2016 – 2017
B. TECH (IV SEMESTER) EXAMINATION
CIVIL ENGINEERING
HIGHER MATHEMATICS – II
(AM-212)

Maximum Marks: 60
Duration: Two Hours

Answer all questions

1.(a) Find the solution of $x^3 + x - 1 = 0$ by general iteration method correct to four decimal places. Co-1

OR

(a') Establish an iterative formula for $\sqrt{N}$ (where $N$ is a positive number) and hence find the value of $\sqrt{5}$ correct to five decimal places. Co-1

(b) Solve the following system of equations by Gauss-Seidel method:

$5x + 2y + z = 12, \ x + 4y + 2z = 15, \ x + 2y + 5z = 20$ Co-1

Use three iterations. (7+8)

2.(a) (i) Find the cubic polynomial which passes through the points (0,1), (1,0), (2,1), (3,10)
(ii) Estimate the missing value in the following table Co-2

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>y=f(x)</td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>-</td>
<td>81</td>
</tr>
</tbody>
</table>

(b) Given the values:

<table>
<thead>
<tr>
<th>x</th>
<th>4</th>
<th>5</th>
<th>7</th>
<th>10</th>
<th>11</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>y=f(x)</td>
<td>48</td>
<td>100</td>
<td>294</td>
<td>900</td>
<td>1210</td>
<td>2028</td>
</tr>
</tbody>
</table>

Evaluate $f(8)$, using Lagranges's formula. Co-2

OR

(b') Derive the Simpson's $\frac{1}{3}$ formula from the general quadrature formula and use it to evaluate the integral $\int_0^1 \frac{dx}{(1+x)}$ with $h = 0.125$. (7+8)

contd... 2
3.(a) Use Taylor’s series method up to $x^4$ term to find the solution of the initial value problem:

$$\frac{dy}{dx} = -xy, \quad y(0) = 1. \quad \text{Also find } y(0.2)$$

(b) Apply fourth order Runge-Kutta method to solve

$$10 \frac{dy}{dx} = x^2 + y^2, \quad y(0) = 1 \text{ for } x = 1 \text{ with } h = 0.5$$

OR

(b) Solve the boundary value problem

$$y'' - 64y + 10 = 0$$

with $y(0) = y(1) = 0$ and $h = 0.25$ by finite difference method. (8+7)

4.(a) Evaluate the following transforms:

(i) $L\left[te^{-2t}\sin at + \left(\frac{e^{at} - e^{bt}}{t}\right)\right]$  

(ii) $L^{-1}\left[\frac{s}{(s^2 + s^2 + 1)} + \frac{1}{s^2(s+a)}\right]$  

(b) Apply convolution theorem to evaluate $L^{-1}\left\{\frac{s^2}{(s^2+1)(s^2+4)}\right\}$  

OR

(b') Using Laplace transform method, find the solution of the initial value problem

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 1 - e^{2t}; \quad y(0) = 1, \quad y'(0) = 0. \quad (8+7)$$
2016-17  
B. TECH. IV SEMESTER (WINTER SEMESTER) EXAMINATION  
CIVIL ENGINEERING  
CIVIL ENGINEERING MATERIALS  
CE 212

Maximum Marks: 60  
Credits: 04  
Duration: Two Hours

Answer all the questions.  
Sketch neat figures, if necessary.

