B.ARCHITECTURE AUTUMN (V SEMESTER) EXAMINATION
ISLAMIC ARCHITECTURE

(AR – 301)
Credits: 03

Maximum Marks : 60
Duration : Three Hours

Note: (i) Answer all questions which carry equal marks.
(ii) Explain your answer with neat sketches which carry due weightage.

1. Explain, essentiality of Islamic understanding of its faith. Values and political
events to truly understand Islamic Architecture and Muslim’s buildings.

2. Explain characteristics of Islamic Architecture in details with suitable examples
and sketches.

3. Explain any ONE in detail.
   (a) Arabian & Moorish Architecture.
   (b) Turkish Architecture
   (c) Central Asian Architecture.

4. Explain any ONE of the following in detail.
   (a) Provisional architecture of two regions during medieval Indo-Islamic period.
   (b) Mughal Architecture
   (c) Rajput and Sikh Architecture

5. Explain any TWO of the following.
   (a) Style of Islamic interior designs.
   (b) Passive climatic control techniques of Islamic buildings.
   (c) Acoustical and seismological control in Islamic Architecture.
   (d) Islamic Architecture of the China and far-east Asia.
   (e) Any famous building and Islamic architecture in India or abroad.
2012 – 2013
B.Architecture Autumn (V Semester) Examination
Landscape Design
(AR – 303)

Maximum Marks : 40
Credits: 04
Duration : Three Hours

Note: Answer all the questions.
Draw neat sketches to support your answers.

1. (a) Explain the need of Landscape Architect for current scenario?

(b) Develop a landscape plan with proper detailing for a circular traffic island of 30M diameter before the entrance or main gate of Aligarh Muslim University.
Select suitable scale and support your plan with sketches whenever required.

2. What are the different elements of landscaping explain them in detail giving suitable examples.

3. Explain the characteristics of any TWO of the following trees with plan and elevation.

(a) Palm
(b) Banyan
(c) Gulmohar

4. Explain with suitable example the key features of Persian Gardens?

OR

4'. Explain with suitable examples the characteristic features of Japanese Gardens.
2012 – 2013
B.ARCHITECTURE AUTUMN (V SEMESTER) EXAMINATION
SPECIFICATION, ESTIMATING & COSTING
(AR – 305)
Credits: 04

Maximum Marks : 60
Duration : Three Hours

Note: Answer all the questions.
All questions carry equal marks.
Assume suitable data if not given.

1. What do you understand by ‘brief specification’. Write down the brief specification for a first class building.

2. (a) Differentiate between “Plinth area estimate and cubic rate estimate.”
(b) A person has a plot size of 30’ x 60’ and wanted to construct a single storey house whose plinth area is 1183.6 sq.f. Calculate approximate quality of the following items.
(i) Bricks
(ii) Cement
(iii) Sand
(iv) Timber for frames and shutters

3. (a) Write down the factors to be considered during preparation of a Detailed Estimate.
(b) Discuss the circumstances on which Revised Estimate is required to be prepared.

OR

3’. Prepare a preliminary estimate of a building having carpet area 10760 sq.ft and 25% of that built-up area shall be circulating area and walls occupy 15% of that built-up area other relevant data as follows.
(i) Plinth area rate = Rs.2200 per sq.m.
(ii) Add 1% of building cost for extra than anticipated depth.
(iii) Architectural treatment = ½ % of the building cost.
(iv) Water supply, sanitary and electric installation and other services 20% of building cost.
(v) Contingencies = 03%
(vi) Supervision charges – 08%

Contd…..2
4. Analyse the rate for any TWO of the following: [2×6=12]
   (a) Cement Concrete 1:2:4
   (b) First Class Brick work in foundation and Plinth with Cement mortar 1:6
   (c) 12mm thick 1:4 Cement Plaster
   (d) 25 mm thick Cement concrete DPC, 1:1\(\frac{1}{2}:3\)

5. (a) Write down the units of measurement for following items. [06]
   Course Sand, Door Shutters, Skirting 10 cm brick wall, window grills, C.C. flooring.

