Seat
No.

S.E. (Civil) (Semester - III) (Revised) Examination, May - 2019
BUILDING CONSTRUCTION AND MATERIALS
Sub. Code : 63342

Day and Date : Thursday, 09 - 05 - 2019   **Total Marks : 100**
Time : 9.30 a.m. to 1.30 p.m.

Instructions : 1) All question are compulsory.
                2) Figures to the right indicates full marks.
                3) Assume suitable data if necessary.

SECTION - I

Q1) a) Explain use of ceramic, vitrified tiles, natural stone and paving in construction industry.   **[8]**

    b) Differentiate wooden formwork and steel formwork with their use.   **[8]**

Q2) a) What is composite masonry? List the types of composite masonry with their use.   **[8]**

    h) Discuss necessity and different types of lintels   **[8]**

Q3) Write Short notes (Any three).   **[18]**

    a) Roof coverings.

    b) Pile foundation.

    c) Ramp and escalator.

    d) Water proofing materials.

    e) Uses of structural steel sections.

P.T.O.

SECTION - II

Q4) Design & draw a Plan & Section passing through first flight of RCC Dog legged staircase for a Residential banglow with following data. **[25]**

a) Floor to floor height – 3200mm

b) Stair hall Size – 2600mm X 5000mm

c) Flight Width – 1200mm

(Consider suitable data as per requirement)

Q5) Draw Sectional plan ,Elevation & Sectional side view of a flush door with following data. **[25]**

a) Clear opening -1050mm X 2100mm

b) Frame size -75mm X 125mm

c) No. of Shutters -1 No.

d) Thickness of shutter –30mm

OR

Draw a Sectional Plan , Elevation & Sectional side view of a teak wood fully glazed window with ventilator at top. **[25]**

a) Size of window – 1200mmX 1650mm

b) Frame Size – 75 X 125

c) Height of ventilator – 450mm

(Consider suitable data as per requirement)

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Seat
No.

S.E. (Civil) (Part-II) (Semester - IV) (Revised)
Examination, May - 2019
BUILDING DESIGN AND DRAWING
Sub. Code: 63348

Day and Date : Friday, 24- 05 - 2019   **Total Marks : 100**
Time : 2.30 p.m. to 6.30 p.m.

Instructions :   1)   **All questions are compulsory?**
                     2)   **Figures to the right indicate full marks.**
                     3)   **Assume suitable data if required and clearly mention it.**

SECTION - I

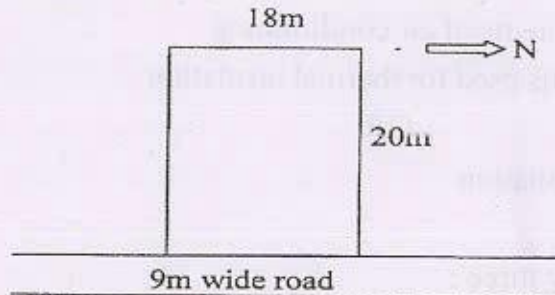**Q1)** a)   Explain the significance of Sun Path Diagram.   **[5]**

   b)   Explain : Site Selection Criteria   **[5]**

OR

Write short note on 'Grouping principle of a building planning.

Q2) Plan a bungalow (G+1) on the given plot. The requirements are as below,

18m

⟹ N

20m

9m wide road

Name of Room	Tentative Size
Living Room	4 m × 5 m
Children Bed Room	5 m × 3.5 m
Master Bed Room	3.5 m × 4.5 m
Guest Bed Room	3 m × 4 m
Verandah	2.5 × 3 m
Store	1.3 × 2.5 m
Staircase	Suitable Size

Assume any other suitable data.

P.T.O.

External walls –230 mm thick. Internal walls –150 mm thick.

Draw to a suitable scale the following :

a) Building Plans (Ground and First Floor)   [25]

b) Furniture layout of Master Bed Room   [5]

Q3) Write short notes on any two :   [10]

a) Building byelaws

b) Building Permission

c) Low cost housing

d) Concept of Green building

SECTION - II

Q4) a) Explain the types of traps used in plumbing with sketches   [10]

b) Explain two-pipe system of plumbing with sketch.   [6]

OR

Explain the concept of Earthing.

Q5) a) Explain the components of air conditioning.   [10]

b) Explain the materials used for thermal insulation.   [6]

OR

Explain: Sound Insulation

Q6) Write short notes on any three :   [18]

a) Types of wiring

b) Characteristics of good plaster

c) Necessity of ventilation

d) Types of paints

e) Rainwater harvesting.