<table>
<thead>
<tr>
<th>Q. No.</th>
<th>Question</th>
<th>M.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>With the help of flow chart, describe the manufacture of ordinary Portland cement by wet process. What are the advantages of wet process over dry process?</td>
<td>[08]</td>
</tr>
</tbody>
</table>
| 1(b)   | Describe any two of the following:  
(i) Characteristics of constituents of cement  
(ii) Blast furnace slag cement  
(iii) Classification of aggregates based on their shape  
(iv) Absorption of coarse aggregate                                                                                     | [04] |
| 2      | Describe any two of the following:  
(i) Measurement of workability of concrete with the help of slump test  
(ii) Bleeding and segregation of concrete  
(iii) Different types of curing of concrete  
(iv) Creep and shrinkage of concrete                                                                                   | [12] |
| 3      | Describe any two of the following:  
(i) Purpose of perforated and cornice brick  
(ii) Types of brick masonry bond (only three)  
(iii) Compressive strength test on brick  
(iv) Cementing action of lime                                                                                           | [12] |
| 4      | Describe any two of the following:  
(i) Any three defects developed during the growth of timber  
(ii) Artificial seasoning of timber  
(iii) Creosoting of timber  
(iv) High yield strength deformed bars                                                                                   | [12] |
| 5(a)   | Describe the properties and uses of various kinds of bitumen.                                                                                                                                              | [06] |
| 5(b)   | Describe the properties and uses of asbestos in civil engineering.                                                                                                                                     | [06] |
2016-17
B.TECH. (WINTER SEMESTER) EXAMINATION
CIVIL ENGINEERING
CE 214
WATER SUPPLY AND TREATMENT
Credits: 04
Duration: Two Hours

Maximum Marks: 60

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. Question M.M.

1(a). What are the various considerations for estimating total demand for water? 5

Or

1(a)' Calculate the fire demand for population of 2.75 lacs by various empirical formulas. 5

1(b) Estimate the population by 2020 of a city with the following record by
   a) Arithmetic Increase Method
   b) Geometrical Increase Method
   c) Incremental Increase Method

<table>
<thead>
<tr>
<th>Year</th>
<th>1990</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62000</td>
<td>79000</td>
<td>117000</td>
</tr>
</tbody>
</table>

2(a). Discuss the various water borne diseases. What is the significance of water quality standard? 5

Or

2*(a)' i) What is the equivalent calcium carbonate concentration of 120 mg/l of NaCl 5
     ii) What is the equivalent calcium carbonate concentration of $2 \times 10^{-2}$ mol of NaCl
     iii) Write down the chemical reactions when Alum is used in water.
2(b) A new water main is disinfected using 40 mg/L of chlorine dose by applying 3% hypochlorite solution. Find out how many kg of dry hypochlorite powder containing 75% chlorine must be dissolved in 100 L of water to make 3% (30,00 mg/L) solution.

2(e) List the various methods of water distribution in a pipe network.

3(a) Briefly describe the design consideration for sedimentation tank. Design a rectangular sedimentation tank for 5 MLD flow. Sketch the different components of sedimentation tank.

3(b) Just below the point where continuous discharge of pollution mixes with a river, the BOD₅ is 11 mg/L DO is 7.6 mg/L. Dissolved Oxygen saturation is 9 mg/L. The river and the waste mixture has a temperature of 20°C, a de-oxygenation constant Kₐ of 0.2 /day, an average flow speed of 0.4m/s and an average depth of 2.5 m. Find the time and distance downstream at which the oxygen deficit is at maximum. Find the minimum value of DO.

4(a) A river water source is passed through a bed of uniform size sand at a filtering velocity of 5 m/hour. The sand grains are 0.4 mm in diameter with a shape factor of 0.85 and specific gravity of 2.65. The depth of the bed is 0.67 m and the porosity is 0.4. Determine the head loss through the bed. Given ρ = 998.2 kg/m³, μ = 1x10⁻³ Ns/m²

4(b) Discuss the breakpoint chlorination in disinfection process. Explain the pH dependence in chlorination process.

Or

4'(b) Briefly explain the ion exchange process for hardness removal in ground water.
2016-17
B.TECH. EXAMINATION
CIVIL
Structural Mechanics CE 216
B. Tech. II (Civil) IV Semester

Maximum Marks: 60
Credits: 04
Duration: Two Hours

Answer all the questions.
Assume suitable data, if missing.
Notations used have their usual meaning.

Q.No. Question

1(a) Deduce the expression given by Euler for the crippling load of a column of
length L, modulus of elasticity E and moment of inertia I when one end is
hinged and the other fixed. [07]

1(b) Compute the Euler’s critical load of a column of square cross-section, 5 m in
length and with fixed supports at the two ends. The same column when used
as a simply supported beam, supporting a load of 100 N at the mid-span
shows 10 mm deflection under the load. [08]

OR

1'(b) A hollow cylindrical cast iron column is 4m long with both ends fixed.
Determine the minimum diameter of the column, if it has to carry a safe load
of 250 kN with a FOS of 5. Take the internal diameter as 0.8 times the
external diameter.

\[ \sigma_{ce} = 550 \text{ MN/m}^2 \text{ and } a = 1/1600 \text{ in Rankine’s formula.} \]
2(a) A beam is shown in Fig.1. Determine the displacement and slope at C. Take $EI$ as constant. Use moment-area theorems.

