necessity of points and crossing. Turnouts, Points of switches, Types of switches, crossing, calculation of turnouts, sleepers at points & crossing, Types of Track junctions. Types, locations, general equipments, layouts, marshalling yards. Definition, layout details, designs of simple turnouts.

Unit III Stations and Yards: Site selection for a Railway stations, Requirements of railway stations, junction station & terminals, location, layout & details, Types of signals in stations and yards, principles of signaling and inter-locking, Modern development in railways, Modernization of track for high speed, Maintenance of track, Track drainage.

Unit - IV Bridge Site Investigation and Planning, Loading Standards & Component parts : Selection of site, alignment, collection of bridge design data- essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, types of road & railway bridges. Metrorail type Bridge construction, Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structure, abutments, piers, wing walls, return walls, approaches, floors and flooring system, choice of super structure. Bridge bearings, Erection and maintenance of bridge.

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Unit V Tunnels:

Selection of route, Engineering Surveys, alignment, shape and size of tunnel, bridge action pressure relief phenomenon, tunnel approaches, shaft, pilot shafts. Construction of tunnels in soft soil, hard soil & rock. Different types of lining, methods of lining. Mucking operation, drainage & ventilation. Examples of existing important tunnels in India & abroad.

Course Outcomes:

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

CO1: Explain the elements of railway like sleepers, rail, ballast, fasteners etc.

CO2: Design various geometrical elements like track, gauge, cant, turnouts, crossing etc.

CO3: Design signalling and interlocking systems & yards.

CO4: Explain various principles of bridge elements.

CO5: Design bridges as per Indian loading provisions.

CO6: Apply the construction methods of railway tunnel.

Reference Books:

- i) Railway Engineering by S.C. Rangwala – Charotar Publication House, Anand
- ii) Railway Engineering by Arora & Saxena – Dhanpat Rai & Sons.
- iii) Railway Tack by K.F. Antia
- iv) Principles and Practice of Bridge Engineering S.P. Bindra – Dhanpat Rai & Sons
- v) Bridge Engineering – S.C. Rangwala – Charotar Publication House, Anand
- vi) Bridge Engineering – J.S. Alagia – Charotar Publication House, Anand.

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Course Code: BCEL - 704 (B)

Course Name: Modern Surveying Techniques

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the use of modern surveying equipments.
- 2) To understand the working principles of electronic total station, geodimeter, tellurimeter etc.
- 3) To understand the application of lasers in distance & angular measurements.
- 4) To understand the working principles of GPS.
- 5) To understand the working principles of GIS.

Syllabus:

Unit - I Modern Surveying Equipments

Data and Equipment needed for Engineering Projects Review of Traditional Surveying Equipment Changing Scene in Surveying and Mapping Map substitutes Use and Advantages of Modern Surveying Equipment in Projects.

Unit - II

Modern Surveying Electronic Equipment, their principles, construction working and use, Electronic Theodolites, E.D.M. Instruments - Geodimeter Tellurimeter, Distomat, Total Station.

Unit - III

Applications of Lasers in distance and angular measurements Introduction of Electronic navigation and position Fixing- different systems and their Characteristics.

Unit - IV Global Positioning System

Global Positioning System- working principle and methods Different Approaches to use GPS and their accuracies, Advantages of GPS in Navigation, Survey, Planning and Mapping.

Unit - V Geographic Information System

Geographic Information System-data requirement and database creation Use of field data, maps, aerial and satellite data Advantages of GIS.

Course Outcomes:

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

- CO1: Explain the use of modern surveying equipments.
- CO2: Evaluate working principles of electronic total station, geodimeter, tellurimeter etc.
- CO3: Measure linear & angular distance by use of lasers.
- CO4: Apply working principles of GPS in surveying.
- CO5: Apply working principles of GIS in surveying.

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Reference Books:

- Arora K.R. "Surveying", Vol. I, II & III, Standard Book House, Delhi.
- Bannister A and Baker R "Solving Problems in Surveying" Longman Scientific Technical U.K
- Burnside C.D. " Electronics Distance Measurement" Oxford, BSP Professional Books, London.
- Kenne T.J.M. and Perrie G. "Engineering Surveying Technology" Blackie & Sons Ltd. London.
- Laurils S.H. " Electronic Surveying in John Wiley & Sons New York
- Wolf P.R. " Elements of Photogrammetry" Mc Graw Hill Book Company, New Delhi.

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Course Code: BCEL – 704 (C)

Course Name: Energy Planning & Management

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the planning of available energy in India.
- 2) To understand the generation of energy from various sources.
- 3) To understand the impacts of energy generation plants on environment.
- 4) To understand the engineering aspects of energy generation & distribution.
- 5) To understand the use of various instruments for O & M of power generation systems.

Syllabus:

Unit-I Planning:- Energy scenario of the world in general and India in particular with respect of demand, supply and resources energy requirement and demand forecasting isolated and integrated planning, concept of national grid, rural energy planning.

Unit-II Generation:- Production of energy from conventional and non conventional sources - Hydel, Thermal Nuclear, Solar, Tidal, Wind, MHD, Geothermal, Bioconversion etc Economic feasibility and cost analysis.

Unit-III Ecological & Environmental Aspects:- Impact assessment of power plants on environment and ecosystem Environmental degradation & control strategies, air pollution, water pollution and their control

Unit-IV Engineering Aspects:- Load predictions, peak load, base load factor, plant factor, capacity factor etc. operation and economics of power stations. Losses in energy generation, transmission and distribution. Energy storage and conservation techniques, reliability analysis of energy systems, energy audit and economics.

Unit-V Instrumentation:- Measurement of pressure, flow temperature and humidity, concept of automatic control, power & frequency control, voltage & reactive power control Microprocessor applications in power systems.

Course Outcomes:

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

- CO1: Assess the resources available for energy generation.
- CO2: Evaluate the generation of energy from various conventional & non conventional sources.
- CO3: Analyze the impacts on environment & ecology due to various power plants.
- CO4: Apply various engineering aspects in energy generation & distribution.
- CO5: Apply instrumentation techniques in O & M of power generation systems.

Reference Books:

- KK Ahuja – Industrial Management
- Richard Greene – Process Energy Conservation
- G.D.Rai Non – Conventional Energy Sources

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Course Code: BCEL - 705 (A)
Course Name: Irrigation Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the water requirements of various types of crops.
- 2) To understand the different types of irrigation systems.
- 3) To plan the reservoir systems as per the requirements.
- 4) To understand various types of dam.
- 5) To understand the concepts of Khosla's and Bligh's theory & its applications
- 6) To understand river training.
- 7) To understand the concepts of Lacey's and Kennedy theory for design of canal systems.
- 8) To understand the canal regulations.

Syllabus:

Unit-I Irrigation Water Requirement and Soil Water Crop Relationship:

Irrigation, Definition, Necessity, Advantages and disadvantages, Type and methods, Irrigation development.

Soil: Types and their occurrence, Suitability for irrigation purposes, Wilting, Coefficient and field capacity, Optimum water supply, Consumptive use and its determination. Irrigation methods - surface and subsurface, Sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, Suitability of water for irrigation, Crops and crop seasons, Principal crops and their water requirement, Crop ratio and crop rotation, Intensity of irrigation, Water logging-causes, effects & its prevention.