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SV - 32

Total No. of Pages : 2

S.E. (Civil) (Semester - III) (Revised)
Examination, May - 2019
BUILDING CONSTRUCTION AND MATERIALS
Sub. Code : 63342

Day and Date : Thursday, 09 - 05 - 2019
Time : 9.30 a.m. to 1.30 p.m.

Total Marks : 100

Instructions :   1)   All question are compulsory.
              2)   Figures to the right indicates full marks.
              3)   Assume suitable data if necessary.

SECTION - I

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   b) Differentiate wooden formwork and steel formwork with their use.   **[8]**

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   b) Discuss necessity and different types of lintels.   **[8]**

Q3) Write Short notes (Any three).   **[18]**

   a)   Roof coverings.

   b)   Pile foundation.

   c)   Ramp and escalator.

   d)   Water proofing materials.

   e)   Uses of structural steel sections.

P.T.O.

SECTION - II

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b) Stair hall Size – 2600mm X 5000mm

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(Consider suitable data as per requirement)

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a) Clear opening -1050mm X 2100mm

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c) No. of Shutters -1 No.

d) Thickness of shutter –30mm

OR

Draw a Sectional Plan , Elevation & Sectional side view of a teak wood fully glazed window with ventilator at top.   **[25]**

a) Size of window – 1200mmX 1650mm

b) Frame Size – 75 X 125

c) Height of ventilator – 450mm

(Consider suitable data as per requirement)

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Seat
No.

S.E. (Civil) (Semester - IV) (Rivesed) (Part - II)
Examination, May - 2019
STRUCTURAL MECHANICS
Sub. Code: 63344

Day and Date : Tuesday, 14- 05 - 2019   Total Marks : 100
Time : 2.30 p.m. to 5.30 p.m.

Instructions :   1)   All the questions are compulsory.
                  2)   Figures to the right indicate maximum full marks for the question
                  3)   Neat sketches should be drawn whenever necessary.
                  4)   Use of Non-Programmable calculator is allowed.
                  5)   Assume any suitable data, if required and state it clearly

SECTION - I

Q1) a)   Explain :   **[4]**

   i)   Principal Plane

   ii)   Principal Stresses

   b)   At a certain point in a strained material the stresses on two planes at right
         angles to each other are 20 N/mm^2 and 10 N/mm^2 both tensile. They are
         accompanied by a shear stress of a magnitude 10 N/mm^2. Find the location
         of principal plane and evaluate principle stress also find magnitude of
         maximum shear stress.   **[12]**

Q2) a)   Explain condition of no tension for solid rectangular section   **[5]**

   b)   A masonary dam 9m high, 2m wide at top and 7m wide at base retains
         water to the full height. The water face of the dam is vertical. Determine
         extreme pressure intensities at the base. Density of Water and Mosonary
         are 9810 N/m^3 and 22500 N/m^3 resp. also find extreme pressure intensities
         at the base of dam when dam is empty.   **[13]**

OR

P.T.O.

A tapering chimney of hollow circular cross section is 30m high. Its external diameter at the base is 2.4m and at the top is 1.6m. the chimney is subjected to uniform wind pressure of 2200 N/m² on the projected area. If the weight of the chimney is 4000 KN and internal diameter at the base is 0.8m. Determine the Maximum and Minimum stress intensities at base.

a) Explain Muller Breslau principal. [4]

b) Construct influence line diagram of the beam shown in fig. 3.1 for [12]

   i) Reaction at B   ii) Reaction at D
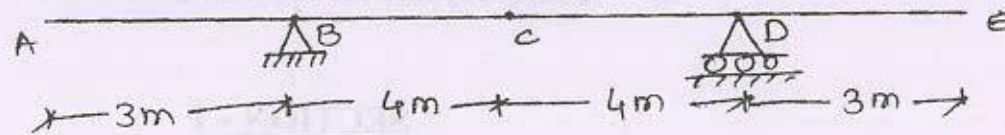
   iii) Moment at C   iv) Shear force at C

Fig 3.1

SECTION - II

l) a) State salient features of Macaulay's method. [4]

b) A beam ABCD is simply supported at A and D. Beam carries a point load of 20KN at point B and a UDL of 10 KN/m from C to D. Span AB = CD = 1m, & span CD = 2m. Determine. [14]

   i) Deflection at C

   ii) Maximum deflection

   iii) Slope at A

Use Macaulay's Method Take $E = 200 \times 10^6$ KN/m² and $I = 20 \times 10^{-6}$ m⁴