![Fig. 1](image)

2(b) Using Conjugate beam method, determine the displacement at the end C of the beam shown in Fig. 2. Take $E = 200 \text{ GPa}, I = 70 \times 10^6 \text{ mm}^4$.

![Fig. 2](image)

OR

2' A horizontal beam rests on two supports at the same level and carries a uniformly distributed load on its entire span as shown in Fig.3. Find the ratio of $L_1$ to $L_2$ if the deflection at the mid span is equal to that at each end.

![Fig. 3](image)
3 (a)  The planer stresses at point in a wall are given as follows:
\[ \sigma_{xx} = -30 \text{ N/mm}^2, \sigma_{yy} = +20 \text{ N/mm}^2 \text{ and } \tau_{xy} = 7 \text{ N/mm}^2 \]
Calculate stresses on a plane perpendicular to which is inclined to X-axis by 30° in clock wise direction. Also calculate principal stresses and locate principal planes and planes of maximum shear.

3 (b)  Describe any two of the following failure theories for generalized state of stress and also mention modified forms of each of the theories for two dimensional stresses.

(i) Maximum strain energy theory
(ii) Maximum principal strain theory
(iii) Maximum shear stress theory

4  Using Castiglione’s theorem, determine slope at free end and deflection at mid-point of the cantilever beam shown in Fig.4. Assume \( E = 2 \times 10^4 \text{ N/mm}^2 \), \( I = 1.5 \times 10^9 \text{ mm}^4 \)

[Diagram of a cantilever beam with loads and dimensions]

OR

4'  Calculate Strain energy due to bending and shear separately for the beam shown in Fig. 5. Assume beam cross section as 250 mm x 400 mm, Poisson's ratio \( \nu = 0.25 \) and \( E = 2 \times 10^4 \text{ N/mm}^2 \)

[Diagram of a beam with loads and dimensions]
Answer all the questions.

Q.No. | Question | M.M.
--- | --- | ---
1 | What points should be considered while selecting suitable site for a building? | [12]

OR

1’ | What are the various principles of planning? Explain any two of the following. | [12]
(a) Aspect (b) Grouping (c) Privacy (d) Circulation

2(a) | Differentiate between Combined Trapezoidal and Strap footing. | [06]
2(b) | Classify the doors on the basis of the following and give brief description of one from each category with the help of neat sketches:
   (i) Type of material (ii) Arrangement of Components (iii) Method of Construction (iv) Nature of Working operations. | [06]

OR

2’(a) | Explain the methods for the design of a load bearing walls. | [06]
2’(b) | Enumerate different types of upper floors and describe any two of them in detail. | [06]
3 | Briefly describe the method of setting out or ground tracing of foundation trenches with the help of neat sketches. | [12]

OR

3’ | Define underpinning and mention some of the situations where underpinning is required. Giving a neat sketch, briefly describe the pit method of underpinning. | [12]
4(a) | What are the ill effects of dampness in buildings? | [06]
4(b) | Explain how pre and post construction anti-termite treatment in buildings is carried out. | [06]
5(a) | What is meant by fire resisting material? Enumerate the characteristics of a fire resisting material. | [06]
5(b) | Explain various causes of vertical cracks in buildings and their repair measures with the help of neat sketches. | [06]
Maximum Marks: 60  
Credits: 04  
Duration: Two Hours

Answer all the questions.  
Assume suitable data if missing.  
Notations used have their usual meaning.

Q. No.  

1 (a) Enumerate the different types of chains used in surveying. Differentiate between Gunter’s chain and Revenue chain.  

1 (b) A 20 m chain was found to be 15 cm too long after chaining a distance of 1600 m. It was found to be 30 cm too long after chaining a distance of 3000 m. Determine the correct distance if the chain was correct before the commencement of the work.  

