Bengal Engineering and Science University, Shibpur

B. Arch. (3rd Semester) Mid-Semester Examination 2012

MATERIALS & METHODS OF CONSTRUCTION – III (AR 302)

Full Marks: 70 **Time : 3 hours**

Answer **ANY FIVE** questions

1. [a] Describe the advantages and limitations of flat-slab floor construction. Explain the following terms as applied to flat-slab construction: [i] Drop panel ; [ii] Capital ;[iii] Flat slab

   [b] A hall of 10m x 10 m is to be roofed with a R.C.C. floor slab. Suggest a suitable type of construction for the hall and illustrate the same with labeled freehand sketches.

   [(4+4+3)+3 =14]

2. [a] Define the following terms as applied to pitched roof construction: [i] Hipped end, [ii] Ridge, [iii] Valley rafter, [iv] Jack rafter, [v] Template, [vi] Eaves board, [vii] Gable, [viii] Purlins

   [b] A hall of 10m x 20m is required to be roofed over with corrugated galvanized sheeting over queen-post truss. The trusses are spaced at 3 m center to center and are supported on two brick walls on either end. Draw freehand labeled sketches for the following: [i] A layout plan indicating roof-truss arrangement; [ii] A section of the hall indicating the roof-truss, roof-covering and gutter arrangement.

   [8 + (3+3) =14]

3. [a] State the different architectural forms of stair-cases mentioning their respective usefulness.

   [b] Assume that a new floor is to be constructed on the existing ground floor of a building and a staircase has to be provided for connecting the two floors. The vertical (floor to floor) distance between the two floors is 3 meter and the minimum width of the staircase has to be 1.2 meter. The maximum size of the space (excluding wall thickness) that can be made available for the staircase is 8.5 x 1.2 meter. Suggest a suitable form for the staircase and sketch its plan and section indicating the construction details.

   [6 + 8 =14]

4. Design and detail the foundation for a three storey high load bearing residential building with the following particulars:

   [i] The foundation is to rest on sandy soil having an angle of repose of 30^0, and a safe bearing capacity of 16 tonnes per sq.m.; [ii] the soil weighs 1680 kg / m^3 ; [iii] the height of the

building is 10.6 m from the ground level (plinth height:0.6 m, floor to floor height: 3 m and parapet wall : 1.0 m high); [iv] Wall thickness: 375 mm for the plinth and ground floor and 250 mm for the first and second floors; [v] the roof consists of 120 mm thick R.C.C. slab finished with 100 thk.(avg.) lime concrete terracing and it is accessible; [vi] the floors consist of 120 mm thick R.C.C. slab finished with 25 mm thk. Terrazzo flooring; [vii] the maximum span of the R.C.C. slab for the roof or floors between two main walls is 4 meters.

Assume: Density of brick work: 2000 kg / m^3; Density of concrete : 2300 kg / m^3 ; Density of lime-concrete / terrazzo flooring : 1920kg / m^3 ; Live load for residential building at floors and roof: 200 kg/m^3

[10 + 4 = 14]

5. [a] Explain the purposes of providing foundations in buildings. Also identify the various causes of failure of foundations.

[b] State the characteristics of "Black Cotton Soil"? What are the precautions and measures required to be taken for designing and laying foundation in Black-cotton soil.

[(3+4)+(3+4) =14]

6. [a] Identify the various defects due to dampness in buildings. Also identify the possible sources of dampness in each case.

[b] Illustrate with sketches(s): Damp-proofing treatment for parapet wall on R.C.C flat roof

[(4+ 4)+ 6 =14]

7. [a] What are the functions of lintel and arches?

[b] Distinguish between a lintel and an arch.

[c] Differentiate between: [i] Flat brick arch & Reinforced brick lintel ; [ii] Concrete block arch & Monolithic concrete arch ; [iii] Semi-circular arch & Funicular arch

[3+3+(4x2) = 14]

8. Write short notes on:

[a] Membrane damp-proofing [b] Tiled flooring [c] Simplex pile

[5+ 5 + 4 =14]