Unit-II Reservoirs and Storage Works:

Types of reservoirs, Reservoir planning, Various investigations, estimation of storage capacity by mass curve analysis, Fixing of principal levels in a storage project, Economical height of dam, Reservoir sedimentation, Suitable site for a reservoir project.

Dams: Classification- gravity, earthen, rockfill, arch, buttress, steel & timber dam, Selection of suitable type of dam at a particular location.

Unit-III Diversion Works and River Training Methods:

Purpose, Selection of site, Layout and functions of component parts, Types of weirs and barrages, Weir design for surface and subsurface flows, Bligh's, Lane's and Khosla's theories, Silt excluders and silt ejectors.

River training methods - objectives, Design principles of levees, Guide bunds & launching aprons.

Unit-IV Canal Irrigation:

Types of canals, Alignment, Design of unlined and lined canals, Kennedy's and Lacey's silt theories, Typical canal sections, Canal losses, Linings-objectives, Materials used, Economics

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Unit-V

Introduction to Canal Regulation Structures: Head and cross regulators, Canal falls, In-slope and outlet-

Course Outcomes:

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

CO1: Analyze water requirements for different types of crops.

CO2: Evaluate various types of irrigation systems.

CO3: Plan storage reservoir systems as per the requirements.

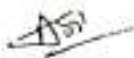
CO4: Apply Khosla's & Bligh's theory in pervious soil for weir & barrage & river training works.

CO5: Design canal systems using Lacey's and Kennedy theory.

CO6: Apply canal regulations in canal structures.

Reference Books:

- i) Irrigation & Water Power Engg. - Dr. B.C. Punmia, Dr. Panu, B.B. Lal
- ii) Irrigation, Water Resources & Water Power by Dr. P.N. Modi
- iii) Irrigation Engineering by Varshney
- iv) Irrigation Engineering by Santosh Kumar Garg
- v) Irrigation, Water Power & Water Resources Engg. By K.R. Arora.










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Course Code: BCEL - 705 (B)
 Course Name: Fluid Dynamics

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the hydrodynamics of fluid & its relevant equations.
- 2) To understand the applications of potential & stream function in kinematics.
- 3) To understand vortex motions & supporting theorems.
- 4) To understand the conformal transformations and mapping in hydrodynamics.
- 5) To carry out seepage analysis of dams and validate with darcy's law.
- 6) To understand the wave celerity & its types.

Syllabus:

- Unit-I Introduction:-** Fluid mechanics & hydrodynamics, types of fluids, fluids as continuum, ideal & real fluid, some real fluid properties, rheological properties. **Fluid Kinematics:-** Mathematical and streamline representation of velocity, steady, unsteady and relative motions acceleration, continuity equation (Lagrange's & Euler's form and relation between the two forms) irrotational and rotational motion, vorticity vector, circulation, Kelvin's relation.
- Unit-II Potential and stream functions:-** Velocity potential, stream function, Kinematics boundary conditions, impulsive motions. **Fluid Kinetics:-** Equation of motion, integration of equations of motion, singular forces in terms of velocity potential (Blasius theorem and application, Kutta-joukowski law, Lagally's theorem), source, sinks doublet and image, stagnation points.
- Unit-III Vortex Dynamics:-** General fluid motions, description of vortex motions (line vortices & line doublets), vortex conservation theorems, Kelvin's circulation theorem, vortex streets (rows), D' Alembert's paradox.
- Unit-IV Methods of Solution (Potential Flows):-** Hydrodynamic singularities in two dimensional flows, conformal transformations and mapping (Including Schwartz Christoffel), numerical methods of solution, electro conductivity analogy, other analogies. **Hydraulic Flows:-** Confined porous-media flow, Darcy's law, Wells in a uniform bed, seepage under dams.
- Unit-V Wave Motions:-** Water waves, wave celerity and types, standing waves (deep water & shallow water dams) **Magneto Hydrodynamics:-** Definition, basic field equations (medium at rest, medium in motion), simplification of field equations.

Course Outcomes:

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

- CO1: Apply energy equations in solving the problems of hydrodynamic problems.
- CO2: Evaluate the use of potential & stream functions for the sink & source.
- CO3: Apply various theorems to solve problems of vortex motions.
- CO4: Apply conformal transformations and mapping in two dimensional flow of hydrodynamics.
- CO5: Explain wave motions in deep water & shallow water.

Reference Books:

- Sanghar H.L. "Dimensional Analysis & Theory of Models"
- Rouse H., "Advance Fluid Mechanics"
- Vellentine, H.R. "Applied Hydrodynamics"
- Shames I.H., Fluid Mechanics.

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Course Code: BCEL – 705 (C)
Course Name: Fluid Transportation Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the mechanism of flow-phase separation and settling.
- 2) To understand the mechanism of sediment motion in rigid & alluvial channel.
- 3) To understand the motion of slurry in pipe.
- 4) To understand the protection of pipe line system.
- 5) To understand methodology of pneumatic conveyance & hydraulic capsule pipelines.

Syllabus:

- Unit-I Mechanism of Solid Transportation by Fluids:-** Types of fluids and basic equations of flow, rheology and classification of complex mixtures. Fundamentals of two phases, flow-phase separation and settling behavior.
- Unit-II Sediment Transport in open Channels:-** Rigid mobile boundary channels, motion of grain on channel bed, analysis of sediment motion, bed forms, hydraulics of channels, alluvial channels.
- Unit-III Slurry Pipe Lines:-** Introduction to slurry pipeline system mechanics of hydraulic transport of solids by pipe lines, transport of settling solids, flow of non-settling slurries, design methods.
- Unit-IV Terminal Facilities:-** Selection and design of equipments for terminal facilities. Pipe Protection: Factors affecting life of pipeline system and methods of protection.
- Unit-V Pneumatic conveyance, hydraulic capsule pipelines, methodology associated with slurry pipeline.**

Course Outcomes:

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

- CO1: Apply mechanism of flow - phase separation and settling.
- CO2: Apply mechanism of sediment motion in rigid & alluvial channel.
- CO3: Apply various methods in determining the flow of slurry in pipe.
- CO4: Apply various methods for pipe protection.
- CO5: Apply methodology of pneumatic conveyance & hydraulic capsule pipelines.

Reference Books:

- Einstein A. Investigation on the theory of the Brownian movement Dover, Newyark (1956)
- Govier G.W. + Charles M.E., The Hydraulics of the Pipe line Flow of Solid-Liquid Mixtures Engineering J.44:8.(1961)
- Stepanoff A.J. (Ed. Bright James R) " Gravity Flow of Bulk Solids and Transportation in Suspension" Wiley. NY. (1969)
- Thorton, Wndy A. The Hydraulic Transport of Solids in Pipes-Bibliography, BHRA, Cranfield, Bedford, England.(1970)
- Govier G.W; Aziz K., The Flow of Complex Mixtures in Pipes, Van Nostrand Reinhold Ltd., Toronto (1972)
- Bain A.G. and Bonnington S.T., The Hydraulic Transport of Solids by Pipeline Pergamon Press, Oxfort, N.Y.

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Course Code: BCET - 706

Course Name: Training / Internship

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To develop an appreciation and importance of civil Engineering in developing the infra structure.
- 2) To develop an understanding regarding the various engineering principals to be used in the field construction activities.
- 3) To emphasize on the use of the modern tools and plants used in the construction industry.
- 4) To build the necessary practical background and exposure to the field problems.
- 5) To develop a technical skill to prepare project documents.