OR

1' (a) What do you mean by reciprocal ranging? Explain in detail.

1' (b) A chain line ABC crosses a river, B and C being on the near and distant banks respectively. The respective bearings of C and A taken at D, a point 60 m measured at right angles to AB from B are 280° and 190°, AB being 32 m. Find the width of the river.

2 (a) State differences between prismatic compass and surveyor’s compass.

OR

2' (a) State advantages and disadvantages of plane table survey.

2 (b) The following bearings were observed in traversing with a compass in a place where local attraction as suspected. Find the corrected bearings of each line.

<table>
<thead>
<tr>
<th>Line</th>
<th>Observed Bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fore bearings</td>
</tr>
<tr>
<td>AB</td>
<td>74° 00'</td>
</tr>
<tr>
<td>BC</td>
<td>91° 00'</td>
</tr>
<tr>
<td>CD</td>
<td>166° 00'</td>
</tr>
<tr>
<td>DE</td>
<td>177° 00'</td>
</tr>
<tr>
<td>EA</td>
<td>189° 00'</td>
</tr>
</tbody>
</table>

3 (a) A level is set up at a station O. The reading on the staff held at A 360 m away from O, is 2.150 m and is 3.895 m when held at B, 550 m away. Find the true difference of level between A and B.
3 (b) Explain temporary adjustments of a dumpy level.

4 (a) Differentiate between loose and fast needle methods of traversing.
4 (b) The table shows the lengths and bearings of the lines of a closed traverse ABCDEA.

Determine the omitted length and bearing of line EA.

<table>
<thead>
<tr>
<th>Line</th>
<th>Length (m)</th>
<th>Observed Bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>204</td>
<td>87° 30'</td>
</tr>
<tr>
<td>BC</td>
<td>226</td>
<td>20° 20'</td>
</tr>
<tr>
<td>CD</td>
<td>187</td>
<td>280° 00'</td>
</tr>
<tr>
<td>DE</td>
<td>192</td>
<td>210° 30'</td>
</tr>
<tr>
<td>EA</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

**OR**

4' (a) Differentiate between stadia and tangential method of tacheometric survey.
4' (b) Determine the gradient of the line AB from the following observations.

<table>
<thead>
<tr>
<th>Instrument station</th>
<th>Staff station</th>
<th>Horizontal angle</th>
<th>Vertical angle</th>
<th>Staff reading</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>upper</td>
</tr>
<tr>
<td>O</td>
<td>A</td>
<td>0° 0' 00&quot;</td>
<td>10° 05' 20&quot;</td>
<td>2.585</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>40° 10' 30&quot;</td>
<td>0° 0' 00&quot;</td>
<td>3.100</td>
</tr>
</tbody>
</table>

Take constants of tacheometer as 100 and 0.

5 (a) What are the factors which should be considered while selecting the base line in triangulation survey?

**OR**

5' (a) Explain the significance of satellite station in triangulation survey.
5 (b) Directions observed from a satellite station S, 5.80 m from the main triangulation station A, are tabulated as shown:

<table>
<thead>
<tr>
<th>Observed station</th>
<th>Bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0° 00' 00&quot;</td>
</tr>
<tr>
<td>B</td>
<td>132° 18' 30&quot;</td>
</tr>
<tr>
<td>C</td>
<td>232° 24' 06&quot;</td>
</tr>
<tr>
<td>D</td>
<td>296° 06' 11&quot;</td>
</tr>
</tbody>
</table>

The lengths of AB, AC and AD were computed to be 3265.5 m, 4022.2 m and 3086.4 m respectively. Determine the directions of AB, AC and AD.
B.TECH. (WINTER SEMESTER) EXAMINATION
CIVIL ENGINEERING
SURVEYING
CE 218R

Maximum Marks: 60  Credits: 04  Duration: Two Hours

Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q. No.  Questions                                    M. M.  
1 (a)    What are the principles of surveying? Explain. [05]  
1 (b)    A 20 m chain used for a survey was found to be 20.15 m at the beginning and 20.35 m at the end of the work. The area of the plan drawn to a scale of 1 cm = 8 m was measured with the help of a planimeter and was found to be 35.58 sq. cm. Find the true area of the field. [10]

