1. Draw any ONE of the following on suitable scale.
   A) Beam to beam connection details (Section and sketch) in steel framed structures.
   B) Draw elevation/sketch of lattice girder having span of 25.0m for north light truss

2. Draw the key section of portal frames having span of 8.0m and show the detail at splice and knee with plan at knee.

3. Discuss any ONE of the following
   A) How forms and site selection for the buildings are important in terms of earthquake considerations?
   B) Draw the plinth beam connection details of steel at T-junctions for earthquake masonry structures.
2016-2017  
B. Architecture (7th-Semester Examination)  
Subject: Estimating, Costing & Specification Course No.: AR-415  
Maximum Marks: 60  Credit: 4  Duration: 2 Hours

Note: Answer all questions, assume any missing data suitably.

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| 1(a). | Define specifications, what is importance and scope of the subject?  
(a') | OR  
What are general specifications of first class building?  
(b) | Write detailed specification of any one item of work of the following:  
(i) Cement concrete 1:2:4  
(ii) Plastering cement mortar |
|   | 7  
|   | 7  
|   | 8  

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| 2. (a) | Describe detailed estimate.  
(b) | Describe any one method of estimate of the following:  
(i) Plinth Area method  
(ii) Approximate quantity method |
|   | 7  
|   | 8  

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| 3. | Prepare bill of quantity of a building as shown in Fig. 1 for any two items of work of the following:  
(i) Earth work in excavation in foundation  
(ii) First class brick work in 1:6 cement sand mortar in foundation  
(iii) 2.5 cm thick damp proof course in 1:2:4 c.c.  
(iv) First class brick work in 1:6 cement sand mortar in superstructure |
|   | 7.5x2=15  

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| 4. | Analyze the rate of any two items of work of the following: (Assume suitable rate)  
(i) 2.5 cm thick damp proof course in 1:1.5:3 c.c.  
(ii) First class brick work in 1:6 cement sand mortar in superstructure  
(ii) Half Brick Wall with 1:3 Cement Mortar |
|   | 7.5x2=15  

- contd... 2 -
Commercial Complex

One of the famous real estate company wants to construct a commercial complex in Lucknow to provide convenient shopping as well as 6-8 offices of multinational companies. The site measuring 47m X 70 m having approach road towards east on shorter side is located in commercial area of city. You are requested to design the said commercial complex with following design requirements:-

<table>
<thead>
<tr>
<th>Design Requirements:--</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Shopping Area</td>
<td>35% of total permissible area</td>
</tr>
<tr>
<td>2 Office Area (to be divided into 6-8 modules with provision of a toilet in each module)</td>
<td>65% of total permissible area</td>
</tr>
<tr>
<td>3 Lobby, circulation space, lift/s, staircase/s Toilets, various services, storage etc. to be created wherever required</td>
<td>As required (within permissible area)</td>
</tr>
<tr>
<td>4 Parking for 20 cars 25 two wheelers</td>
<td>As required</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bye Laws:--</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAR = 2.0</td>
<td>25</td>
</tr>
<tr>
<td>Maximum Ground coverage = 40%</td>
<td>08</td>
</tr>
<tr>
<td>Set back = 4m all sides</td>
<td>07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drawings Requirements:--</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All Plans (1:100 scale)</td>
<td>25</td>
</tr>
<tr>
<td>Elevations</td>
<td>08</td>
</tr>
<tr>
<td>Sections</td>
<td>07</td>
</tr>
</tbody>
</table>
2016-2017
B.ARC.H. / B.TECH.(AUTUMN SEMESTER) EXAMINATION
(ARCHITECTURE / CIVIL ENGINEERING)
DESIGN OF CONCRETE STRUCTURES-II
(CE-411)

Maximum Marks: 60
Credits: 04
Duration: Two Hours

Note: (i) Answer all the questions.
(ii) Assume suitable data, if not given.
(iii) Use of IS codes 456, 3370 and IRC loading charts are allowed.

Q1. Calculate the reinforcement in a continuous reinforced concrete beam of rectangular section
   to support a dead load of 10 kN/m and a service live load of 15 kN/m over three simply
   supported spans of 8m each. The materials to be used are M-20 grade concrete mix and
   HYSD steel of grade Fe-415 for moderate exposure conditions. Use bending moment and
   shear force coefficients for the continuous beam given in IS-456.

   OR

Q1'. Determine the design moments at support and in the mid span region, before and after
   redistribution of moments of 30%, for a beam AB of span L, carrying a uniformly
   distributed load, when (i) it is fixed at both ends A and B; (ii) it is fixed at end A and simply
   supported at B. Draw the bending moment diagrams in each case, and show the points of
   contra flexures and points of maximum bending moments.

Q2. Design the cylindrical wall of an Intz type water tank of 0.8 million litres capacity,
   supported on an elevated tower comprising of 8 columns. The base of the tank is 16 m
   above the ground level. Depth of foundation is 1.5 m below the ground level. Adopt M-25
   grade concrete and Fe-500 grade TMT steel. The design of the tank should conform to the
   stresses specified in IS:3370 and IS:456.

   OR

Q2'. Design the only long wall of a rectangular water tank of plan dimension 6m x 4m (inside)
   and of 2.5m high. The tank rests on firm ground. Use M-25 grade concrete and Fe-500
   grade tor steel. The design of the tank should conform to the stresses specified in IS:3370
   and IS:456.

Q3. A slab culvert has to be constructed for a national highway of span 5m (clear) and clear
   roadway of 10 m between the kerbs. Sketch the outlines for I.R.C. Class AA tracked vehicle
   on the deck. Calculate the maximum B.M. and S.F. due to the above load. Use M-25 grade
   concrete and Fe-500 grade steel.

