2014-15
B.E. III SEMESTER) EXAMINATION
CIVIL ENGINEERING
MATHEMATICS-III
EAM-211

Maximum Marks: 60   Credits: 04   Duration: Three Hours

Answer underline all questions.
Programmable calculators are not allowed.
Write answers up to four decimals.
Notations and symbols used have their usual meaning.

Q. No.	Question	M.M.
1(a)	Find the directional derivative of the divergence of the vector field $\vec{F} = xy\hat{\imath} + xy^2\hat{\jmath} + z^2\hat{k}$ at the point (2,1,2) in the direction of the outer normal to the sphere $x^2+y^2+z^2 = 9$ at the same point.	[05]
1(b)	For any vector field $\vec{A}$ prove that $$\vec{\nabla}(\vec{A})^2 = 2(\vec{A}.\vec{\nabla})\vec{A} + 2\vec{A} \times (\vec{\nabla} \times \vec{A}).$$	[05]

OR

1'(b)	For any vector field $\vec{F}$ prove that $$\text{Curl Curl } \vec{F} = \text{grad div}\vec{F} - \nabla^2\vec{F}.$$	[05]
1(c)	A fluid motion is given by $$\vec{V} = (y\sin z - \sin x)\hat{\imath} + (x\sin z + 2yz)\hat{\jmath} + (xy\cos z + y^2)\hat{k}.$$ Is the motion irrotational? If so, find the ~~scalar~~ vector potential.	[05]
2(a)	Evaluate the integral $\iint_S \vec{F}.\hat{n}\,dS$, where $\vec{F} = x^3\hat{\imath} + x^2y\,\hat{\jmath} + x^2z\,\hat{k}$ and S is the surface of the cylinder $x^2 + y^2 = a^2$ bounded by $z = 0, z = b$.	[05]
2(b)	Verify divergence theorem for $\vec{F} = 4xz\,\hat{\imath} - y^2\hat{\jmath} + yz\,\hat{k}$ over the cube bounded by $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.	[10]

OR

2'(c)	Verify Stokes theorem for $\vec{F} = x^2\,\hat{\imath} + xy\hat{\jmath}$ in the square region in XOY plane bounded by the lines $x = 0, x = a, y = 0, y = a$.	[10]

3(a) Show that the function that the function [05]

$$f(z) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2} & , z \neq 0 \\ 0, & z = 0 \end{cases}$$

satisfies the Cauchy –Riemann equations at $z = 0$. Is the function analytic at $z = 0$?
Justify your answer.

3(b) Is the function $u = \frac{1}{2}\log(x^2 + y^2)$ is harmonic? If so, determine its conjugate [05]
function.

OR

3'(b) If $u - v = (x - y)(x^2 + 4xy + y^2)$, and $f(z) = u + iv$ is an analytic function, [05]
find $f(z)$ in terms of z.

3(c) Evaluate the integral $\int_C \frac{3z^2+z}{z^2-1} dz$ where C is the circle $|z| = 2$. [05]

4(a) Form the partial differential equation by eliminating f from [05]
$$f(x^2 + y^2, z - xy) = 0.$$

4(b) A tightly stretched flexible string has its ends fixed at $x = 0$ and $x = l$. At time [10]
$t = 0$ the string is given a shape defined by $F(x) = \mu x(l - x)$, where μ is a
constant, and then released. Find the displacement of any point x of the string at
any time $t > 0$.

OR

4'(b) A rectangular plate with insulate surfaces is 10 cm wide and so long compared to [10]
its width that it may be considered infinite in length without introducing an
appreciable error. If the temperature along the short edge $y = 0$ is given by

$$u(x, 0) = \begin{cases} 20x, & 0 < x \leq 5 \\ 20(10 - x), & 5 \leq x < 10 \end{cases}$$

While the two long edges $x = 0$ and $x = 10$ as well as the other short edge s are kept
at $0°C$. Find the steady state temperature $u(x, y)$ at any point $p(x, y)$ of the plate.