Syllabus:

1. Each candidate shall go for 1 month (4 week) on field training at different organizations / sites of his / her choice after completion of their 6th Semester exams (in summer vacations) and shall submit a detailed report after completion of training.
- 2) Candidates will be taken to nearby places where civil engineering works are being carried out during the semester and they shall have to submit a detailed report of their visit.

Course Outcomes:

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: BCEP - 707
Course Name: Major Project - I

L	T	P	Credit
0	0	4	2

Course Objectives:

- 1) To develop an appreciation of civil engineering problems & have a feel of real life situations in planning & execution of projects.
- 2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
- 3) To utilize the expertise in engineering to solve industry's technological problems.
- 4) To become innovative and professional in technology development, and system implementation.
- 5) To be able to function in their profession with social awareness and responsibility.
- 6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
- 7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of report of experimental work/software package on any specific problem of importance.

Course Outcomes:

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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Course Code: BCES - 708

Course Name: Seminar / Group Discussion

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To encourage students to read, study & understand different topics of civil engineering published in articles, literatures.
- 2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge gained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

1. Any relevant topic related to civil engineering from within or beyond the syllabus through Swayam / NPTEL / MOOC.

Course Outcomes:

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

- CO1: Analyze 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.

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Course Code: BCEI – 801

Course Name: Advanced Structural Design – II (Steel)

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To study the components of truss, loads on trusses, analysis and design of purlins and truss members.
- 2) To study the design of gantry girder, welded plate girder bridges as per standard loadings.
- 3) To study the design of trussed girder bridges, railway & highway bridges as per IRC loadings and Bridge Rules.
- 4) To study the design of water tanks.
- 5) To study the design of chimneys.

Syllabus:

Unit-I

Design of Industrial Building: Dead Load, Live Load and wind load analysis for roof trusses, Design of purlins & members of truss. Design of gantry girder.

Unit-II

Plate Girder Bridges: Railway standard loading, Design of various components of plate girders bridges for railway & highways; Bearings for bridges.

Unit-III

Trussed Girder Bridges: Design of Foot over bridge, Design of various components of railway & highway bridges (IRC & railway standard loading)

Unit-IV

Steel Water Tanks: Design of Rectangular & Circular tanks with ordinary plates, Design of elevated water tanks with suspended bottoms, Pressed steel tanks.

Unit-V

Design of Chimneys: Design of self supporting type and Guyed Chimney.

Course Outcomes:

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

- CO1: Design roof truss as per codal provisions.
- CO2: Design gantry girder as per codal provisions.
- CO3: Design plate girder bridges and bearings as per IRC loadings.
- CO4: Design trussed girder bridges as per IRC loadings.
- CO5: Design various shapes of steel water tanks as per codal provisions.

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C06: Design chimneys as per codal provisions.

Reference Books:

- i) Steel Structure By D. Ramchandra Vol. I & II.
- ii) Steel Structure By Arya & Ajmani
- iii) Essentials of Bridge Engineering by D. Johnson Victor
- iv) Design of Steel Structures by B C. Punmia.
- v) Design of Steel Structure by S.K. Duggal
- vi) Design of Steel Structures by Daya raman
- vii) Indian standard codes.

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Course Code: BCEI - 802

Course Name: Hydraulic Structure

L	T	P	Credit
3	1	2	5

Course Objectives:

- 1) To study the different aspects of design of hydraulic structures.
- 2) To build the necessary theoretical background for the selection of a suitable site for a dam and a suitable dam for a given site location.
- 3) To emphasize on the basic design principle of the gravity dam & earthen dam
- 4) To carry out the stability & seepage analysis of various types of dams.
- 5) To provide knowledge on various hydraulic structures such as energy dissipaters, spillways & gates & understand their designs.
- 6) To understand the design of cross drainage structures for uninterrupted water supply in natural channels and manmade canals.
- 7) To provide a basic knowledge on various types of hydropower plants and their components.

Syllabus:

Unit-I Gravity dams:

Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

Unit-II Earth and Rock fill dams:

Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

Rock fill dams: Types, merits and demerits, conditions favourable for their adoption

Unit-III Cross drainage works:

Types, selection of suitable type, design criteria, fluming of canal- Mitra & Chaturvedi methods. Design of Different types of CD works.

Unit-IV Spillways, Energy dissipators and gates:

Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways. Principles of energy dissipation, Energy dissipators based on tail water rating curve and jump height curves, Spillway crest gates - vertical lift and radial gates, their design principles and details.

Unit-V Hydropower Plants:

Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

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Course Outcomes:

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

CO1: Evaluate various design criteria of gravity dams.

CO2: Design elements of earthen dams and carry out seepage and stability analysis.

CO3: Design different types of cross drainage works.

CO4: Design energy dissipators and spillways.

CO5: Explain various elements of hydropower plants.

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

CO1: Evaluate various design criteria of dams.

CO2: Design different types of cross drainage works.

CO3: Design energy dissipators and spillways.

Reference Books:

- i) Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
- ii) Hydroelectric Hand Book by Creager
- iii) Hydraulic Structures by Varshney
- iv) Irrigation & Water Power Engg. By Punmia & Pandey
- v) Water Power Engineering by Dandekar
- vi) Irrigation Engineering & Hydraulic Structure by S.K. Garg.

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Amit Kumar
Dr. M. K. Singh
Dr. J. P. Singh
Dr. J. P. Singh
Dr. J. P. Singh

Course Code: BCE1. - 803 (A)

Course Name: Industrial Waste Treatment

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To provide broad knowledge on various methods of sewage disposal, their effects on water pollution & also provide information on various disposal standards.
- 2) To learn the basics of sewage composition & its characteristics.
- 3) To understand the 3R concepts and how to implement them.
- 4) To provide knowledge on various waste water treatment techniques.
- 5) To provide information on various rules & regulations regarding disposal of municipal wastes.
- 6) To provide information about various existing waste treatment & management techniques of various industries.

Syllabus:

Unit-I Problem of Water Pollution: ✓

Effects of wastes on streams and sewage treatment plant, natural purification of streams, oxygen sag curve, allowable organic load on streams, classification of stream, stream standards and effluent standards requirement of water for different purposes.

Unit-II Sampling and Analysis of Wastewater: ✓

Sampling of waste waters, Grab, Composite and Integrated samples, analysis of waste water, Biochemical Oxygen Demand, Chemical Oxygen Demand and pH value of waste water, Toxicity of waste by Bioassay method.

Pretreatment of Wastes: Volume and strength reduction, salvage of materials, recovery of by products, reuse of waste water.

Unit-III Conventional Methods of Treatment of Waste Water: ✓

Removal of suspended solids, removal of inorganic and organic dissolved solids, sludge disposal. Advance methods of treatment such as Reverse Osmosis, Ion Exchange Process, Electro Dialysis, Algal Harvesting etc

Unit-IV Combined Treatment of Waste Water with Sewage:

Municipal regulations, Sewer rental charges, Instrumentation in waste water treatment plants, Operation and maintenance of plants, Role of water pollution control board. Low cost Treatment Plant Effluent Treatment Plant Design and Operation.

Unit-V

Brief study of industrial processes and treatment methods of waste water from common industries such as Textile, Dairy, Paper and pulp, Tannery & Distillery.

