

**Bachelor of Civil Engineering Examination , 2017**  
**( BCE – 3<sup>rd</sup> year – Evening - 1<sup>st</sup> semester -Supplementary )**

**Design of Structures I**

Time: 3 hours

Full marks : 100

The figures in the margin indicate full marks

Assume reasonable value of any data if required

IS 456 and SP16 are allowed in the examination hall

Answer any four questions

- 15+10=25**
- 1( a) Design a short RCC column against an axial compressive force of  $P=2200$  KN and biaxial moments  $M_x=120$  KN-m and  $M_y= 85$  KN-m. Grade of concrete M25. Grade of steel Fe 415. Apply 'Limit State Method' of design as per IS 456. Partial safety factor against load and moments may be considered 1.2. Show detail of reinforcements through neat sketches.
- (b) Design a simply supported RCC beam of span 5m against an udl of 40KN/m. Grade of concrete M20. Grade of steel Fe 415. Apply 'Working Stress Method' of design as per IS 456.
- 25**
2. Design a short column with a suitable Isolated square footing against an axial compressive force  $P=1200$ KN. Safe bearing capacity of soil  $=150$ KN/m<sup>2</sup>. Partial safety factor against load may be considered 1.5. Show detail of reinforcements through neat sketches.
- 25**
3. Design a Dog legged staircase within a space of 3m x 5m against a live load  $= 5$ KN/m<sup>2</sup>. Floor to floor height = 3.3m. Grade of concrete M20. Grade of steel Fe 415. Apply 'Limit State Method' of design as per IS 456. Show detail of reinforcements through neat sketches.
- 25**
4. Design a RCC slab panel of dimension 4mx4.8m against a live load of 3 KN/m<sup>2</sup>. Two adjacent edges of the slab panel is discontinuous and remaining two edges are continuous. Check short and long term deflection. Grade of concrete M20. Grade of steel Fe 415. Apply 'Limit State Method' of design as per IS 456. Show detail of reinforcements through neat sketches.
- 25**
5. Design a Five span RCC continuous beam of each span 5m against a DL=30 KN/m and LL=20 KN/m. Use BM and SF coefficients provided in IS456. Grade of concrete M20. Grade of steel Fe 415. Apply 'Limit State Method' of design as per IS 456.