AUTUMN 2014-15
B. E. (WINTER SEMESTER) EXAMINATION
CIVIL ENGINEERING
CIVIL ENGINEERING MATERIAL
ECE 212

Maximum Marks: 60   **Credits: 04**   **Duration: Three Hours**

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

Q. No.	Question	M.M.
1(a)	With the help of flow chart diagram, describe the manufacture of Portland cement by dry and wet process. Also make a comparative statement between two processes.	[08]
1(b)	Describe the characteristics of any two of the following:	[04]

(i) Rapid hardening Portland cement

(ii) Portland Pozzolana cement

(iii) High alumina cement

(iv) Portland slag cement

2(a)	What is meant by workability of concrete? Describe the factors affecting the workability of concrete.	[06]
2(b)	Differentiate between segregation and bleeding of concrete. Write the circumstances in which the segregation and bleeding take place.	[06]

OR

2'(a)	What is meant by curing of concrete? Describe the methods of curing of concrete.	[06]
2'(b)	What does shrinkage of concrete mean? Discuss the classification of shrinkage of concrete.	[06]
3(a)	Write the compositions of good brick-earth and describe the properties of the constituents.	[06]
3(b)	What are the classifications of bricks? Discuss their characteristics and uses.	[06]

OR

3'(a)	Describe the characteristics and uses of different types of bricks.	[06]
3'(b)	What is lime? Describe the specifications and characteristics of lime.	[06]
4(a)	What are the characteristics of good timber? Discuss the various defects of timber.	[06]
4(b)	What is seasoning of timber? Discuss the various methods of seasoning of timber.	[06]

OR

4'(a)	What is meant by preservation of timber? Describe the various methods of preservation of timber.	[06]
4'(b)	Describe the characteristics and uses of different types of steel used in civil engineering structures.	[06]
5(a)	Discuss the functions of various constituents of glass. Also describe the characteristics of sheet, laminated and insulating glass.	[08]
5(b)	Define bitumen and describe the properties and uses of various kinds of bitumen.	[04]

2014-15
B.E. (AUTUMN SEMESTER) EXAMINATION
CIVIL ENGINEERING
ENGINEERING GEOLOGY
ECE 215

. Maximum Marks: 60   Credits: 04   Duration: Three Hours

Answer all the questions.
Assume suitable data if missing.

Q.No.	Question	M.M.
1(a)	Define and differentiate between "Fracture" and "cleavage" with example of minerals.	[06]
1(b)	What do you understand by "Form" of rocks. Give examples from igneous rocks.	[06]
2	Enumerate different geomorphic processes. In what ways knowledge of these processes are important for civil engineers?	[12]

OR

2'	What are the factors which cause deformation of rocks? Show with neat diagrams important deformation structures and their parts.	[12]
3	Give a pictorial account of vertical distribution of groundwater in unconsolidated medium, showing different types of aquifers.	[12]
4	Discuss various geological factors to be taken into consideration for construction of tunnels.	[12]

OR

4'	What are the causes of landslides. What are the civil engineering measures are taken to mitigate this problem.	[12]
5	Write short notes on any two of the followings:	[2 x 6]

(a) Unconformity

(b) Core Recovery and Rock Quality Designation

(c) Qualities of Building Stones

(d) Geotectonic Units

2014-15
B.E. III SEMESTER) EXAMINATION
(CIVIL)
QUANTITY SURVEY
(ECE – 220)

Maximum Marks: 60   Credits: 04   **Duration: Three Hours**

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

Q.No.   M.M.