Hazardous wastes-Impact handling and disposal

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Course Outcomes:

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

CO1: Evaluate the effects of waste on streams as per the standards

CO2: Determine various sewage characteristics.

CO3: Explain various waste treatment methods.

CO4: Apply municipal regulations in operation & maintenance of waste water treatment plant

CO5: Illustrate waste management methods of different industries.

Reference Books:

- i) Liquid Waste of Industries - Theories, Practice and Treatment - N.L. Nemerow, Wesley Publishing Co.
- ii) Treatment of Industrial Waste - E.B. Besselievre & Max Graw Hill Bok Company
- iii) Waste Water Engg. - Treatment Disposal & Reuse - Metcalf & Eddy - Tata Mc Graw Will, New Delhi
- iv) Waste Water Treatment - Arceivala - Tata Mc Graw Will, New Delhi
- v) Industrial Pollution Control hand book - Lund I.L.F. Tata Mc Graw Will, New Delhi

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Course Code: BCEI - S03 (B)

Course Name: Construction Techniques

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand various techniques in construction of pile foundations, coffer dams etc.
- 2) To understand various types of formworks.
- 3) To understand various techniques of steel construction works.
- 4) To understand the prefabrication in construction.
- 5) To understand the concept of prestressing methods in construction.
- 6) To understand various advanced pavement construction methods.

Syllabus:

Unit-I

Foundations: Techniques of construction of piles, Cassons, Wells, Cofferdams and diaphragms, Drilling blasting, Underpinning, Shoring and shuttering of foundation.

Unit-II

Formwork: Design and construction of different types of formworks and temporary structures, Stationary and slip formwork techniques, Formwork of special structures eg. Shells, Bridges, Towers etc.

Steel Construction: Fabrication and erection, Shop and in situ construction techniques, Different connections, Clearances and tolerances, Erection of steel structures like bridges, Chimneys and trusses.

Unit-III

Prefabrication: Application in construction Modular coordination and standardization, joints and tolerances, Special equipments and plants for industrial production of prefabricated components, Pre-engineered Building.

Unit-IV

Prestressing: Concept, Materials and Prestressing methods, Special equipments and plants for industrial production of prestressed components, Prestressing of bridge girders, Water tanks and special structures.

Unit-V

Advanced pavement construction Techniques: Pavement construction using bitumen hot mix plant, Concrete road construction, Fibre reinforced pavement construction, Low cost road construction techniques, Pavement quality control.

Course Outcomes:

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

CO1: Apply various techniques in construction of pile foundations, coffer dams etc.

CO2: Evaluate various types of formworks.

CO3: Apply various techniques of steel construction works.

CO4: Apply the concepts of prefabrication in construction.

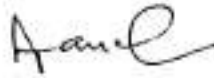
CO5: Apply the concepts of prestressing methods in construction

CO6: Apply various advanced pavement construction methods.

Reference Books:

1. Soil Mechanics by Gopal Ranjan, New Age Publishers.
2. Mahesh Verma, Construction Equipment, its planning & Application, Metropolitan Book Co.(P) Ltd.,
3. Foundation Design Manual by Narayan V. Nayak
4. Prestressed concrete by Rajagopalan
5. Prestressed concrete by T. Y. Lin
6. Highway Engg by Justo and Khanna

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Course Code: BCEL - 803 (C)

Course Name: Earthquake Engineering

L	T	P	Credit
3	1	0	4

Syllabus:

- Unit - I Single DOF Systems:- Undamped and Damped, Response to Harmonic and Periodic excitations. Response to Arbitrary, Step, Ramp and Pulse Excitation.
- Unit-II Numerical Evaluation of Dynamic Response:- Time stepping methods, methods based on Interpolation of Excitation, Newmark's and Wilson- ϕ method. Analysis of nonlinear Response.
- Unit-III Earthquake Response of structures:- Nature of dynamic loading resulting from earthquake, construction of Response spectrum for Elastic and Inelastic systems.
Elements of seismology:- Definitions of the basic terms, V related to earthquake, seismographs (magnitude, intensity, epicenter etc.)
- Unit-IV Multiple DOF systems:- Stiffness and Flexibility matrices for shear buildings, free and forced vibrations undamped and damped, Modal and Response History Analysis, Systems with distributed elasticity.
- Unit-V Earthquake Resistant Design of Structures, Design of structures for strength & serviceability Ductility and energy absorption, Provisions of IS:1893 and IS; 4326 for a seismic design of structures.

Reference Books:

- Berg G.V. Elements of structural Dynamics, Prentice Hall of India, Englewood Cliffs, NJ
- Paz Mario, Structural Dynamics, CBS Publishers, Delhi
- Clough R.W. & Penzien, Dynamics of structures, New York.

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Course Code: BCEL - 804 (A)

Course Name: Building Environment & Services

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To develop an understanding about the acoustics of a building.
- 2) To understand the fundamental concepts of ventilation in a building.
- 3) To understand about various preventive measures to be taken for corrosion & cracks in building & plan accordingly the building maintenance system.
- 4) To understand the concepts of illumination and plan accordingly the lighting system in building.
- 5) To understand the concepts of air conditioning, elevators & lifts installation, thermal insulation & stair case design for a building.
- 6) To understand the requirements of fire fighting in a building and plan accordingly.
- 7) To plan the sanitation system of a building.

Syllabus:

Unit-I Acoustics and Ventilation

Characteristics of sound, Behaviour of sound, Defects of sound, Acoustic design, Sound absorption materials and techniques, Noise control in Building, Sound insulation of floors, walls, roof etc.

Functional requirements of ventilation, System of Ventilation, Factors and various considerations for improved natural ventilation. Artificial Ventilation (mechanical Ventilation), use of topography in improving ventilation.

Unit II

Building Maintenance

Causes of deterioration of Buildings. Approach to maintenance, reliability of maintenance system., pest control. Preventive maintenance in building and electric installations, checklist for inspection, Cracks in building (causes and effect), Maintenance of floors & roofs, Maintenance of brick masonry, Corrosion in Reinforced concrete members, Prevention of leakage in building, Maintenance of windows, Doors and external Joinery (Timber), Building services required in building complexes.

Unit-III

Electrification & Illumination

System of distribution of electrical energy in building, Methods of wiring, System of wiring, Selection of wiring, conductor & insulators, Methods of earthing, Energy calculation, Fuses, electrical safety precautions.

Illumination, terminology, Different source of light Design of lighting scheme, Street lighting flood lighting, Lighting calculations, Various types of electrical circuits used in building i.e. Stair case wiring corridor wiring, Connection of Fan, Bulb socket in circuit.

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Unit – IV

Services in Building

Staircase design, Elevators, Escalators, Air Conditioning, Essentials of Air Conditioning Systems, Thermal insulation of building (wall, roof, floor etc.), Methods of thermal insulation, Lifts and its types, Power requirement of lifts, Traffic analysis, Quality and quantity of service of lift operations, Lift installation.

Unit-V

Fire Fighting & Sanitation

Causes of fire, Classification of fire, Modes of fire, Fire load, Modes of fire fighting, Types of fire extinguishers, provisions in building from fire safety angle, Additional requirement for multi storied building, Municipal rules & laws, Fire alarm, Fire hydrants.

Water seal and traps, sanitary noise and control, maintenance of water tanks & sewer lines, leakage in building and its prevention, Hot water supply in building, Basic principles of design of water supply system, Sanitary piping, troubles and causes, House - keeping in water and sanitary installation.

