Lesson Plan No. 1	Course Name: Building construction materials and drawing Topic: Introduction to Sustainable Engineering materials	Course No.: CE-802C

Objectives	At the end of the lesson the student shall be able to: a. Articulate the concept of building materials. b. Select what types of materials should be appropriate for the construction practice. c. Illustrate different types of masonry structures. d. Learn about the environment impact of the materials.
Teaching Aids (if any)	a. Power point presentations. b. Use of IS codes in practice in classrooms
Teaching Development	1. **Introduction** (5 minutes) - Introduce the sustainable engineering materials in construction.. - Discuss about its types. - Introduce them about sustainable construction practice - Highlight why the green building exhibit low embodied energy. 2. **Development** (30 minutes) a) Discussed about 10 different types of sustainable building materials : 1) Bamboo 2) Recycled steel 3) Hemp-crete 4) Recycled concrete 5) Straw bales 6) Recycled glass 7) Cork 8) Recycled plastics 9) Low voc paints and finishes 10) Rammed earth. b) Advantages of using these building materials c) Environmental impact of sustainable construction materials -Lower energy consumption -green house gas emissions -land fill usage d) Benefits of straw bale construction -Eco friendly building techniques -green building materials with low embodied energy 3. **Exercise** (5 minutes) – Give different use-of the green construction materials over conventional building materials.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.

	2. Suggested Reading - Original novatar blogs https://www.novatr.com/blog/sustainable-building-materials 3. Homework - Read about all the materials make a list, its uses and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 2	Course Name: Building construction materials and drawing Topic: Environmental Impact Assessment	Course No.: CE-802C

Objectives	At the end of the lesson the student shall be able to: e. Learn about the concept of environmental impact assessment. f. g. Select what types of rules and regulations are associated with impact assessment. h. Illustrate the industrial and general specific assessment methods. i. Learn about how different countries have implemented such policies and laws of EIA.
Teaching Aids (if any)	c. Power point presentations. d. Use of IS codes in practice in classrooms e. Chalk and board
Teaching Development	4. **Introduction** (5 minutes) - Introduce the students about the purpose of environmental impact assessment. - Discuss about its history. - Introduce them about different countries using these laws according to their states. - Highlight about use of EIA in India. 5. **Development** (30 minutes) Discussed about main laws in action in India on EIA: Bamboo 11) Water act (1974) 12) Indian wildlife protection act (1972) 13) Environment protection act (1986) 14) Biodiversity act(2002) 15) The central pollution control board. 16) Air prevention and control of pollution act (1981) 17) Set up of environmental information centres. e) Environmental impact statements f) Environmental impact of sustainable construction materials -Lower energy consumption -green house gas emissions -land fill usage g) Benefits of straw bale construction -Eco friendly building techniques -green building materials with low embodied energy 6. **Exercise** (5 minutes) – Give them task of getting the benefits and demerits associated with this EIA related to construction industry.
Closure	4. Summarize the Lesson Learning Outcomes and get affirmation from

	students on these. 5. Suggested Reading - Video links - https://www.youtube.com/watch?v=Is5K6itKIX8&list=PL_j5WWCG6ukRQ5cY_d95wTVsRyV6qREV 6. Homework - Read about EIA policies used in India and make a list, its uses and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	2. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 3	**Course Name: Building construction materials and drawing** **Topic: Evaluation of green building materials**	**Course No.: CE-802C**

Objectives	At the end of the lesson the student shall be able to: j. Got an overview of common green materials that can be used to build and rebuild properties to green standards k. Select what types of resources are used during all stages of construction. l. Illustrate the carbon footprint of the construction process a factor that concerns the owner of a building using those materials. m. Learn about earthen structures, insulated concrete forms, structural insulated panels (SIPS) and other materials.
Teaching Aids (if any)	f. Power point presentations. g. Use of Green building codes in practice in classrooms h. Chalk and board.
Teaching Development	7. **Introduction** (5 minutes) - Introduce the students about the purpose of using these common green building materials. - Discuss about materials used in substructure and superstructure. - Introduce them about the green building standards in India. - Highlighted about different types of green buildings constructed in India in present. 8. **Development** (30 minutes) Discussed about framing and building green building structures:

	18) Earthen structures. 19) Insulation with fibre glass, natural fibre(cotton and wool) 20) Polystyrene and Iso-cyanurate. 21) Steel roofing 22) Fibre cement, composites. 23) Natural clay plasters 24) For heating and air conditioning like geo-thermals, solar water heaters etc. techniques. h) Paper less dry wall. i) Use of green construction materials in different components and parts of building and its benefits:- -Lower energy consumption -green house gas emissions -land fill usage j) Benefits of using structural insulated panels and types of woods like engineered woods etc. -Eco friendly building techniques -green building materials with low embodied energy 9. **Exercise** (5 minutes) – Give them task of reading the research papers related to use of green building materials.
Closure	7. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 8. Suggested Reading - Video links - https://www.youtube.com/watch?v=VsahyCrZ9sk 9. Homework - Read about concept of green buildings and make a list of green buildings case study on it and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	3. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 4	Course Name: Building construction materials and drawing Topic: Stone Masonry.	Course No.: CE-802C