1   Determine the number of bricks for the room as shown in Fig 1, required in: [12]

    (i)   Superstructure of height 4000 mm and wall thickness of 229 mm

    (ii)   Plinth of height 1000 mm

    (iii)   Second footing of thickness equal to two bricks

    (iv)   First footing of thickness equal to two bricks

    (v)   The parapet wall of height 600 mm

Figure 1
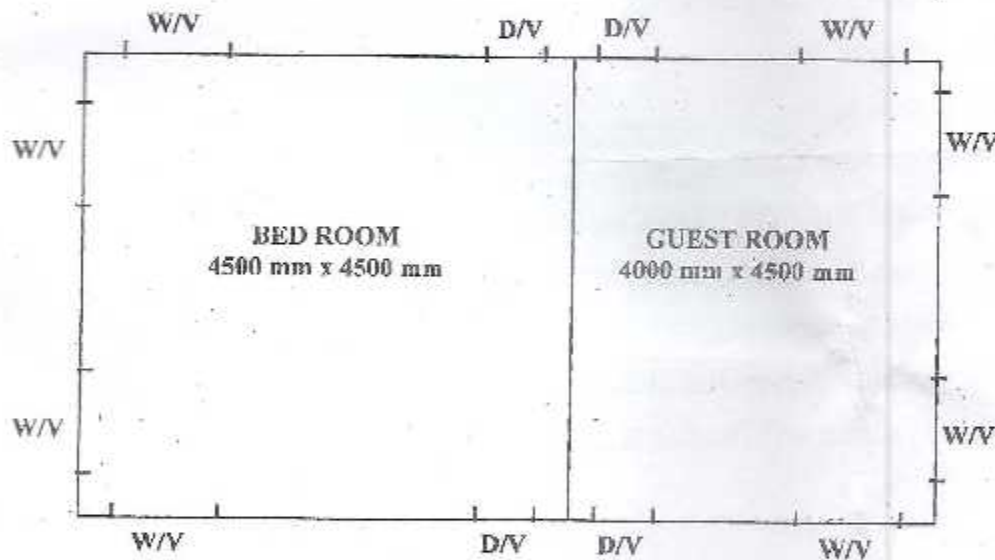
2(a)   Draw a neat sketch of the wall section and write the dimensions of its components.   [09]

2(b)   What is DPC? Write its purpose and dimensions.   [03]

OR

2'(a) Draw a neat sketch of the foundation plan of the rooms as shown in Fig. 1.

2'(b) Write the standard sizes of:

(i) Door

(ii) Window

(iii) Ventilator

3(a) What is the purpose of rate analysis?

3(b) Analyse the rates for 1st class brickwork in foundation and plinth with 20x10x10 cm bricks per cubic metre with 1:6 cement sand mortar.

OR

3' Write short notes on the following

(i) Contract Document   (ii) Earnest Money and Security Deposit

4(a) Write the least dimensions of the front setback, side setbacks and courtyard in a residential building for a plot size of:

(i) 250 sq. m

(ii) 500 sq m

4(b) Write the least dimensions of

(i) Bed Room   (ii) Drawing cum Dining Room   (iii) Kitchen

(iv) Wash Room   (v) Store   (vi) Width of Internal and External Verandah

4(c) Write short notes on:

(i) Quantity Survey and its Requirement (iii) Different areas in a Building

5 What is a contract? Discuss in detail the essential requirements of contract

2015-2016

B. E. (III SEMESTER) EXAMINATION
(CIVIL ENGINEERING)
MATHEMATICS – III
[EAM – 211]
Credits – 04

Max Marks: 60   Duration: Three Hours

Note :   Answer all questions.

1.   (a)   Find the directional derivative of $x^2 + y^2 + 4xyz$ at $(1, -2, 2)$ in the direction $2\vec{i} - 2\vec{j} + \vec{k}$.

     (b)   Show that div $(\text{grad } \gamma^n) = n(n+1)\gamma^{n-2}$.

OR

     (b') Prove that for any vector field $\vec{A}$

            div curl $\vec{A} = 0$.