Course Outcomes:

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

- CO1: Evaluate acoustics & ventilation of a building.
- CO2: Develop building maintenance.
- CO3: Develop system of distribution of electrical energy in buildings & illumination in buildings.
- CO4: Plan various services like air condition, thermal insulation & lift installation in a building.
- CO5: Plan fire safety for a building.
- CO6: Develop sanitation system in a building.

Reference Books:

- (i) Building Construction by B.C. Punmia
- (ii) Building Construction by S.C. Rangwala
- (iii) Building Services in High rise building by V.K. Jain
- (iv) Maintenance of Building by A.C. Panchdhari
- (v) Water Supply and Sanitary Installations by A.C. Panchdhari
- (vi) Electrical Installations Estimating and Costing by J.B. Gupta

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Course Code: BCEL – 804 (B)
Course Name: Modern Foundations

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the concepts of shells used in foundation.
- 2) To understand the foundation for special structures like water tanks, chimney etc.
- 3) To understand the foundation for various underground structures like tunnels, conduits etc.
- 4) To understand the foundation for special soils like expansive soils, soft & compressive soils.
- 5) To understand the techniques used in foundation construction.

Syllabus:

- Unit-I Shells in Foundation:-** Shell as a structural form, classification of shells used in foundation. Design of shell foundation-hyperbolic paraboloidal shell, inverted dome shell, construction of shell foundation, in situ construction, precast construction.
- Unit-II Foundation for special structures:-** Foundations for water tanks, chimneys and cooling towers, telecommunication and transmission line towers foundations for guyed structure, industrial structure and for ground storage tanks.
- Unit-III Foundations for underground structure:-** Beddings of conduits, tunnels, underground powerhouses. Foundation for Coastal and offshore structures; Marine piles, foundations for offshore drilling platforms, and foundations for offshore defence installations.
- Unit-IV Foundations in Special Soils:-** Foundations in expansive soils, foundations in soft and compressible soils, foundations in over consolidated desiccated soils.
- Unit-V Modern Foundation Techniques:-** Drilled piers, reinforced earth, reinforced concrete retaining walls with relieving shelves diaphragm walls and bored pile walls the stabilizing action of drilling mud, roof piles, vibro-floatation, stone columns, sand wicks and rope drains, grouting.
- Modern Soil Testing:-** Centrifugal testing of soil models, pressure meter testing of soils.

Course Outcomes:

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

- CO1: Apply the concepts of shells used in foundation.
- CO2: Evaluate foundation for special structures like water tanks, chimney etc.
- CO3: Evaluate foundation for various underground structures like tunnels, conduits etc.
- CO4: Evaluate foundation for special soils like expansive soils, soft & compressive soils.
- CO5: Apply techniques used in foundation construction.

Reference Books:

- Foundation Design by W.C. Teng – Prentice Hall Int. Inc. New Delhi
- Foundation Analysis & Design by J.E. Bowles- Mc Graw Hill Book Co., New Delhi
- Foundation Engineering by G.A. Leonord – Mc Graw Hill
- Foundation Engineering by R.E.Peck, W.E.Hanson & T.H.Tourbun-Asia Publishing House, Delhi.

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Course Code: BCEL - 804 (C)
Course Name: Pavement Design

L	T	P	Credit
3	1	0	4

Course Objectives:

- 1) To understand the concepts of ESWL.
- 2) To understand various methods of flexible pavement design.
- 3) To understand concepts used in rigid pavement.
- 4) To understand various methods of rigid pavement design.
- 5) To understand various methods of evaluation & strengthening of existing pavements.

Syllabus:

Unit-I Equivalent Single Wheel Load (ESWL):- Definition, calculation of ESWL, repetition of loads and their effects on the pavement structures.

Unit-II Flexible Pavements:- Component parts of the pavement structures and their functions, stress in flexible pavements. Stress distribution through various layer, Boussinesque's theory, Burmister's two layered theory, methods of design, group index method, CBR method, Burmister's method and North Dakota cone method.

Unit-III Rigid Pavements:- Evaluation of subgrade, Modulus-K by plate bearing test and the test details Westergaard's theory stress in rigid pavements, Temperature stress, warping stress, frictional stresses, critical combination of stresses, critical loading positions.

Unit-IV Rigid Pavement Design:- IRC method, Fatigue analysis, PCA chart method, joints, design and construction & types, AASHTO Method, Reliability analysis.

Unit-V Evaluation and Strengthening of Existing Pavements:- Benkleman beam method, Serviceability Index Method, Rigid and flexible overlays and their design procedures.

Course Outcomes:

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

- CO1: Apply the concepts of ESWL.
- CO2: Evaluate various methods of flexible pavement design.
- CO3: Apply concepts used in rigid pavement.
- CO4: Evaluate various methods of rigid pavement design.
- CO5: Apply various methods of evaluation & strengthening of existing pavements.

Reference Books:

- Principles of pavement design by E.J. Yoder & M.W. Witczak * Srinivasn M. "Modern Permanent Way"
- AASHTO, "AASHTO Interim Guide for Design of Pavement Structures", Washington, D.C.
- Portland Cement Association. Guidelines for Design of Rigid Pavements, Washington.
- DSIR, Conc. Roads Design & Construction.

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Course Code: BCEP - 805

Course Name: Major Project - II

L	T	P	Credit
0	0	12	6

Course Objectives:

- 1) To develop an appreciation of civil engineering problems & have a feel of real life situations in planning & execution of projects.
- 2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
- 3) To utilize the expertise in engineering to solve industry's technological problems.
- 4) To become innovative and professional in technology development, and system implementation.
- 5) To be able to function in their profession with social awareness and responsibility
- 6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
- 7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of report of experimental work/software package on any specific problem of importance.

Course Outcomes:

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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Course Code: BCES – 806

Course Name: Seminar / Group Discussion

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To encourage students to read, study & understand different topics of civil engineering published in articles- literatures.
- 2) To help in presenting different topics of civil engineering and related subjects to supplement theoretical knowledge trained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

1. Any relevant topic related to civil engineering from within or beyond the syllabus through Swayam / NPTEL / MOOC.

Course Outcomes:

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

- CO1: Analyze 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.

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**2. Scheme & Syllabus of M.E. CTM, Structural Engg. &
M.Tech Environmental 3rd & 4th Sem to be implemented
from July 2018**

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

M.E. (Construction Technology & Management)

W.E.F JULY 2018
For batches admitted in July, 2017 (to be implemented in July, 2018)

III Semester

S. No.	Subject Code	Name of Subject	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks
			L	T	P		End Sem. Exam	Mid Sem. Exam.	Assignment / Quiz	End Sem. Practical / Viva	Practical Record / Assignment / Quiz / Presentation	
1.	510301	Elective I	3	1	-	4	70	20	10	-	-	100
2.	510302	Elective II	3	1	-	4	70	20	10	-	-	100
3.	510303	Seminar	-	-	4	4	-	-	-	-	100	100
4.	510304	Preliminary Dissertation (Literature Survey)	-	-	8	8	-	-	-	-	80	200
Total			6	2	12	20	140	40	20	120	180	500

L: Lecture, T: Tutorial, P: Practical

Elective I	510301(A)	Infrastructure Project Management	510301(B)	Advance Scheduling Techniques	510301(C)	Sustainable Construction Methods
Elective II	510302 (A)	Urban Hydrology & Waste Management	510302 (B)	Decision & Risk Analysis	510302 (C)	Building Construction Practices