Contd...-2.
Q4 (a) What is Prestressed concrete? Discuss the merits and demerits of prestressed concrete over conventional reinforced concrete. (06)

(b) A beam of 150 mm x 300 mm is prestressed by a force of 250 kN by steel cables located at an eccentricity of 60 mm as shown in Fig.1. Determine the loss of prestress due to creep of concrete for the following data:

- $\sigma_{ck} = 45$ N/mm$^2$
- Cables = 6 Nos. -7 mmØ
- Creep coefficient = 2
- $E_s = 200$ kN/mm$^2$
- $E_c = 30190$ N/mm$^2$

(06)

Q5. Calculate the main reinforcement in the waist slab of a staircase shown in Fig.2. The stairs are simply supported on beams provided at the first riser and at the edge of the upper landing. Assume a finish load of 0.8 kN/m$^2$ and a live load of 5.0 kN/m$^2$. Use M20 grade concrete and Fe415 grade steel. Assume mild exposure conditions. Take Tread $T = 300$ mm and Riser $R = 150$ mm. (12)

OR

Q5'. A vertical stem T-shaped retaining wall of height 3 m above the ground level is to be constructed for a highway. The top of the earth retained is surcharged at an angle of 10° with the horizontal. The angle of repose of earth is 29° and its density is 17 kN/m$^3$. The safe bearing pressure is 100 kN/m$^2$. The B.M. and S.F at the critical section is 47.3 kN/m and 35.5 kN respectively. Design the section at bottom of the cantilever and proportioned the various other components. Check the safety of the section in shear also. Use M-25 grade concrete and Fe-500 grade TMT bars. (12)
FIGURES

Note: All dimensions are in mm

Fig.1

Fig.2

Note: All dimensions are in mm
B.Arch./B.Tech.(End Semester) Examination
(Architecture / Civil Engineering)

Design of Concrete Structures-II (CE-411)
(Graduating Course)

Maximum Marks: 60 Credits: 04 Duration: Two Hours

Note: (i) Answer all the questions.
(ii) Assume suitable data, if not given.
(iii) Use of IS codes 456, 3370 and IRC loading charts are allowed.

Q1. Calculate the reinforcement in a three span continuous beam of a typical interior idealized plane frame of a building. The frames are spaced 5.5m apart and in the typical floor 140mm thick continuous slab is cast monolithically with beams. The thickness of floor finish is 40mm. The beam has three equal spans of length 6.1m. The floor is to support imposed load of 5 KN/m² at the service state. The unit weight of the finishing material is 20KN/m³. The materials to be used are M-20 grade concrete mix and HYS steel of grade Fe-415 for moderate exposure conditions. Use bending moment and shear force coefficients for the continuous beam given in IS-456. (12)

OR

Q1'. Obtain the maximum elastic moment diagram (BM envelop) for ultimate limit state before redistribution of moments, and design moment envelop after 30% redistribution of moments for a two span continuous beam ABC, 8m long, freely supported at A and C, and continuous over the central support B, 4m from A. The beam carries dead load (inclusive of self weight) of 20 kN/m and a uniformly distributed live load of 28 kN/m. (12)

Q2. Design the top ring beam and cylindrical wall of an Intz type water tank of 1 million litres capacity, supported on an elevated tower comprising of 8 columns. The base of the tank is 16m above the ground level. Depth of foundation is 1.5m below the ground level. Adopt M-25 grade concrete and Fe-500 grade TMT steel. The design of the tank should conform to the stresses specified in IS:3370 and IS:456. (12)

OR

Q2'. Design the long wall of a rectangular water tank of capacity 70,000 litres. The tank rests on firm ground. Use M-25 grade concrete and Fe-500 TMT bars. The design of the tank should conform to the stresses specified in IS:3370 and IS:456. (12)
Q3. Design a slab culvert (section and steel reinforcement) for a clear span of 5m having a clear roadway of 10 m between kerbs for I.R.C. Class AA single wheeled vehicle. Sketch the outlines for IRC Class AA tracked vehicle on the deck. Use M-20 grade concrete and Fe-415 grade steel. 

(12)

Q4(a) Explain why high strength concrete and high tensile steel are used for prestressed concrete construction. 

(06)

Q4(b) In prestressed concrete beam of cross-section 200mm x 300mm and span 6m, an initial prestressing force of 400KN is applied at constant eccentricity of 50mm by tendons of area 400mm$^2$. Assuming $E_s = 2 \times 10^5$ N/mm$^2$; $E_c = 0.333 \times 10^5$ N/mm$^2$; anchor slip = 1.5mm; creep coefficient in concrete $C_c = 2.0$; shrinkage coefficient of concrete = 0.0002 and creep in steel = 3.0%. Find the total percentage loss of prestress in the tendons. 

(06)

Q5. Calculate the reinforcement in a waist slab type of a dog-legged staircase for an office building for the following data: 

- Height between the floor = 3.2 m 
- Tread $T$ = 270 mm 
- Riser $R$ = 160 mm 
- Width of flight = landing width = 1.25 m 
- Live load = 5.0 kN/m$^2$ 
- Finished load = 0.6 kN/m$^2$ 

Assume the stairs to be supported on 230 mm thick masonry walls at the outer edges of the landing, parallel to the risers. Use M20 grade concrete and Fe415 grade steel. 

(12)

OR

Q5’. Design the vertical stem of a T-shaped retaining wall for a height of 4 m above the ground level. The top of the earth retained is surcharged at an angle of 10° with the horizontal. The angle of repose of earth is 30° and its density is 17kN/m$^3$. The safe bearing pressure is 150 kN/m$^2$. Use M-20 grade concrete and Fe- 500 grade TMT bars. 

(12)