(b) Discuss any TWO of the following. [06]
   (i) Prime cost
   (ii) Provisional Sum
   (iii) Water supply & Sanitary works.
2012 2013
B. Arch. Autumn (V Semester ) Examination
Water Supply and Sanitation
(AR 307)
CREDITS: 03

Maximum Marks: 60 Duration: Three Hours

Instructions to Examinees
1. Attempt all questions
2. Assume missing data suitably
3. Use of attached Nomograph permitted

Q. 1(a) Explain the different surface and subsurface sources of water supply (5)

(b) Explain the various methods for the prediction of population. The following data shows the population of a town for the past five decades. Predict the population of the town for the decade 2030 by geometric increase and incremental increase method.

<table>
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<tr>
<th>Year</th>
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<tr>
<td>1970</td>
<td>120000</td>
</tr>
<tr>
<td>1980</td>
<td>170000</td>
</tr>
<tr>
<td>1990</td>
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</table>

OR

Q. 1'(a) Draw a neat sketch of water supply connection for a house and explain the function of each unit. (6)

1'(b) Briefly describe the procedure of removal of iron and manganese from water. Write down the chemical equations involved. (4)
1'(c) What are the various water borne diseases? (2)

Q. 2 (a) Briefly describe the method of determination of capacity of overhead tanks. (4)

(b) Differentiate between coagulation and flocculation. Write down the equations for coagulation process using Alum, Ferric chloride and Ferrous sulphate. Briefly explain the significance of presence of alkalinity in coagulation process using alum as a coagulant. (8)

Q.3 (a) Describe the various methods of disposal of wastewater (6)

(b) The BOD$_5$ at $20^\circ$C of wastewater sample is 250 mg/L. Determine the ten day BOD if the temperature was $30^\circ$C. Take $K_{20}$ as 0.23 d$^{-1}$. (3)

(c) A 500 mm diameter sewer was laid at a slope of 0.0020. Calculate the depth of flow and discharge when the velocity 1.1 m/s. Use of attached nomograph and partial flow diagrams. (3)

OR

Q. 3'(a) Draw the sewage treatment flowsheet and briefly describe the function of each unit. (8)

(b) Design a sedimentation tank for 20 m$^3$/d. Assume surface overflow rate as 25 m$^3$/m$^2$.d (4)
Q. 4 (a) Describe the functioning of activated sludge process and how it different from trickling filter.

(b) Briefly explain the working of an oxidation pond. Design an oxidation pond for the post treatment of 10 MLD of industrial wastewater. The BOD loading may be taken as 150 Kg BOD ha\(^{-1}\).d\(^{-1}\). The influent BOD may be taken as 200 mg/L.

Q. 5. Briefly explain any four of the following

(i) Septic tank
(ii) Breakpoint Chlorination
(iii) Traps
(iv) Manholes
(v) Flushing Cistern

Fig. Attached
<table>
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<tr>
<th>Flow, gpm</th>
<th>Flow, m³/s</th>
<th>Pipe Diameter, ft</th>
<th>Pipe Diameter, cm</th>
<th>Slope of pipe, ft/ft</th>
<th>Slope of pipe, m/m</th>
<th>Slope, percent</th>
<th>Velocity, ft/sec</th>
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</table>

Figure 4-22
Nomograph for Manning formula in English and SI metric units for circular pipes flowing full based on n = 0.013.

Figure 4-23
Relative quantity, velocity, and cross-sectional area of flow in a circular pipe for any depth of flow.
B.Architecture. Autumn (V Semester) Examination
Architectural Design – III
(AR – 351)

Maximum Marks : 40
Credites: 08
Duration : Six Hours

Note: Make neat and to-scale, two line plans, etc. to depict the design.
Use of standards is permitted, however, their availability/supply in examination hall is not guaranteed.

Art Gallery

Design and present an Art Gallery on Aligarh-Agra Highway on a flat stretch of land measuring 200 mts along the only access road (R/W 45 mts with a service lane) and 150 mts deep with existing level 1’ - 6” (450 mm) below the nearest road which falls on the North of the site near Manglayatan Dham. Plan Park, Parking, services and facilities for a foot-fall of 1000 people on a day. There possibly can be a restaurant for accommodating 50 people at one point of time serving the visitors of passerbys alike. There possibly can be a permanent theme gallery depicting produces of Aligarh-Mathura and Agra. Other four galleries could be need based depicting historicity of Aligarh-Mathura and Agra region. Emphasis has to be on quality of spaces, their efficiency in terms of Design-detail and specification. Assume but clearly mention any missing data or situation required for evolving the design.