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M.E. (Construction Technology & Management)

W.E.F JULY 2018
For batches admitted in July 2017 (to be implemented in July 2018)

IV Semester

S. No.	Subject Code	Name of Subject	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks	
			L	T	P		End Sem. Exam	Mid Sem. Exam.	Assignment / Quiz	End Sem. Practical/ Viva	Practical Record / Assignment / Quiz / Presentation		
1.	510401	Dissertation	-	-	20	20	-	-	-	-	100	200	300
Total			-	-	20	20	-	-	-	-	300	200	500

L: Lecture, T: Tutorial, P: Practical

- *Answers*

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

M.Tech. (Environmental Engineering)

W.E.F JULY 2018
For batches admitted in July, 2017 (to be implemented in July, 2018)

IV Semester

S. No.	Subject Code	Name of Subject	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)			Total Marks
			L	T	P		End Sem. Exam	Mid Sem. Exam.	Assignment / Quiz	End Sem. Practical / Viva	Practical Record / Assignment / Quiz / Presentation		
1.	530401	Dissertation	-	-	20	20	-	-	-	-	100	200	500
Total			-	-	20	20	-	-	-	-	100	200	500

L: Lecture, T: Tutorial, P: Practical

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

M.E. (Structural Engineering)

WAF JULY 2018
For batches admitted in July 2017 to be implemented in July 2018

III Semester

S. No.	Subject Code	Name of Subject	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks	
			L	T	P		End Sem. Exam	Mid Sem. Exam	Assignment / Quiz	End Sem. Practical / Viva	Practical Record / Assignment / Quiz / Presentation		
1.	520301	Elective I	3	1	-	4	70	20	10	-	-	100	
2.	520302	Elective II	3	1	-	4	70	20	10	-	-	100	
3.	520303	Seminar	-	-	4	4	-	-	-	-	100	100	
4.	520304	Preliminary Dissertation (Literature Survey)	-	-	8	8	-	-	-	-	120	80	200
Total			6	2	12	20	140	40	20	20	120	180	500

L: Lecture, T: Tutorial, P: Practical

Elective I	520301(A)	Infrastructure Project Management	520301 (B)	Foundation Engineering	520301 (C)	Theory of Plates & Shells
Elective II	520302 (A)	Finite Element Method	520302 (B)	Earthquake Resistant Design of Structures	520302 (C)	Computer Applications

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


M.E. (Structural Engineering)

W.E.F JULY 2018
For batches admitted in July, 2017. (to be implemented in July, 2018)

IV Semester

S. No.	Subject Code	Name of Subject	Periods per Week			Credits	Maximum Marks (Theory Slot)			Maximum Marks (Practical Slot)		Total Marks	
			L	T	P		End Sem. Exam	Mid Sem. Exam.	Assignment / Quiz	End Sem. Practical/ Viva	Practical Record / Assignment / Quiz / Presentation		
1.	520401	Dissertation	-	-	20	20	-	-	-	-	300	200	500
		Total	-	-	20	20	-	-	-	-	300	200	500

L: Lecture, T: Tutorial, P: Practical



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510301 (A) Infrastructure Project Management

L	T	P	Credit
3	1	0	4

Unit-I

Nature & Type of Infrastructure Projects. Characteristics, Scope and Status of Infrastructure Projects in India.

Unit-II

Issues of Developing, Funding, Financing Infrastructure Projects. Various Construction Procurement Options.

Unit-III

Uncertainties & Risks in Large Scale Construction Projects.

Unit-IV

Development of sustainable Infrastructure. Environmental Impact assessment of Infrastructure projects.

Unit-V

Management of Infrastructure projects. Role of I.T. in Infrastructure development.

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510302 (A) Urban Hydrology & Waste Management

L	T	P	Credit
3	1	0	4

Unit-I

Utilization of industrial waste in construction industry, Flyash as building material, ceramic insulator scrap as aggregate in concrete. Use of cement stabilized soil block as an alternative to burnt clay brick, urban solid waste and sludge as building material. Cement and building material from industrial waste. Lal-G brick. Pollution free production of innovative building materials and components. Concrete aggregate from demolition waste. Structural concrete using industrial waste.

Unit-II

Industrial Waste: Problem associated with industrial waste. Equalization, neutralization, volume reduction. House keeping method and Advanced treatments like adsorption, ion exchange, Chemical oxidation, Phosphorus removal, Nitrification, chemical precipitation, Reverse-osmosis, Electrodialysis.

Unit-III

Wastewater Treatment: Waste water generation, Collection, Construction of sewer lines. Sewer appurtenances. Disposal of wastewater & refuse. Recycling and reuse.

Unit-IV

Surface & Subsurface Hydrology: Hydrological cycle & its application in engineering. Precipitation, its types, forms & measurements. Rainfall data. DAD curve. Methods of average rainfall and losses.

Ground Water: Aquifer properties, groundwater properties, types and problems, well hydraulics, well losses, ground water investigation.

Unit-V

Hydrographs: Run off-discharge measurement, stage discharges, runoff computation, runoff simulation model, concept of hydrograph, component of hydrograph, unit hydrograph and its derivation. S-hydrograph, IUH hydrograph and its derivation. Synthetic unit hydrograph. Flood estimation techniques.

Reference Books:

- i) Engineering Hydrology by K. Subramanya - Tata Mc Graw Hill Publ. Co.
- ii) Hydrology & Water Resources Engineering by S. K. Garg - Khanna Publishers
- iii) Sewage Disposal & Air Pollution Engineering by S. K. Garg - Khanna Publishers.
- iv) Waste Water Engineering, Treatment, Disposal & Reuse by Metcalf & Eddy - TMH Publishers.

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530301 (A) Principles and Design of Biological Treatment Systems

L	T	P	Credit
3	1	0	4

Unit-1

Principles Objectives of Biological Treatment, significance, aerobic and anaerobic treatment kinetics of biological growth, factor effecting growth- attached and suspended growth.

Types of wastewater. Constituents of wastewaters- Sources. Significant parameter Fundamentals of Process Kinetics, Zero order, First order, Second order Reactions, Enzyme kinetics

Unit-2

Bio reactors: Types, Classification, Design principles. Design of wastewater treatment systems, Primary, secondary and tertiary treatments. Evaluation of Biokinetic Parameters

Unit-3

Biological Nitrification and denitrification. Suspended Growth process- Activated Sludge process: Introduction, Modifications. Membrane bioreactors, Waste stabilization ponds and Lagoons. Aerobic pond, facultative pond, anaerobic ponds, aerated Lagoons

Unit-4

Attached Growth Biological Treatment Systems: Trickle Filters, Rotating Biological Contactors. Anaerobic processes -Process fundamentals, Standard, high rate and hybrid reactors.

Unit-5

Anaerobic filters, Expanded /fluidized bed reactors, Up flow anaerobic sludge blanket reactors, Expanded granular bed reactors, Two stage/phase anaerobic reactors, Sludge Digestion, Sludge disposal.