     (c)   A vector field is given by   [5,5,5]

            $$\vec{A} = (x^2 + xy^2)\vec{i} + (y^2 + x^2y)\vec{j}$$

            show that the field is irrotational, and find the scalar potential.

2.   (a)   Verify divergence theorem for $\vec{F} = 4xz\hat{i} - y\vec{j} + yz\vec{k}$ taken over the cube bounded by the planes $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.

     (b)   Verify Green's theorem in the plane $\int_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$, where C is

            the bounded of the regions defined by $y = \sqrt{x}, y = x^2$.

OR

     (b') Verify Stoke's theorem for the function $\vec{F} = x^2\vec{i} - xy\vec{j}$ integrated round the square   [7,8]
            in the plane $z = 0$ and bounded by the lines $x = 0, y = 0, x = a$ and $y = a$.

3.   (a)   If $f(z) = u + iv$ is an analytic function of $z = x + iy$ and

            $u + v = (x - y)(2 - 4xy + x^2 + y^2)$, then find u, v and the analytic function
            $f(z)$.

     (b)   Use Cauchy's integral formula to evaluate $\int_C \dfrac{e^{2z}}{(z+1)4} dz$, where C is the circle

            $|z| = 2$.

OR

     (b') If $f(z) = u + iv$ is an analytic of (z), show that the curve $u = $ constant and   [7,8]
            $v = $ constant cut orthogonally.

4. (a) Form the partial differential equation by eliminating f from

$$F(x + y + z, xyz) = 0.$$

(b) A tightly stretched string with tied end points $x = 0$ and $x - l$ is initially at rest in its equilibrium position. If it is set vibrating by giving each point a velocity $tx(l - x)$, find the displacement of the String at any distance x from arc end at any time t.

OR

(b') Solve $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$ for $\begin{cases} 0 < x < \pi \\ 0 < y < \pi \end{cases}$

[7.

with given conditions

$$u(0, y) = u(\pi, y) = u(x, \pi) = 0$$

$$u(x, 0) = \sin^2 x.$$

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2015-16
B. E. (AUTUMN SEMESTER) EXAMINATION
CIVIL ENGINEERING
CIVIL ENGINEERING MATERIAL
ECE 212

Maximum Marks: 60   **Credits: 04**   **Duration: Three Hours**

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

Q. No.	Question	M.M.
1(a)	What are the main constituents of ordinary Portland cement? Discuss their role in setting and hardening process of Portland cement.	[06]
1(b)	List various types of cement. Describe the properties of blast furnace slag cement and low heat cement.	[06]
2(a)	Enumerates different tests on workability of concrete? Explain slump test with neat sketch for the measurement of workability of concrete.	[06]
2(b)	Enumerates different tests on hardened concrete. Describe the test procedure for the measurement of tensile strength of concrete.	[06]

OR

2'(a)	What do you understand by durability of concrete? Discuss the factors affecting the durability of concrete.	[06]
2'(b)	Write short note on the followings: (a) Fire resistance property of concrete (b) Freezing and thawing resistance properties of concrete	[06]
3(a)	Discuss the purpose of bonding in brick masonry construction. Differentiate with neat sketches between Flemish bond and English bond.	[06]
3(b)	What do you understand by the term "frog" in bricks? State its importance in clayey bricks.	[06]

OR

3'(a)	Describe the tests performed to check the quality of bricks.	[06]
3'(b)	Explain setting action of lime? Describe the classifications of lime.	[06]
4(a)	What are the characteristics of hard and soft wood	[06]
4(b)	What are the defects in timber? Discuss in detail with neat sketch.	[06]

OR

4'(a)	Write short note on the followings: (a) Ply board (b) Block board (c) Fibre board	[06]
4'(b)	Describe the properties of different types of steel used in building construction.	[06]
5(a)	Define asbestos. Describe the properties and uses of asbestos in building construction.	[06]
5(b)	What is plastic? Describe the properties and uses of plastics in building construction.	[06]