OR

Find slope and deflection at A, B, C, and D of the beam shown in figure 4.1 by using conjugate beam method. Take $I = 2 \times 10^{10}$ mm⁴ and $E = 2 \times 10^5$ N/mm².
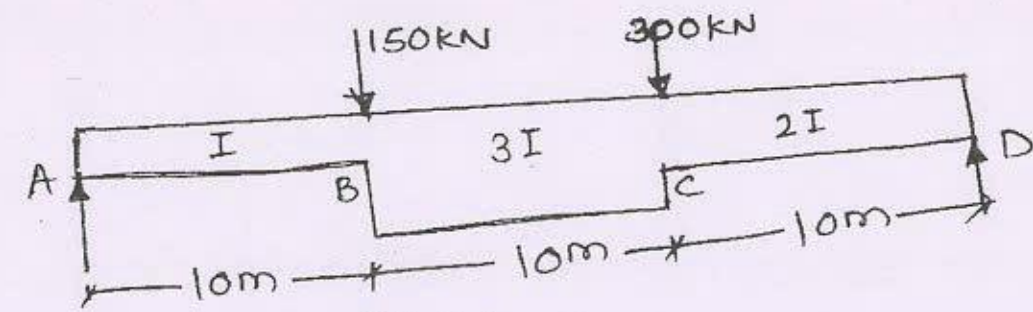
Fig. 4.1

i) a) Explain any two theories of failure [4]

b) A solid circular shaft transmits 2250 KN at 400 rpm and also subjected to a bending moment of 30 KN-m at a section find. [12]

   i) Equivalent Bending moment

   ii) Equivalent twisting moment

   iii) Minimum diameter of shaft if maximum shear stress is limited to 63 N/mm²

i) a) What are the assumptions made in Euler's Formula [4]

b) A hollow CI column is 9m long and is fixed at both ends. The external diameter of the column is 80cm and internal diameter is 32cm. calculate 1) Safe load using Rankine's formula using FOS of 4. 2) Ratio of Euler's and Rankine's critical loads. [12]

Take 6c = 550mpa, $E = 9.4 \times 10^4$ Mpa, a = 1/1600, FOS = 4

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S. E. (Civil), (Part - II)
(Semester - IV) Examination, May - 2019
FLUID MECHANICS - II (Revised)
Sub. Code : 63347

Day and Date : Wednesday, 22 - 05 - 2019   **Total Marks : 100**
Time : 2.30 p.m. to 5.30 p.m.

Instructions :   1)   Question No. 1 and No. 5 are compulsory.
                   2)   Out of remaining attempt any two questions from each section.
                   3)   Figures to the right indicate full marks.
                   4)   Assume suitable data if necessary and state it clearly.

SECTION - I

Q1) Attempt the following: **[4×5=20]**

a)   What do you understand by uniform and non-uniform flow in the case
      of channels?

b)   An open channel is V shaped, each side being inclined at 45° to the
      vertical. If it carries a discharge of 0.04 m³/sec, When the depth of flow
      at the centre is 225mm. Calculate the slope of the channel assuming that
      Chezy's C=50.

c)   Write the assumption of dynamic equation of gradually varied flow?

d)   Define 'Hydraulic jump' and state its applications.

Q2) Attempt the following: **[3×5=15]**

a)   A trapezoidal channel has a bed width of 3 m and side slopes of 1:1. The
      bottom slope of the channel is 0.0036. If a discharge of 15 m³/sec passes
      in this channel at a depth of 1.25 m, estimate the value of Chezy coefficient.

b)   An earthen trapezoidal channel with a base width 2 m and side slope 1
      horizontal to 2 vertical. Carries water with a depth of 1m. The bed slope
      is 1 in 625. Calculate the discharge if n = 0.03 Also calculate the average
      shear stress at the channel boundary.

P.T.O.

c) Making use of the condition of specific energy show that 'At the critical flow state, velocity head is equal to half the hydraulic depth.'

) a) Show that for a rectangular channel $y_c = \left(\dfrac{q^2}{g}\right)^{\frac{1}{3}}$ **[8]**

and also prove that $E = \left(\dfrac{3}{2}\right) y_c$

where Yc = critical depth

q = discharge per unit width

E = specific energy

g = gravitational acceleration

b) Give in detail classification of channel bottom slopes in non uniform flow in channels. **[7]**

) Write short note on **[15]**

a) Spatially varied flow

b) Practical applications of hydraulic jump.

c) M_3 curve

SECTION - II

5) Attempt the following: **[4×5=20]**

a) Write advantages of triangular notch over rectangular notch.

b) Derive an expression for the force exerted by the jet at centre on a stationary curved plate.

c) Draw the schematic diagram of single jet pelton wheel and name the part.

d) Write a note on priming of a centrifugal pump.