Reference Books:

1. Benefield, L.D. and Randall C.W. Biological Processes Design for wastewaters. Prentice-Hall, Inc. Eaglewood Cliffs, 1982.
2. Gray Jr. C.P.I. and Lin H.C. Biological wastewater treatment: Theory and Applications. Marcel Dekker, Inc New York, 1980.
3. Metcalf & Eddy, Inc. Wastewater Engineering, Treatment and Reuse. 3rd Edition. Tata McGraw-Hill, New Delhi, 2003.
4. Quasim S.R. Wastewater Treatment Plant, Planning Design & Operation. Technomic Publication, New York 1994.
5. Manual on "Sewerage and Sewage Treatment CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

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530302 (A) Urban Hydrology & Waste Management

L	T	P	Credit
3	1	0	4

Unit-I

Utilization of industrial waste in construction industry. Flyash as building material, ceramic insulator scrap as aggregate in concrete, Use of cement stabilized soil block as an alternative to burnt clay brick, urban solid waste and sludge as building material, Cement and building material from industrial waste, Fal-Gi brick, Pollution free production of innovative building materials and components, Concrete aggregate from demolition waste, Structural concrete using industrial waste.

Unit-II

Industrial Waste: Problem associated with industrial waste. Equalization, neutralization, volume reduction, House keeping method and Advanced treatments like adsorption, Ion exchange, Chemical oxidation, Phosphorus removal, Nitrification, chemical precipitation, Reverse osmosis, Electrolysis.

Unit-III

Wastewater Treatment. Waste water generation, Collection, Construction of sewer lines, Sewer appurtenances, Disposal of wastewater & refuse, Recycling and reuse.

Unit-IV

Surface & Subsurface Hydrology: Hydrological cycle & its application in engineering, Precipitation, its types, forms & measurements, Rainfall data DAD curve, Methods of average rainfall and losses.

Ground Water: Aquifer properties, groundwater properties, types and problems, well hydraulics, well losses, ground water investigation.

Unit-V

Hydrographs: Run off-discharge measurement, stage discharges, runoff computation, runoff simulation model, concept of hydrograph, component of hydrograph, unit hydrograph and its derivation, S hydrograph, H/H hydrograph and its derivation, Synthetic unit hydrograph, Flood estimation techniques.

Reference Books:

- i) Engineering Hydrology by K. Subramanya - Tata Mc Graw Hill Publ. Co.
- ii) Hydrology & Water Resources Engineering by S. K. Garg - Khanna Publishers.
- iii) Sewage Disposal & Air Pollution Engineering by S. K. Garg - Khanna Publishers.
- iv) Waste Water Engineering, Treatment, Disposal & Reuse by Metcalf & Eddy - TMH Publishers.

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520301 (A) Infrastructure Project Management

L	T	P	Credit
3	1	0	4

Unit-I

Nature & Type of Infrastructure Projects, Characteristics, Scope and Status of Infrastructure Projects in India.

Unit-II

Issues of Developing, Funding, Financing Infrastructure Projects, Various Construction Procurement Options.

Unit-III

Uncertainties & Risks in Large Scale Construction Projects.

Unit-IV

Development of sustainable Infrastructure, Environmental Impact assessment of Infrastructure projects.

Unit-V

Management of Infrastructure projects, Role of I.T. in Infrastructure development.

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520302 (A) Finite Element Method

L	T	P	Credit
3	1	0	4

UNIT-I:

Introduction:

Brief history of the development, general description of the method, advantages and disadvantages of finite element method, displacement approach.

Basic Principles of Structural Mechanics:

Equilibrium conditions, strain displacement relations, linear constitutive relations, Principle of virtual work, energy principle, application to finite element method.

UNIT-II:

Element Properties:

Displacement models, relation between the nodal degrees of freedom and generalized coordinates, convergence requirements, natural coordinate systems, shape functions (interpolation functions), element strains and stresses, element stiffness matrix, equivalent nodal loads and static condensation.

Isoparametric Elements:

Two and three dimensional isoparametric elements, evaluation of stiffness matrix using numerical integration techniques, convergence criteria.

UNIT-III:

Analysis of Framed structures:

Two and three dimensional truss elements, two and three dimensional beam elements, shear deformation in beams and beams on elastic foundation.

Plane Stress plane strain and Axisymmetric Stress Analysis:

Triangular elements, rectangular elements, isoparametric elements Axisymmetric solid element and patch test.

UNIT-IV:

Three Dimensional Stress Analyses:

Three dimensional solid elements, eight and twenty noded isoperimetric solid element load vector and evaluation of stresses.

Analysis of Plate Bending:

C^0 , C^1 and C^2 displacement functions, plate-bending elements, shear deformation in plates, four and eight noded isoparametric plate elements, selective reduced integration and behavior of elements.

Analysis of Folded Plates & Shells:

Review of shell elements, flat shell element, bilinear degenerated shell element and eight noded shell element.

UNIT-V:

Solution of Finite Element Equilibrium Equations:

Direct solution using algorithms based on Gauss elimination, direct solution using orthogonal matrices Gauss-Siedel iterative solution, frontal solution method and solution of errors.

Techniques for Non Linear Analysis:

Non-linear problems non-linear solution techniques, problems involving geometric non-linearity and problem involving both material and geometric non-linearity, convergence criteria.

Books:

- O.C. Zienkiewicz, "The Finite Element Method", Tata-Mc Graw Hill Co. Delhi
- C.S. Krishnamoorthy, "Finite Element Analysis - Theory and Programming", Tata Mc Graw Hill, Delhi

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520301 (B) Foundation Engineering

L	T	P	Credit
3	1	0	4

UNIT-I:

Shallow Foundations:

Introduction, General Requirements, Depth of Foundation, Bearing capacity, Eccentric inclined loads, Bearing capacity of stratified soils, Settlement of footings, Settlement of footings from constitutive laws, Settlement of footings on eccentrically loaded footings, allowable settlement, Plate bearing test, Standard penetration test, Effect of water table, Shallow foundation classifications, Modulus of subgrade reaction, Beams on elastic foundation, Rigid foundation

UNIT-II:

Pile Foundation:

Introduction, Uses of piles, Types of piles, pile drivers, Bearing capacity of piles, Static analysis, Pile load test, Dynamic methods, Other methods, Negative Skin friction, Pile groups, Ultimate bearing capacity of pile groups, Settlement of pile group, Influence of pile cap, Laterally loaded piles, Ultimate resistance, Elastic method, Pile groups under lateral load, batter pile under lateral load, Batter pile groups under inclined loads, Pile under dynamic loads

UNIT-III:

Well Foundation:

Introduction, elements of a well foundation, Shapes of wells, Depth of well foundation, Depth of scour, Bearing capacity analysis, Loading, Sinking stresses, Conditions for stability of well, Lateral stability of well, Design of individual members, Well sinking, Tilts and shifts

UNIT-IV:

Machine Foundations:

Introduction, Criteria for satisfactory action of a machine foundation, Definitions, Degrees of freedom of a block foundation, Analysis of block foundation, Theory of linear weightless spring, Equivalent soil springs, vertical vibrations, Rocking vibrations, Vibrations in shear, Simultaneous rocking sliding and vertical vibrations for a foundation, Indian standard on design and construction of foundations for reciprocating machine, Foundations for impact type machines, Indian standard on design and construction of foundations for impact type machines, Analysis of block foundation based on elastic half space theory

UNIT-V:

Coffer Dams:

Introduction, Types of Coffer Dams, Design data for cellular cofferdam, stability analysis of cofferdam, Interlock stresses

