GOVERNMENT POLYTECHNIC, BOLANGIR

NAME OF THE FACULTY : Mr. Pius Ranjan Tandi GUEST FACULTY (Civil Engineering)

Subject: ADVANCED CONSTRUCTION TECHNIQUES & EQUIPMENT
Program: Diploma in Civil Engineering
Semester: 6TH sem syllabus
Total Contact Hours: 60 Total Marks: 100
Assessment: Internal Assessment – 20, End Term – 80

COURSE OBJECTIVES
On completion of the course students will be able to-
1. Select proper material during construction in domain of advanced materials including fibers, artificial timbers etc.
2. Select appropriate prefabrications in pursuance of standard codes
3. Adopt structural requirements and possible retrofits to improve earthquake resistance
4. Comprehend requirement of various services need to be operational
5. Understand the role of different construction earth moving equipments and select during planning
6. Comprehend necessity of soil reinforcing and prescribe appropriate strategy

Hour	Topic	Subtopic	Teaching Aids/Activities	Course Objective
	Advanced construction materials	**10 HRS**		

1	Fibers and Plastics-	Definations, characteristics	PPT, Chalk & Board	CO1
2	Types of fibers-	Steel, Carbon, glass fibers,	PPT, Chalk & Board	CO1
3	Use of fibers as construction material,	Use of fibers as construction material,	PPT, Chalk & Board	CO1
4	properties of Fibers.	properties of Fibers.	PPT, Chalk & Board	CO1
5	Types of plastics-	PVC, RPVC, HDPE, FRP, GRP	PPT, Chalk & Board	CO1
6	Colored plastic sheets. Use of plastic as construction material.	Colored plastic sheets. Use of plastic as construction material.	PPT, Chalk & Board	CO1
7	Artificial Timbers	Properties and uses of artificial timber.	PPT, Chalk & Board	CO1
8	Types of artificial timber available in market, strength of artificial timber.	Types of artificial timber available in market, strength of artificial timber.	PPT, Chalk & Board	CO1
9	Miscellaneous materials	Properties and uses of acoustics materials,	PPT, Chalk & Board	CO1

10	wall claddings, plaster boards, micro-silica, artificial sand, bonding agents, adhesives etc.	wall claddings, plaster boards, micro-silica, artificial sand, bonding agents, adhesives etc.	PPT, Chalk & Board	CO1
	Prefabrication	**8 HRS**		
11	Introduction,	Introduction, necessity and scope of prefabrication of buildings,	Stone samples, Board	CO2
12	history of prefabrication, current uses of prefabrication ,	history of prefabrication, current uses of prefabrication ,	Timber & bamboo samples, PPT	CO2
13	types of prefabricated systems, classification of prefabrication,	types of prefabricated systems, classification of prefabrication,	Samples, PPT	
14	advantages and disadvantages of prefabrication,	advantages and disadvantages of prefabrication,	Samples, PPT	CO2
15	The theory and process of prefabrication	The theory and process of prefabrication	Lime sample, Soil charts	CO2
16	design principle of prefabricated systems,	design principle of prefabricated systems,	Lime sample, Soil charts	CO2
17	types of prefabricated elements, modular coordination	types of prefabricated elements, modular coordination	Lime sample, Soil charts	CO2
18	Indian standard recommendation for modular planning.	Indian standard recommendation for modular planning.	Sand & aggregate samples	CO2

	Earthquake Resistant Construction	**8 HRS**		
19	Building Configuration	Building Configuration	Brick samples, PPT	CO3
20	Lateral Load resisting structures	Lateral Load resisting structures	Tile samples, PPT	CO3
21	Building characteristics	Building characteristics	Samples, PPT	CO3
22	Effect of structural irregularities-vertical irregularities,	Soft Storey Irregularity, Mass Irregularity, Vertical Geometric Irregularity, Stiffness Irregularity,plan configuration problems.	Samples, PPT	CO3
23	plan configuration problems	plan configuration problems	Samples, PPT	CO3
24	Safety consideration during additional construction and alteration of existing Buildings.	Safety consideration during additional construction and alteration of existing Buildings.	Samples, PPT	CO3
25	Additional strengthening measures in masonry building-corner reinforcement,	Additional strengthening measures in masonry building-corner reinforcement,	Samples, PPT	CO3
26	lintel band, sill band, plinth band, roof band, gable band etc.	lintel band, sill band, plinth band, roof band, gable band etc.	Samples, PPT	CO3