5) a) The maximum flow through a rectangular flume 1.8 m wide and 1.2m deep is 1.65m³/sec. It is proposed to install a suppressed sharp crested rectangular weir across the flume to measure flow. Find the maximum height at which the weir crest can be placed in order that water may not overflow the sides of the flume. Assume cd = 0.6 Consider

i) Velocity approach

ii) Without velocity approach. **[10]**

b) Derive an expression for a discharge over a sharp crested triangular weir. **[5]**

7) a) Derive an expression for work done and efficiency of a water wheel having flat plates and show that its maximum efficiency is 50%. **[8]**

b) A jet of water 5 cm in diameter having a velocity of 25 m/sec strikes normally a smooth flat plate. Determine the thrust when

i) The plate is stationary.

ii) Moving with a velocity of 5 m/sec in the direction of jet.

What is the work done per sec by the jet in each case? **[7]**

3) a) Write a note on selection of turbines? **[5]**

b) What is a draft tube? What are its functions? **[5]**

c) Write short note on NPSH - centrifugal pump. **[5]**

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S.E. (Civil) (Semester - III) (Revised)
Examination, May - 2019
FLUID MECHANICS - I
Sub. Code : 63341

Day and Date : Tuesday, 07 - 05 - 2019   **Total Marks : 100**
Time : 10.00 a.m. to 1.00 p.m.

Instructions :   1)   Attempt any three questions from each section.
                  2)   Assume necessary data if not given.

SECTION - I

Q1) a) Define the following fluid properties & mention their practical evidences.
Viscosity, capillarity & vapour pressure.   [6]

b) The space between two parallel plates is filled with oil. Each plate has
size 60cm × 60cm. The thickness of the oil film is 12.5mm. The lower
plate is stationary & upper plate is moving with velocity 2.5m/s requires
a force 98.1N to maintain the speed, determine,   [6]

i)   The dynamic viscosity &

ii)   kinematic viscosity of oil.

c) Using Buckling ham's π theorem show that the velocity through a circular

orifice is given by, $V = \sqrt{2gH}\, \phi\left(\dfrac{D}{H} \quad \dfrac{\mu}{\rho} \right)$ where H is head causing how, D

is diameter of orifice, μ is coefficient of viscosity, ρ is mass density & g
is gravitational acceleration.   [6]

Q2) a) A cubical tank has sides of 1.5m. It contains water for the lower 0.6 m
depth. The upper remaining part is filled with oil of specific gravity 0.9.
Calculate the force acting on one vertical side of the tank & position of
centre of pressure. Draw pressure diagram.   [8]

b) State the conditions of equilibrium of a floating object. How the
metacentric height is determined experimentally & analytically. Draw
necessary sketches.   [8]

P.T.O.

Q3) a) What are different types of flow ? Explain with practical examples. **[8]**

b) If for a two dimensional potential flow, the velocity potential is given by $\phi = x(2y-1)$, determine the velocity at a point P(4,5). Determine also the value of stream function at point P. **[8]**

Q4) Write short notes on any 4 **[16]**

a) Similitnde and model laws.

b) Static pressure acting on Curved Surface.

c) Pressure measurement devices.

d) Three dimensional continuity equation.

e) Flow net: construction & use.

SECTION - II

Q5) a) Derive an expression for for Euler's equation along a streamline & further derive Bernoulli's equation what are the assumptions made. **[6]**

b) What is venturimeter? Draw Sketch. An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm and throat diameter 10cm. The oil mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through the horizontal venturimeter Take Cd = 0.98. **[6]**

c) Draw neat sketch of orifice. What are different hydraulic coefficients of orifice. How to determine them. **[6]**

Q6) a) Explain Reynolds's experimental with sketch. Differentiate Laminar flow & Turbulent flow w.r.t losses & velocity distribution. **[8]**

b) Find the displacement thickness, momentum thickness & energy thickness for the velocity distribution in boundary layer given by $\dfrac{u}{U} = \dfrac{y}{\delta}$. Also calculate the value of $\dfrac{\delta}{\theta}$. **[8]**

Q7) a) Derive the expression to find major loss in pipe flow what are different minor losses in pipe flow? State expression for each. **[8]**

b) Two pipes of diameter 50mm & 100mm, each of length 100m are connected in parallel between two reservoirs which have a difference of level of 10m. Take f = 0.32 for both the pipes. Calculate the rate flow in each pipe & also the diameter of single pipe 100m long which would give the same discharge, if it were substituted for the original two pipes. **[8]**

Q8) Write short notes on any 4 **[16]**

a) Pitot tube & orificemeter.

b) Hagen Poiseulle formula for pressure drop in viscous flow through pipe.

c) Hydrodynamically smooth & rough pipes.

d) Moody's chart.

e) Separation of Boundary layer.