Deep Open Cuts

Introduction sheeting and bracing for deep cuts, Movements associated with sheeting and bracing, Modes of failure of braced cuts, Pressure distribution behind a sheeting, Field measurements

Soil Exploration

Introduction, Methods of exploration, Direct Methods and techniques of exploration, Methods of boring, types of samples, Disturbance of soil sample, Soil samples and sampling techniques, Ground water observations, Boring records, Spacing and depth of bore holes, Indirect methods of soil exploration, Penetration tests, Geophysical methods, Dynamic methods, Sequence of exploration programme

Books

- Bowles, "Foundation Analysis and Design", Mc Graw Hill Book Company
- Peck, R B, W. E. Hanson and J H. Thornburn, "Foundation Engineering", Wiley, New York

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103

520302 (B) Earthquake Resistant Design of Structures

L	T	P	Credit
3	1	0	4

UNIT-I

Elements of Seismology -

Basic terms - seismic waves, earthquake magnitude and intensity, measurement of earthquake - seismic zoning & microzonation

Earthquake response of structures - Consequences of earthquake - Response spectrum - Construction of response spectrum - JEL, Lique and Inelastic systems

UNIT-II

Torsion & Rigidity

Rigid diaphragms - Centre of mass, Centre of rigidity, torsional effects

Design concept - Earthquake resistant design philosophy, ductility, hysteretic response and energy dissipation

UNIT-III

Earthquake Analysis of Building Systems

Estimation of dynamic characteristics using Rayleigh's, Holzer's, Stodola's methods, Loads resulting from earthquakes, Seismic Load estimation based on relevant IS Codes.

UNIT-IV

Earthquake Design of Buildings -

Masonry Buildings - Behavior of unreinforced & reinforced buildings, Box action - Seismic design - Cold Joints

RC Buildings - Principles, Ductile detailing, Shear walls, Design of shear walls

UNIT-V

Seismic design of Special Structures -

Design of Liquid storage tanks, stack-like structures, Bridges and Dams.

Seismic strengthening of existing buildings - Learning from past earthquakes, retrofitting of masonry buildings, retrofitting of RC buildings, Seismic Base Isolation.

Books:

- Elements of Earthquake Engineering by Jai Krishna, A.R. Chandrasekaran & Hejesh Chandra, South Asian Publishers, New Delhi.
- Earthquake Engineering Handbook by Wai-Fah Chen and Charles Scawthorn, CRC Press Washington, U.S.A.
- Earthquake Resistant Design of Masonry Buildings, by Milja Tomazevic, Imperial College Press, London UK
- Earthquake Resistant Design of Structures by Pankaj Agrawal & Manish Shrivastava, PHI Learning Private Limited, Delhi
- Earthquake Resistant Design of Structures by S.K. Duggal, Oxford University Press, India
- Structural Dynamics, by M. Paz, Van Nostrand Reinhold, New York.
- IS 1897 - Indian Standard Criteria for Earthquake Resistant Design of Structures, B.I.S. - New Delhi
- IS 4726-1997 - Indian Standard Code of Practice for Earthquake Resistant Design and Construction of Buildings, B.I.S. - New Delhi
- IS 13920-1993 - Code of Practice for Ductile Detailing of R.C. C. Structures Subjected to Seismic Forces, B.I.S. - New Delhi.
- Fundamental Concepts of Earthquake Engineering by Roberto Villaverde, CRC Press
- Fundamentals of Seismic loading on structures by Topas K. Sen, Wiley Publisher

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520301 (C) Theory of Plates and Shells

L	T	P	Credit
3	1	0	4

Unit-I

Pure Bending of Plates

Slopes and Curvatures of Slightly bent plates, relations between moments and curvatures. Particular cases of pure bending of plates, strain energy in pure bending, Limitations of pure bending theory

Symmetrical bending of circular plates:

Differential equation for symmetrical laterally loaded circular plates, uniformly loaded circular plates

Circular plates with a circular hole at the center, Circular plate concentrically loaded and circular plate loaded at the center. Small deflections of Laterally Loaded plates

Differential equation of the deflected surface, boundary conditions, exact theory of plates.

Unit-II

Simply Supported Rectangular Plates.

Plates under sinusoidal loads, Navier's solution for U D patch load and concentrated load, Levy's solution for U D L., Plates under hydrostatic load, Plates of infinite length

General Introduction to Shells Theory

Definition of shell, thick and thin shells, classification of shell surfaces, basis assumptions, structural action, stress resultants, selection of shell type.

Unit-III

General Introduction to Shells Theory

Definition of shell, thick and thin shells, classification of shell surfaces, basis assumptions, structural action, stress resultants, selection of shell type.

Membrane analysis of shells of Revolution Equilibrium equations, strain- displacement relations, boundary conditions, membrane analysis of spherical and parabolic domes subjected to, symmetrical loading, conical shells.

Unit-IV

Membrane Analysis of Translational shells.

Membrane forces and displacements of circular, parabolic and elliptic, cylindrical shells, membrane theory of shells of double curvature, membrane theory for synclastic and anticlastic shells, governing differential equations for elliptic, parabolic, and hyper parabolic, shells, conical, shells, membrane behavior of soap bubble sheets.

Unit-V

Bending Analysis of shells of Revolution:

General theory of a symmetrically loaded shell of revolution - equations, strain - displacement relationship, stress- strain relation, stress resultants and displacement due to edge disturbances in spherical domes and conical shells, design considerations.

Reference Books:

1. Timoshenko, S.P. & Krieger S.W., Theory of Plates and shells, Mc-Graw Hill Book Co., New Delhi
2. Chatterjee, B. K., "Theory and design of concrete shells", Oxford & IBH Pub Co., New Delhi
3. Ramaswamy, G.S., "Design and Construction of shell roofs", Mc-Graw Hill Book Co., New Delhi
4. IS Code- 2210 - 1962 'Criteria for the design of reinforced concrete shell structures of folded plates, BIS., New Delhi

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520302 (C) Computer Applications

L	T	P	Credit
3	1	0	4

Unit I

Introduction to C++ Programming Basics:

Digital Computer Systems, problem solving techniques, introduction to programming languages, computer language and C++, source program, Compilation and debugging, C++ Programming Basics: Using Turbo C++, Basic program construction, preprocessor directive #include, #define, Header and Library functions, Keywords: INPL, L-OL, LPL, Statements, comments, Constants, Variables, and operators, Formatting statements, ENDL and SL, LW manipulators.

Unit-II

Loops, Decision and Arrays:

WHILE, DO-WHILE and FOR loops, general structure and control, IF, IF-ELSE statements, SWITCH, BREAK, CONTINUE statements, GOTO and labels, ARRAY fundamentals, types, use and manipulation of 2-D arrays as Matrices.

Unit-III

Functions:

Concept of modularization of structured programming: Basics of functions, their type declaration, definition and structure.

Unit-IV

Object Oriented Programming Concept:

General concepts of Object Oriented Programming, Objects and Classes, Member Functions, user defined data, Pointers, etc.

File Processing Streams, String I/O, Character I/O, Object I/O, input-output with multiple objects, File Pointers, Disk I/O with Member Functions, Error Handling, Printer Output.

Unit-V

Practical Applications:

Programming for mathematical models of structural analysis and design problems: use of general purpose programs.

Books recommended:

1. Object Oriented Programming with C++ by Robert Lafore
2. Object Oriented Programming with C++ by S.K. Panday

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