	Retrofitting of Structures	**8 HRS**		
27	Seismic retrofitting of reinforced concrete buildings	Seismic deficiencies in RC buildings	Cement sample, PPT	CO3
28	Seismic retrofitting of reinforced concrete buildings	Local retrofitting techniques	Lab demo, BIS charts	CO2
29	Seismic retrofitting of reinforced concrete buildings	Global retrofitting techniques,	Lab demo, BIS charts	CO1
30	-Sources of weakness in RC frame building	design, detailing, construction, material, and configuration issues	Chart, PPT	CO2
31	-Sources of weakness in RC frame building	design, detailing, construction, material, and configuration issues	Chart, PPT	CO1
32	-Classification of retrofitting techniques and their uses	Global Retrofitting Techniques	Chart, PPT	CO2
33	-Classification of retrofitting techniques and their uses	Local Retrofitting Techniques,	Chart, PPT	CO3
34	-Classification of retrofitting techniques and their uses	Material-Based Retrofitting Techniques	Chart, PPT	CO4

	Building Service	**8 HRS**		
35	Cold Water Distribution in high rise building, lay out of installation	Cold Water Distribution in high rise building, lay out of installation	Board, PPT	CO1
36	Hot water supply – General principles for central plants-layout	Hot water supply – General principles for central plants-layout	Board, PPT	CO2
37	Sanitation	–soil and waste water installation in high rise buildings	PPT, Chart	CO4
38	Electrical services	i) requirements in high rise buildings ii) Layout of wiring - types of wiring	Board, PPT	CO4
39	Electrical services	iii) Fuses and their types iv)Earthing and their uses	Board, PPT	CO4
40	Lighting –	Requirement of lighting, Measurement of light intensity	Lab demo	CO4
41	Ventilation	Methods of ventilation (Natural and artificial Systems of ventilation) problems on ventilation	Chart	CO4
42	Mechanical Services	Lifts, Escalator, Elevators – types and uses.	Case studies, PPT	CO4

	Construction and earth moving equipments	10 HRS		
43	Planning and selection of construction equipments	Planning and selection of construction equipments	Board, PPT	CO1
44	Planning and selection of construction equipments	Planning and selection of construction equipments	PPT, Chart	CO2
45	Study on earth moving equipments	Excavator, Backhoe, Backhoe Loader, Front Shovel, Clamshell, Scraper, Motor Grader, Wheel Loader, Skid Steer Loader, Trencher, Dump Truck / Tipper, Compactor / Road Roller	Board, PPT	CO4
46	Study on earth moving equipments	drag line, tractor, bulldozer, Power shovel	PPT, Chart	CO4
47	Study on earth moving equipments	drag line, tractor, bulldozer, Power shovel	Board, PPT	CO4
48	Study and uses of compacting equipments	tamping rollers, Smooth wheel rollers,	PPT, Chart	CO4
49	Study and uses of compacting equipments	Pneumatic tired rollers and vibrating compactors	Board, IS 10262	CO4
50	Study and uses of compacting equipments	Sheep foot roller ,Grid roller, Plate compactor, Ramming compactor, Vibratory plate compactor, Trench compactor	Lab demo	CO4

51	Owning and operating cost – problems	Owning and operating cost – problems	Board, PPT	CO4
52	Owning and operating cost – problems	Owning and operating cost – problems	Board, PPT	CO5
	Soil reinforcing techniques	**8HRS**		
53	Necessity of soil reinforcing.	Necessity of soil reinforcing.	Samples, PPT	CO1
54	Necessity of soil reinforcing.	Necessity of soil reinforcing.	Samples, PPT	CO2
55	Use wire mesh and geo-synthetics.	Use wire mesh and geo-synthetics.	Samples, PPT	CO4
56	Use wire mesh and geo-synthetics.	Use wire mesh and geo-synthetics.	Samples, PPT	CO1
57	Strengthening of embankments,	Causes of Failure, Slope Stabilization, Soil Compaction,	Samples, PPT	CO2
58	Strengthening of embankments,	Geosynthetics Use, Soil Replacement, Grouting, Monitoring	Samples, PPT	CO4

59	Slope stabilization in cutting and embankments by soil reinforcing techniques.	Slope stabilization in cutting and embankments by soil reinforcing techniques.	PPT, Samples	CO4
60	Slope stabilization in cutting and embankments by soil reinforcing techniques.	Slope stabilization in cutting and embankments by soil reinforcing techniques.	Case studies	CO6

Signature of Faculty **Signature of HOD**