2015-16
B.E. (AUTUMN SEMESTER) EXAMINATION
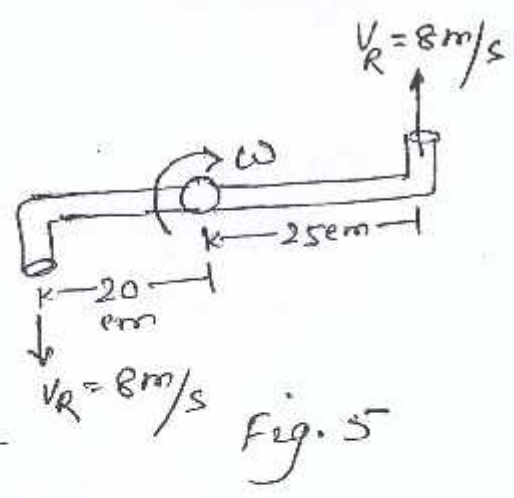### CIVIL ENGINEERING
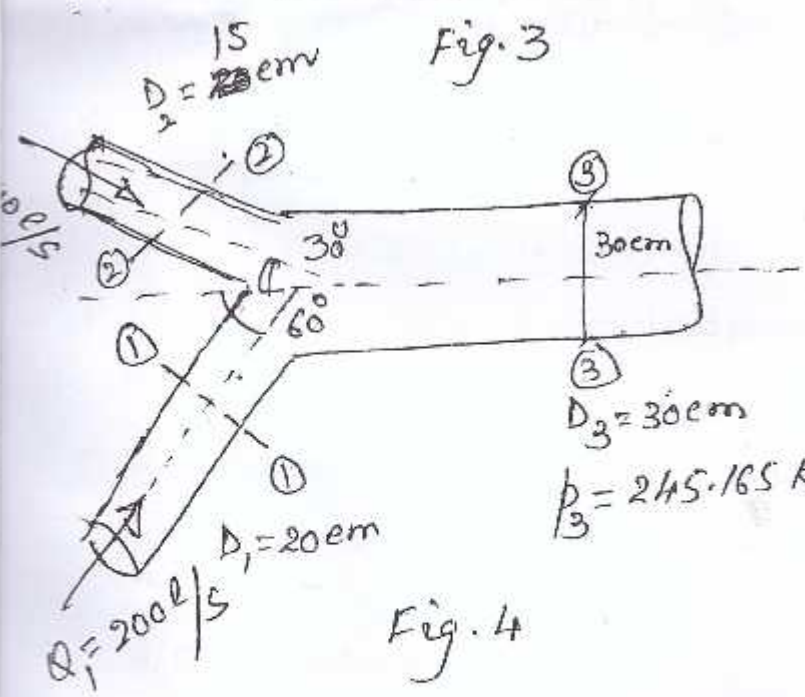### FLUID MECHANICS (ECE-213)
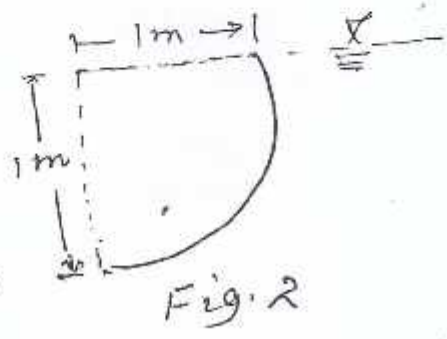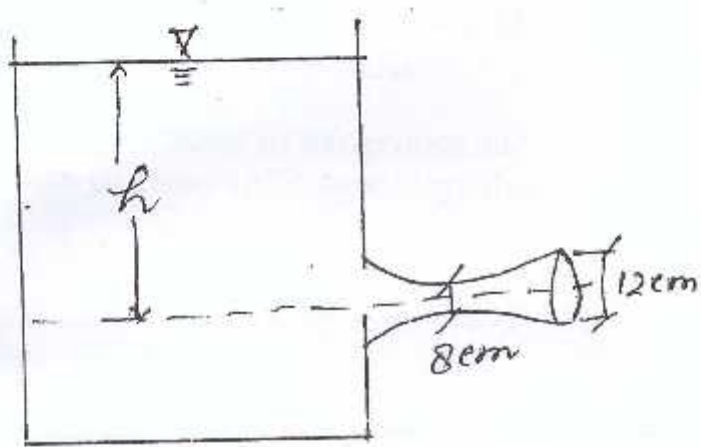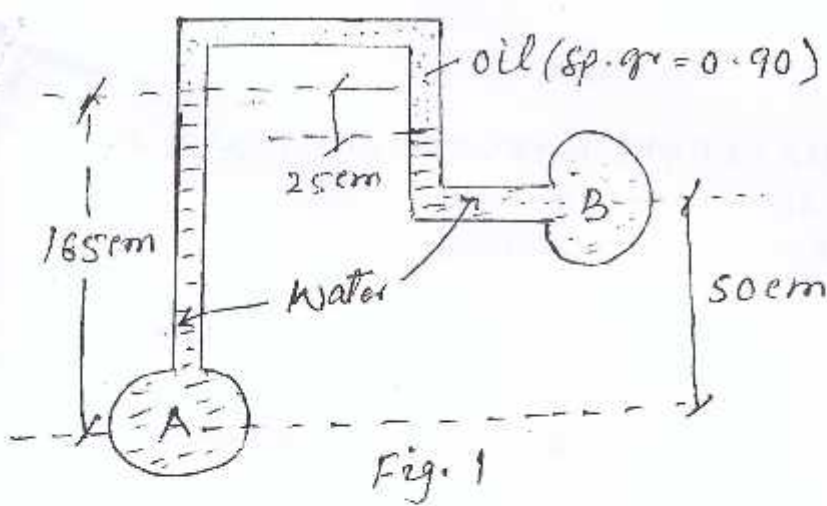
Maximum Marks: 60   **Credits: 04**   **Duration: Three Hours**