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Seat No.

S.E. (Civil Engg.) (Semester - III) Examination, April - 2019
ENGINEERING MATHEMATICS-III
Sub. Code: 63338

Day and Date : Friday, 26 - 04 - 2019   **Total Marks : 100**
Time : 10.00 a.m. to 1.00 p.m.

Instructions :   1)   All questions are compulsory.
                 2)   Figures to the right indicate full marks.
                 3)   Use of calculator is allowed.

SECTION-I

Q1) Solve any three of the following.   **[18]**

    a) $\left(D^2 + 2\right)y = x^2 e^{3x}$

    b) $\left(D^2 - 1\right)y = x \sin x$

    c) $\left(D^2 + 3D + 2\right)y = \sin e^x$

    d)   A light horizontal strut AB is freely planned at A & B. It is under the action of equal and opposite compressive forces P at its ends and it carries a load W at the centre. Then for $0 < x < l/2$, the differential equation is $EI \dfrac{d^2 y}{dx^2} + Py + \dfrac{1}{2}Wx = 0$

        If y=0 when x = 0 and $\dfrac{dy}{dx} = 0$ when x=l/2,

        Prove that $y = \dfrac{W}{2p}\left[\dfrac{\sin nx}{n \cos\left(nl/2\right)} - x\right]$ Where $n^2 = \dfrac{P}{EI}$.

P.T.O.

2) Attempt any two of the following. [16]

a) Find the directional derivative of $\phi = 2x^3 y - 3y^2 z$ at p(1,2,–1) in the direction of Q(3,–1,5). In What direction from P is the directional derivative maximum? Find the magnitude of maximum directional derivative.

b) Show that the vector field $\bar{F} = \left(6xy + z^3\right)i + \left(3x^2 - z\right)j + \left(3xz^2 - y\right)k$ is irrotational and find its scalar potential. Also find the constant a if $\bar{F} = (x + 3y)i + (y - 3z)j + (az + x)k$ is Solenoidal.

c) Prove that i) $\nabla \cdot (\bar{a} \times \bar{r}) = 0$ ii) $\nabla \cdot \left(\dfrac{\bar{a} \times \bar{r}}{r}\right) = 0$

iii) $\nabla \times (\bar{a} \times \bar{r}) = 2\bar{a}$

Where $\bar{a} = a_1 i + a_2 j + a_3 k$ and $\bar{r} = xi + yj + zk$

)3) Attempt any two of the following. [16]

a) Fit the curve y=ab^x to the following data

x: 1   2   3   4   5   6   7   8
y: 1   1.2   1.8   2.5   3.6   4.7   6.6   9.1

b) Fit a second degree curve to the following data.

x: 1   2   3   4   5   6   7   8   9
y: 2   6   7   8   10   11   11   10   9

c) Find the two lines of regression from the following data.

x: 65   66   67   67   68   69   70   72
y: 67   68   65   66   72   72   69   73

SECTION-II

)4) Attempt any two of the following. [16]

a) The probability that a pen manufactured by a company will be defective is $\left(\dfrac{1}{10}\right)$. If 12 such pens are manufactured, find the probability that

i)   exactly two will be defective.
ii) at least two will be defective.
iii) none will be defective
iv) not more than two will be defective.

-2-

b) A random variable X has the following probability distribution.

x	0	1	2	3	4	5	6	7
p(x)	0	k	2k	2k	3k	k²	2k²	7k²+k

Find k. find p(x<6), p(x≥6), p(3<x≤6)

c) In a certain factory turning razor blades, there is small chance of $\dfrac{1}{500}$ for any blade to be defective. The blades are in packets of 10. Use Poisson distribution to calculate the number of packets containing

i)   no defective
ii) one defective
iii) 2 defective blades in a consignment of 1000 packets.