Present your scheme through

(a) Site Plan showing structure(s), park and parking [10]
(b) Floor Plan(s) to scale [10]
(c) Front Elevation Cross Section [10]
(d) Concept sheet explaining the design as visualized for specific function and form which may be evaluated by examiners through a Viva-Voce. [10]
Maximum Marks : 60

Note: Answer all questions.
Assume suitable data, if required also list the relevant clauses of the IS 456-2000 while solving the problem.
Use of IS:456-2000 Code is allowed.

1. (a) How the following factors are incorporated in the design formulae for the limit state of design:
Partial safety factor for load
Partial safety factors for material strength
Difference between cube strength and strength of concrete in structure

(b) Calculate the ultimate moment carrying capacity of a rectangular beam with b=250mm and D=400mm, and \( A_{st} = 4 \times 16 \text{mm} \) diameter bars. Provide nominal clear cover to meet the requirement of the resistance rating of 2hrs and durability requirements for “very severe” exposure. Assume concrete grade as M30 and steel grade as Fe 415. Show the reinforcement details with neat sketches. List the relevant clauses of the IS456-2000 while solving the problem.

OR

1'. (a) What are the basic assumptions in the design of a reinforced concrete section for limit state of collapse in bending.

(b) Design a doubly reinforced section for a rectangular beam of effective span 4m. The superimposed live load is 40kN/m and the size of the beam is limited to 250×350mm overall. Take concrete grade M20 and steel grade Fe 415.

2. (a) Deduce the formula for the calculation of development length in RC structure in standard notations.

(b) An RC Beam of section 300×400mm is reinforced with 3 bars of 20mm diameter of Fe415 at support. The span of the beam is 5m and rate of UDL 36 kN/m. Design the shear reinforcement with vertical stirrups only.

3. (a) Discuss in brief the various modes of failures in concrete columns.

Contd.....2
(b) Design a square column for a residential building of ceiling height 3m subjected to a direct load of 200kN. Assume suitable end conditions. Use M20 and Fe 415. Show a neat sketch of reinforcement detail.

4. Design a slab of a multi penal floor system with all four edges continuous and centre to centre spans of 4m × 4m. Assume a live load of 4 kN/m² and a floor finish of 1 kN/m². Assume concrete grade as M20 and steel grade as Fe 415. Show a neat sketch of reinforcement details in the middle and edge strips.

OR

4'. (a) Explain punching shear failure in flat slabs.

(b) Design an interior panel of a flat slab. The slab is supported on columns spaced at 6m in both the directions. The size of the column is 600mm × 600mm. Assume a live load of 3 kN/m² and a floor finish of 1 kN/m². Height of the column is 6m. Assume concrete grade as M20 and steel grade as Fe 415. Show a neat sketch of reinforcement details in the middle and column strips.

5. Design the footing of a square column of size 300×300mm with 8 # 16mm diameter to carry a working load of 900 kN for the following data

Bearing Capacity of soil 100 kN/sq.m.

Concrete grade : M20
Steel grade : Fe415

Also show a neat reinforcement detail in the footing and column.
1 (a) Enumerate various methods for determining the specific gravity of soil. Describe a method for determination of the specific gravity of fine grained soil.

(b) A soil sample in its undisturbed state was found to have volume of 105 cm³ and weight 201 g. After oven drying the weight reduced to 168 g. Compute (i) water content (ii) voids ratio (iii) porosity (iv) degree of saturation. Take G = 2.7

OR

1’ (a) Give the step by step procedure for classification of soil by Indian standard classification system.

(b) The natural density of sand is 17.5 kN/m³. Find the relative density if the maximum dry density is 18.5 kN/m³ and the minimum dry density is 16 kN/m³. Take G = 2.65

2 (a) What is Darcy’s law of permeability? Discuss the factors affecting permeability of soil.

(b) A sand stratum 10 m thick. The water table is 2.5 m below ground level. The unit weights of sand above and below water table are 17 kN/m³ and 21 kN/m³ respectively. The capillary rise above water table is 1.5 m. Draw the distribution of effective pressure, pore water pressure and total pressure at the bottom of sandy stratum.