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

Q. No.	Question	M.M.
1(a)	On stress-strain diagram show various types of non-Newtonian fluids. Give at least one example of each. A disc of radius R is rotating over a fixed bed with angular speed ω. Develop the expression for torque. The gap h between disc and the surface is filled with a lubricating fluid having viscosity μ.	[08]
1(b)	Explain local and convective accelerations. For a curved stream line, show that the tangential acceleration is given by $\alpha_t = \frac{\partial v}{\partial t} + V\frac{\partial v}{\partial s}$, where all terms have their usual meanings.	[04]
1(c)	If $u = 2xy$ and $v = xy^2$, check whether the flow is potential.	[03]
	OR	
Q1'(a)	Differentiate between steady and unsteady flows with few examples. If velocity distribution in a given flow field is defined as, $\vec{V} = x^3y\vec{i} - 2xyz\vec{j} + 2t\vec{k}$ Find (i) Acceleration along x-direction at P (1,2,1) and t= 2 units (ii) Rotation component along y-direction at Q(1,2,3) and t = 1 unit and (iii) Vorticity along z-direction at R(3,2,3) and t= 3 units	[08]
1'(b)	Differentiate between velocity potential and stream function. If velocity potential is defined as $\emptyset = -x^2 - y^2 - \frac{y^3}{3}$, determine stream function ψ.	[07]
2(a)	What are manometers? Where will you prefer an inclined manometer? Calculate the pressure difference between pipes A and B (Fig.1).	[8]
(b)	State Pascal's law. The diameters of ram and plunger of a hydraulic press are 300 mm and 30 mm respectively. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500 N.	[7]
	OR	