Objectives	At the end of the lesson the student shall be able to: n. Got an overview of types of buildings, structural systems of buildings o. Knowledge on functional planning of buildings. p. Illustrate the important building components, its basic part. q. Learn about stone masonry, materials requires for stone masonry, common building stones in India and other parameters.
Teaching Aids (if any)	i. Power point presentations. j. Chalk and board.
Teaching Development	10. **Introduction** (5 minutes) - Introduce the students about the stone masonry and different types of materials like stones and mortar in detail that are required to make structure. - Discuss about common building stones of India. - Introduce them about natural bed, corbel, sill, soping , weathering, throating, plinth, reveals, heads, Stooling etc. - Joints in stone masonry. 11. **Development** (30 minutes) Discussed about various joints in stone masonry: 25) Butt or square joint. 26) Rebated or lapped joint. 27) Tongued and grooved joint. 28) Tabled joint 29) Saddle or water joint. 30) Rusticated joint. 31) Dowelled joint 32) Cramped joint 33) Plugged joint k) Classification of stone masonry. l) Use of Rubble masonry and Ashlar masonry:- -Types of rubble masonry like coursed rubble, un coursed rubble , random rubble dry rubble, Polygonal rubble , flint rubble -Types of Ashlar masonry like ashlar fine, ashlar rough-tooled, ashlar rock faced, ashlar chamfered, ashlar block in course. Safe permissible loads on stone masonry -tools used in stone masonry -Dressing of stone surfaces -Appliances for lifting stones. - Points to be observed while supervising the stone work.

	12. **Exercise** (5 minutes) – Ask them about the reasons for different questions in stone masonry.
Closure	10. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 11. Suggested Reading - Video links 12. https://www.youtube.com/watch?v=0gepAvupilo 13. Homework - Read about the difference between the ashlar and rubble masonry and its used in different conditions and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	4. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 5	**Course Name: Building construction materials and drawing** **Topic: Brick Masonry.**	**Course No.: CE-802C**

Objectives	At the end of the lesson the student shall be able to: r. Got an overview about standard sizes of modular and non modular bricks used in construction. s. Knowledge on stretcher, headers, laps, closers, bat etc t. Illustrate the important building components, its basic part. u. Learn about Brick masonry, its characteristics and importance in construction.
Teaching Aids (if any)	k. Power point presentations. l. Chalk and board.
Teaching Development	13. **Introduction** (5 minutes) - Introduce the students about the brick masonry and different types of brick masonry used in India like brick work in mud, with class 1, class 2 and class3 masonry. - Discuss about various tools used in brick masonry. - Introduce them about safe permissible loads on brick masonry. - Supervision required in brick masonry. 14. **Development** (30 minutes)

	Discussed about definitions like: 34) Stretcher 35) Header. 36) Perpends. 37) Lap. 38) Closer like queen closer, king closer, bevelled closer. 39) Bat like half bat, three quarter bat, bevelled bat, bull nose. 40) Bed joint. 41) Toothing. m) Classification of brick masonry. n) Tools uses in brick masonry. - Types of brick masonry 1) Brickwork in mud. 2) Brickwork in cm or I class. 3) Brickwork in cm or II class. 4) Brickwork in cm. or III class. 15. **Exercise** (5 minutes) – Ask them about the reasons for different questions in stone masonry.
Closure	14. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 15. Suggested Reading - Video links 16. https://www.youtube.com/watch?v=p22bn-I0Kh0 17. Homework - Read about the reduction coefficients for isolated brick pillars and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	5. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 6	Course Name: Building construction materials and drawing Topic: Brick bonds and its classification.	Course No.: CE-802C

Objectives	At the end of the lesson the student shall be able to: v. Got an overview about bonds in brick work construction. w. Knowledge on connections that are used in those bonds. x. Illustrate the important building components, its basic part. y. Learn about Brick masonry, thickness of walls in brickwork, defects in brick masonry, cracks in walls, composite masonry etc.
Teaching Aids (if any)	m. Power point presentations. n. Chalk and board.
Teaching Development	16. **Introduction** (5 minutes) - Introduce the students about the brick masonry and different types of brick masonry bonds, joints, cracks in the walls used. - Discuss about various defects in brick masonry work. - Introduce them about the thickness of wall in brick masonry. - Supervision required in brick masonry. 17. **Development** (30 minutes) Discussed about different bonds like: 42) Stretcher bond. 43) Header bond. 44) English bond. 45) Flemish bond. 46) Garden wall bond. 47) Dutch bond. 48) Raking bond. 49) English cross bond. 50) Facing bond. o) Classification of bonds at connections. p) Tools uses in brick masonry. - Types of junctions 5) Right angled junction 6) Squint junction. 7) Quoins and types. 18. **Exercise** (5 minutes) – Ask them about the sulphate attacks in brick work.
Closure	18. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 19. Suggested Reading - Video links -https://www.youtube.com/watch?v=hJkuBhCr0Us