3 (a) Discuss the approximate methods for determining the vertical stress under surface footing. Also state the assumption made by Boussinesq for computing vertical stress under surface footing.

(b) A long strip footing of width 2.5 m carries a load of 600 kN/m. Determine the vertical stress at a depth of 4 m below the centre of the footing.

OR

3’ (a) Derive an expression for the vertical stress under uniformly distributed circular area. Write down the expression for the vertical stress below the centre of the uniformly distributed rectangular area of length L and width B.

(b) A rectangular area 4 m x 2 m is uniformly loaded with a load intensity of 100 kN/m². Calculate the vertical stress at a point 3 m below one of its corners (i) by equivalent point load method (ii) Newmark’s influence chart method.

4 (a) Describe the laboratory consolidation test. Also discuss briefly that how the data obtained from laboratory consolidation test are used to determine the coefficient of consolidation.

(b) A clay layer whose settlement under a given loading is expected to be 12 cm. settles by 3.5 cm at the end of one month after the application of the load increment. How many months will be required to reach a settlement of 5 cm? How much settlement will occur in one year? Assume the layer to have double drainage.
5 (a) Describe in detail about the triaxial shear test. What are its merits and demerits?

(b) Vane shear test conducted in a soft clay deposit, failure occurred at a torque of 45 Nm. Afterwards the vane was allowed to rotate rapidly and the test was repeated in the remoulded soil. The torque at failure in the remoulded soil was 17 Nm. Calculate the sensitivity of soil. In both cases the vane was pushed completely inside the soil. The height of vane and diameter are 100 mm and 80 mm respectively.
Maximum Marks: 60  
Answer ALL the questions. Notations used have their usual meaning.

1(a) Explain the difference between orientational, electronic and ionic polarizations in brief. [05]

(b) Define static dielectric constant and obtain the relation \( P = \varepsilon_0(\varepsilon_r-1) E \). [05]

(c) What is piezoelectricity? Give two examples of piezoelectric materials. Draw hysteresis curve for ferroelectric material and discuss it briefly. [05]

OR

(c') The electronic polarizability of the Ar atom is \( 1.8 \times 10^{-39} \) F.m\(^2\). What is the static dielectric constant of Ar gas at 1 atmospheric pressure at room temperature (300K)? [Given: \( k_B = 1.38 \times 10^{-23} \) J/K and \( \varepsilon_0 = 8.854 \times 10^{-12} \) F/m] [05]

2(a) What is dipolar relaxation? Obtain the relation for orientational polarization in alternating fields. [07]

(b) Explain the diffusion process in semiconductors and find a relation for diffusion current per unit area for \( n \) and \( p \) type semiconductors. [05]

(c) An intrinsic Si sample is doped with donors from one side such that \( N_d = N_e \exp(-ax) \). [03]
   (i) Find an expression for \( E(x) \) at equilibrium over the range for which \( N_d >> n_i \).
   (ii) Evaluate \( E(x) \) when \( a = 4 \) (\( \mu \)m)\(^{-1} \).

3(a) How ferromagnetism is explained on the basis of exchange interaction? Give a brief account of Weiss theory of ferromagnetism. [07]

(b) The magnetic field in a diamagnetic material is 1000 Am\(^{-1} \). Calculate the magnetization and flux density of the material if its susceptibility is \( -0.4 \times 10^{-5} \). [04]

(c) Distinguish between hard and soft magnetic materials. Give two examples for each. [04]

Continued......2
4(a) Derive the London's equations and explain the term coherence length.

(b) A d.c. voltage of $1\mu V$ is applied across a Josephson junction. Calculate the frequency of the Josephson current generated. [Given: $h = 6.63 \times 10^{-34}$ J.s]

(c) Discuss briefly the potential applications of superconductors.

OR

4(a') Explain d.c. Josephson effect. Show that the supercurrent of superconducting pairs across the junction depends on the phase difference.

(b') A superconductor sample has a critical temperature of 3.722 K in zero magnetic field of 0.0305 T at 0 K. Evaluate the critical field at 2 K.

(c') Discuss the thermodynamics of superconducting transition in detail.