2'(a)	Define centre of pressure. A 1m wide and 1.5 m deep rectangular plane surface lies in water in such a way that its plane makes an angle of $30°$ with free water surface. Determine the total pressure and position of centre of pressure when the upper edge is 0.75 m below the free surface.	[8]
(b)	A gate having a quadrant shape of radius of 1 m subjected to water pressure as shown in Fig.2. Find the resultant force and its inclination with the horizontal. Take length of the gate as 3m normal to plane of paper. .	[7]
Q3(a)	Write various forms of Bernoulli's equation explaining each term. Find the value of h at which the cavitation at the throat of the tube is expected (Fig.3). Also find the discharge. Assume cavitation occur at a pressure of 6.5 m of water.	[10]
OR		
Q3'(a)	What are energy and momentum correction factors? What are their values for laminar and turbulent flows for pipes? Determine the components of hydrodynamic force on the joint (Fig. 4). Use all data given in the figure. .	[10]
3(b)	Write torque equation. For a frictionless shaft in the rotating sprinkler as shown in Fig. 5, equal discharge flows through each nozzle (relative velocities = 8 m/s). Find the speed of rotation in rpm.	[05]
4(a)	Define orifice and mouthpiece. A 100 mm diameter orifice discharges 36 l/s water under a constant head of 2.6 m. A flat plate held normal to the jet just downstream from the orifice requires a force of 240 N to resist the impact of jet. Determine the hydraulic coefficients.	[07]
(b)	What are various types of mouthpieces? A convergent-divergent mouthpiece having throat diameter 40 mm is discharging water under a constant head of 4 m. Determine the maximum outlet diameter to avoid separation of flow, if the maximum vacuum pressure is 8.5 m of water. Also find the discharge.	[08]
OR		
(b')	What is a cippoletti weir? Derive the discharge equation for a V-shaped weir taking suitable symbols. Where will you prefer V-shaped weir?	[08]

Fig. 1

oil (sp. gr = 0·90)

25cm

165cm

Water

B

50cm

A

Fig. 3

h

12cm

8cm

Fig. 2

1m

1m

Fig. 4

$D_2 = 15$ cm

②

30°

②

60°

①

①

$D_1 = 20$ cm

$Q_1 = 200 \ell/s$

③

30cm

③

$D_3 = 30$ cm

$p_3 = 245.165 \ kN/m^2$

Fig. 5

$V_R = 8 m/s$

ω

25cm

20 cm

$V_R = 8 m/s$

B. E. (AUTUMN), IIIrd SEMESTER EXAMINATION 2015 .
(CIVIL ENGINEERING)
ENGINEERING GEOLOGY (ECE – 215)

MAXIMUM MARKS: 60   **Duration: Three Hours**

Note: Answer all questions. The marks are given in parenthesis.

1 a. Discuss the processes by which minerals originate with examples.   **(06)**

1 b. Enumerate different steps in formation of sedimentary rocks and give brief
   classification of sedimentary rocks.   **(06)**

2. What do you understand by exogenous and endogenous processes? Write a
   short account of geomorphic agents involved in topographic evolution?   **(12)**

OR

2'. What are the different types of folds? How folds are significant in civil
   engineering.   **(12)**

3. Define different types of groundwater bearing horizons and their characteristics
   in terms of their porosity and permeability.   **(12)**

4. Give pictorial description of different types of dam. What are the important
   geomorphological and geological issues in the construction of dams?   **(12)**

OR

4'. Classify earthquakes and define related parameters. What are the precautions
   and measures to mitigate the problems of earthquakes?   **(12)**

5. Write short notes on any two of the following:

   a. Uses and properties of rocks in construction Industry   **(06)**
   b. Rock Quality Designation   **(06)**
   c. Joints and Rock Mass Properties   **(06)**
   d. Strike and dip of rocks   **(06)**

2015-16
B.E. III SEMESTER) EXAMINATION
(CIVIL)
QUANTITY SURVEY
(ECE – 220)