OR

1' (a)   Explain how three-point problem is solved by graphical method. [05]
1' (b)   The following bearings were observed while traversing with a compass. [10]

<table>
<thead>
<tr>
<th>Line</th>
<th>Observed Bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fore bearings</td>
</tr>
<tr>
<td>AB</td>
<td>N45° 45'E</td>
</tr>
<tr>
<td>BC</td>
<td>S83° 05'E</td>
</tr>
<tr>
<td>CD</td>
<td>N29° 45'W</td>
</tr>
<tr>
<td>DE</td>
<td>N35° 12'W</td>
</tr>
</tbody>
</table>

Mention which stations are affected by local attraction and determine the corrected bearings.

2 (a)   Write short notes on the following:  
i) Chromatic and spherical aberrations  
ii) Profile leveling  

OR

2' (a)   What are the factors which should be considered while selecting the triangular stations? [05]

2 (b)   The following consecutive readings were taken with a level: [10]
0.894, 1.643, 2.896, 3.016, 0.954, 0.692, 0.582, 0.251, 1.532, 0.996, 2.135
The instrument was shifted after the fourth and the eighth readings. The first reading was taken on the staff held on the bench mark of RL 820.765. Rule out a
page of a level field book and enter the above readings. Calculate the reduced levels of the points by rise and fall method and show the usual checks. What is the difference of the levels between the first and the last points?

3 (a) Define the following terms:
Point of curve, normal chord, forward tangent, apex distance and length of curve [05]

3 (b) Two straights AI and BI meet at a chainage of 3450 m. A right handed simple circular curve of 250 m radius joins them. The deflection angle between the two straights is 50°. Tabulate the necessary data to layout the curve by Rankine’s method of deflection angles. Take the chord interval as 20 m. [10]

4 (a) How is the closing error of a traverse adjusted graphically? [05]

4 (b) The lengths and bearings of a closed traverse ABCDA are tabulated. Determine the independent co-ordinates of the survey stations using Transit Rule. [10]

<table>
<thead>
<tr>
<th>Line</th>
<th>Length (m)</th>
<th>Corrected Bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>255</td>
<td>140° 42' 00&quot;</td>
</tr>
<tr>
<td>BC</td>
<td>656</td>
<td>34° 58' 55&quot;</td>
</tr>
<tr>
<td>CD</td>
<td>120</td>
<td>338° 41' 26&quot;</td>
</tr>
<tr>
<td>DA</td>
<td>668</td>
<td>227° 23' 13&quot;</td>
</tr>
</tbody>
</table>

OR

4' (a) Define tacheometry? Explain the methods employed in tacheometric survey. [05]

4' (b) For the following traverse, compute the length of CD so that A, D and E may be in straight line. [10]

<table>
<thead>
<tr>
<th>Line</th>
<th>Length (m)</th>
<th>Bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>110</td>
<td>83° 12' 00&quot;</td>
</tr>
<tr>
<td>BC</td>
<td>165</td>
<td>30° 42' 00&quot;</td>
</tr>
<tr>
<td>CD</td>
<td>?</td>
<td>346° 06' 00&quot;</td>
</tr>
<tr>
<td>DE</td>
<td>212</td>
<td>16° 18' 00&quot;</td>
</tr>
</tbody>
</table>
Answer all the questions.
Assume suitable data if missing.
Notations used have their usual meaning.

Q.No. | Question | M.M.
--- | --- | ---
1(a) | Describe hydrologic cycle and its components with a suitable sketch. | [05]
1(b) | Explain Orographic precipitation. Annual rainfall of station A and the average annual rainfall of five surrounding stations from 2010 to 1996 are given below. Check the consistency of data of station A. If data is found inconsistent, then correct the inconsistent data. | [10]