	20. Homework - Read about the comparison of brick masonry and stone masonry and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	6. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 7	**Course Name: Building construction materials and drawing** **Topic: Composite masonry/ Reinforced brick work.**	**Course No.: CE-802C**

Objectives	At the end of the lesson the student shall be able to: z. Got an overview about use of composite masonry in place of other masonry. aa. Knowledge on different types of structures in brickwork. bb. Illustrate the importance of reinforced brickwork or use of reinforced bars in brickwork. cc. Learn about brick lintel, pier with reinforcement, slabs with reinforced brick work.
Teaching Aids (if any)	o. Power point presentations. p. Chalk and board.
Teaching Development	19. **Introduction** (5 minutes) - Introduce the students about the brick masonry and different types of brick masonry bonds, joints, cracks in the walls used. - Discuss about more types of brickwork like reinforced brickwork. - Introduce them about the applications of reinforced brickwork for typical structures briefly. - Advantages of using reinforced brickwork in construction practice. 20. **Development** (30 minutes) Discussed about design of brick wall with reinforcement incorporated in it and cases like: 51) Reinforcement in wall in the form of iron bars or expanded metal mesh. 52) The flat bars section and special bricks used.

	53) Isolated brick piers that are strengthened by reinforcement. 54) Reinforcement in case of brick lintels which consists of steel bars of 6mm to 12mm. q) Discussed about the possibility to construct floor slabs of brickwork with reinforcement. r) Tools uses in brick masonry. - The possibility of using reinforced brickwork in seismic areas. 21. **Exercise** (5 minutes) – Ask them about the reason that enough cover is provided to the reinforcement in case of the reinforced brickwork.
Closure	21. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 22. Suggested Reading - Video links - https://www.youtube.com/watch?v=esHRdo8tqKss 23. Homework - Read about the more modern used of reinforced brickwork and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	7. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 8	Course Name: Building construction materials and drawing Topic: Glass block masonry	Course No.: CE-802C

Objectives	At the end of the lesson the student shall be able to: dd. Got an overview about use of glass blocks/glass bricks in the construction work. ee. Knowledge on importance and benefits of using such masonry. ff. Illustrate the features of using glass blocks and different sizes used in it. gg. Learn about different styles and textures available in these types of glass blocks/bricks,
Teaching Aids (if any)	q. Power point presentations. r. Chalk and board.
Teaching Development	22. **Introduction** (5 minutes) - Introduce the students about the glass block/brick masonry and different types of block masonry glass shaped. - Discuss about advantages of using such masonry work. - Introduce them about the applications of glass blocks in the construction work - Discussed about the types of materials. 23. **Development** (30 minutes) Discussed about designs of glass blocks and how are they made and used in interior designs and there types like: 55) See-through. 56) Frosted. 57) Random wave. 58) Vertical/horizontal. 59) Diamond. 60) Leather. 61) Crystalline. 62) Grid. Discussed about the advantages of glass blocks, there thermal and sound insulation s) There disadvantages and temperature variability. - The use of glass blocks in buildings to upscale interior design of building. 24. **Exercise** (5 minutes) – Ask them about the use of leather glass blocks in construction work.
Closure	24. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 25. Suggested Reading - Video links - https://www.youtube.com/watch?v=piCR1TcKnLQ

	26. Homework - Read about more work that is going on in these glass blocks and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	8. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 9	**Course Name: Building construction materials and drawing** **Topic: Stone Masonry/ Dressing of stones.**	**Course No.: CE-802C**

Objectives	At the end of the lesson the student shall be able to: hh. Got an overview on purpose of dressing of stones. ii. Knowledge on different methods of dressing of stones. jj. Illustrate the important building components, its basic part. kk. Learn about stone masonry and varieties of finishes for stonework.
Teaching Aids (if any)	s. Power point presentations. t. Chalk and board. u. IS-1129-1972 code book for recommendation of dressing of natural building stones.
Teaching Development	25. **Introduction** (5 minutes) - Introduce the students about the stone masonry and different types of materials like stones and mortar in detail that are required to make structure. - Discuss about common building stones of India. - Introduce them about different varieties of finishes for stone work. - Appliances for lifting stone. 26. **Development** (30 minutes) Discussed about various varieties of finishes in stone masonry: 63) Rock faced finish or quarry faced finish. 64) Scabbling finish. 65) Axed finish. 66) Tooled finish. 67) Punched finish. 68) Hammer dressed finish.

	69) Vermiculated finish. 70) Reticulated finish. 71) Furrowed finish. t) Classification of sunken finish, circular finish, polished finish etc. u) Use of Rubble masonry and Ashlar masonry:- -finishing work in stone masonry. -Dressing of stone surfaces -Appliances for lifting stones. - Points to be observed while supervising the stone work. 27. **Exercise** (5 minutes) – Ask them about different purpose of dressing of stones.
Closure	27. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 28. Suggested Reading - Video links https://www.youtube.com/watch?v=ts0a531Hc6U 29. Homework - Read the IS codal provisions given in IS-1129.1972 and make short notes and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learning.
Evaluation	9. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Spend 5 minutes to evaluate student assimilation of the lesson contents