Maximum Marks: 60   **Credits: 04**   **Duration: Three Hours**

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

Q.No.	Question	M.M.
1	Determine the number of bricks for the room as shown in Fig 1, required in:	[12]

    (i)   Superstructure of height 4000 mm and wall thickness of 334 mm (1 ½ brick)

    (ii)   Plinth of height 1200 mm

    (iii) Second footing of thickness equal to two bricks

    (iv) First footing of thickness equal to two bricks

    (v)   The parapet wall of height 500 mm
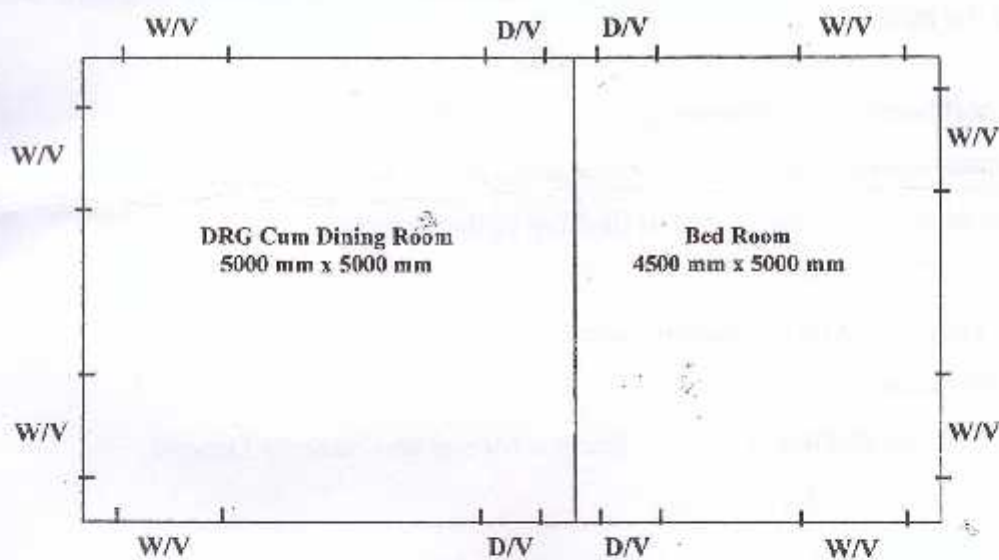

Figure 1

2(a)   Define the following in brief: [03]

    (i) SILL (ii) REVEAL (iii) JAMB (iv) Dwarf Wall (v) DPC (vi) Lintel

2(b) How will you protect the RCC Roof Slab from transferring the heat and leakage in [05] the room? Give the dimensions and description of the materials used.

2(c) Write the dimensions of the following: [04]

(i) Riser and Tread   (ii) Skirting   (iii) Width   of   Internal   and   External

Verandah   (iv) Beam on a Verandah opening of span 2000 mm

OR

2' Draw a neat sketch of the plan of a dog legged stair case as per the following data: [12]

(i) Width of Stair Case = 2200 mm

(ii) Length of Stair Case = 4500 mm

(iii) Width of Tread = 300 mm

(iv) Height of Riser = 150 mm

(v) Horizontal Gap between the flights = 200 mm

3(a) What is the purpose of rate analysis? [06]

3(b) Analyse the rates for 25 cubic metre of Reinforced Cement Concrete in beams and [06] slabs in the ratio of 1:1½:3. .

OR

3' Write short notes on the following [12]

(i) Contract Document   (ii) Earnest Money and Security Deposit

4(a) Give the detail of materials used in flooring of the room in a building [02]

4(b) What is the Carpet Area [02]

4(c) What is Frog? Give its significance also. [02]

4(d) Write short notes on: [06]

(i) Capital cost of Project   (ii)   Earnest Money and Security Deposit

5 Write short notes on the following [12]

(a) Contract Document   (b) Administrative Approval   (c) Technical and Expenditure Sanction