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual avg. Precipitation of station A (mm)</th>
<th>Annual avg. Precipitation of 5 surrounding stations (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1220</td>
<td>1430</td>
</tr>
<tr>
<td>2009</td>
<td>1280</td>
<td>1150</td>
</tr>
<tr>
<td>2008</td>
<td>750</td>
<td>950</td>
</tr>
<tr>
<td>2007</td>
<td>1120</td>
<td>1230</td>
</tr>
<tr>
<td>2006</td>
<td>1250</td>
<td>1350</td>
</tr>
<tr>
<td>2005</td>
<td>1380</td>
<td>1440</td>
</tr>
<tr>
<td>2004</td>
<td>1210</td>
<td>1360</td>
</tr>
<tr>
<td>2003</td>
<td>1760</td>
<td>1730</td>
</tr>
<tr>
<td>2002</td>
<td>1400</td>
<td>1080</td>
</tr>
<tr>
<td>2001</td>
<td>1240</td>
<td>970</td>
</tr>
<tr>
<td>2000</td>
<td>1760</td>
<td>1320</td>
</tr>
<tr>
<td>1999</td>
<td>1480</td>
<td>1350</td>
</tr>
<tr>
<td>1998</td>
<td>1740</td>
<td>1410</td>
</tr>
<tr>
<td>1997</td>
<td>1420</td>
<td>1270</td>
</tr>
<tr>
<td>1996</td>
<td>1580</td>
<td>1260</td>
</tr>
</tbody>
</table>

OR

contd... 2
1(b) Describe the procedure for finding average depth of rainfall using Isohyetal method. A circle of diameter 40 km is a close approximation to a river basin. The position coordinates of five rain gauge stations A, B, C, D and E located within the basin with respect to coordinate axes system whose x-axis and origin are coincident with diameter and centre of the circle are (0,0), (10,0), (0,10), (-10,0), and (0,-10) km respectively. If the rainfalls recorded at these rain gauges are 30, 45, 40, 25 and 20 cm respectively, determine the average depth of rainfall using Arithmetic mean method and Thiessen polygon method.

2(a) List the various factors affecting evaporation. Describe the Indian standard evaporation pan used to estimate evaporation loss.

2(b) Enumerate various methods of PET. Describe any one of them. For an initial infiltration capacity of 7.5 cm/hr and a decay coefficient 0.28 hr\(^{-1}\), derive an infiltration capacity curve if the ultimate infiltration capacity is 1.3 cm/hr. For the first 8 hours, estimate the average infiltration rate.

3(a) List various methods of peak flood estimation and discuss their limitations.

3(b) Discuss various components of a single peaked hydrograph. The ordinates of a 4-h unit hydrograph are given below:

<table>
<thead>
<tr>
<th>Time (h)</th>
<th>0</th>
<th>4</th>
<th>8</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>28</th>
<th>32</th>
<th>36</th>
<th>40</th>
<th>44</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-h UH ordinates (m(^3)/s)</td>
<td>0</td>
<td>15</td>
<td>55</td>
<td>145</td>
<td>115</td>
<td>85</td>
<td>60</td>
<td>45</td>
<td>27</td>
<td>15</td>
<td>5</td>
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</table>

Derive the ordinates of a flood hydrograph for the same catchment corresponding to an excess rainfall of 3 cm occurring over the catchment in four hours. Assume a constant base flow of 10 m\(^3\)/s.

OR

3'(b) Discuss the factors, which affect the recession limb of hydrograph. Give step-wise procedure for developing a flow duration curve, and also discuss its significance.

4(a) Derive the equation for steady state discharge through a well in a confined aquifer and also mention the assumptions made.

OR

4'(a) What is the significance of flood routing? A confined stratified aquifer has a total thickness
of 12 m and is made up of three layers. The bottom layer has a coefficient of permeability of
30 m/d and a thickness of 5.0 m. The middle and top layers have permeability of 20 m/d and
45 m/d respectively and are of equal thickness. Calculate equivalent permeability of
confined aquifer, if the flow is along the stratification.

4(b) Explain Darcy’s law. A gravity well has a diameter of 60 cm. The depth of water in the well
is 40 m before pumping is started. When pumping is being done at the constant rate of 0.033
m³/s, the draw down in a well 10 m away is 4.0 m and in another well 20 m away is 2.0 m.
Determine:

(i) Coefficient of permeability
(ii) Radius of zero draw down.
(iii) Draw down in the well.