Q5) Attempt any Three of the following. [18]

a) Find the Laplace transform of $e^{-4t} \sinh t \sin t$

b) Find the inverse Laplace transform of $\dfrac{1}{(s^3 + 1)}$.

c) Find the inverse Laplace transform of $\dfrac{1}{(s^2 + 4)(s + 1)^2}$ using convolution theorem.

d) Use Laplace transform to solve $(D^2 + 2D + 5)y = e^{-t} \sin t$ where y(0)=0 and y' (0)=0.

Q6) Attempt any Two of the following: [16]

a) Show that the real and imaginary parts of the function w=logz satisfy the Cauchy-Riemann equations when z is not zero. Find its derivative.

b) Show that the function v(x,y) =e^x siny is harmonic. Find its conjugate harmonic function u(x,y) and the corresponding analytic function f(z).

c) find the value of the integral $\int_0^{1+i} \left(x - y + ix^2\right) dz$

i)   along the straight line from z=0 to z=1+i
ii) along the real axis from z=0 to z=1and then along a line parallel to the imaginary axis from z=1 to z=1+i

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Seat
No.

S.E. (Civil) (Semester - III)
Examination, May - 2019
SURVEYING-I
Sub. Code : 63339

Day and Date : Thursday, 02 - 05 - 2019   Total Marks : 100

Time : 10.00 a.m. to 01.00 p.m.

Instructions : 1)   Answer any Three questions from Each section.
2)   Figures to the right indicate full marks.
3)   Assume suitable data if necessary and state them clearly.
4)   Answers shall be supported by adequate sketches.

SECTION - I

Q1) a)   Explain theory of reciprocal leveling with suitable derivation.   [9]

b)   Derive the expression for correction for curvature and refraction.   [9]

Q2) a)   A leveling instrument was set up exactly midway between two pegs P and Q 100 m apart. The staff reading on P and Q was 1.875 m and 1.790 m respectively. The instrument was then set up at a distance of 10 m from P on line QP. The corresponding staff readings were 1.630 m and 1.560 m. Calculate the correct staff reading on P and Q when the line of collimation is exactly horizontal.   [8]

b)   Explain various methods for determination of planimeter constant.   [8]

Q3) a)   The following perpendicular offset were taken at 10 m interval from a survey line to an irregular boundary line –3.82, 4.37, 6.82, 5.26, 7.59, 8.90, 9.52, 8.42 and 6.43 m. Calculate area enclosed between survey line and irregular boundary by   [8]

i)   Simpson's Rule

ii)   Trapezoidal Rule

iii) Average ordinate Rule

b)   What is the principal of plane table surveying? What is orientation of plane table? Explain different method.   [8]

P.T.O.

Q4) Write short note on: [16]

a) Interpolation of contours

b) Principle of equating BS and FS

c) Auto Level

d) Resection in plane table surveying

SECTION - II

Q5) a) Give the functions of following parts of a Transit Theodolite. [5]

    i) Upper tangential screw

    ii) Lower tangential screw

    iii) Shifting head

    iv) Vertical circle clamp screw

    v) Altitude bubble tube

b) Explain the method of repetition with reference to [2+4+2]

    i) Its applicability

    ii) Procedure and reading with an arbitrary example

    iii) Errors eliminated

c) Give the stepwise procedure to measure whole circle bearing of a line [4]

Q6) a) Following is the table of lines, their lengths and whole circle bearings of the traverse ABCDEA. Calculate the missing data of EA. [10]

Line	AB	BC	CD	DE	EA
Length in metres	190.50	201.50	165.50	172.50	?
Whole circle Bearings	85°	15°	286°	195°	?

b) Discuss the various rules for balancing a closed traverse. Also, indicate the situations where they are appropriate. [4+2]

Q7) a) What do you understand by the term Sounding? Discuss the various available methods for making soundings. [2+6]

b) Explain the construction and use of Box sextant. [4]

c) Explain the Reconnaissance survey to be carried out for a new railway alignment. [5]

Q8) a) In order to determine the elevation of top of a flag mast, following observations were taken. Stations A, B and flag mast are in same vertical plane. Find the reduced level of tip of flag mast. [8]

Instrument Station	Staff Reading on BM	Vertical angle	Remarks
A	1.260	19°22'	RL of BM is 145.000 m
B	1.085	7°15'	Distance AB is 50 m

b) Differentiate between [8]

    i) Dependent and Total co-ordinates

    ii) Radiating and parallel ranges

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Table 4 (IS 456 - 2000)

Minimum Cement Content, Maximum Water - Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size

Sr. No.	Exposure	Reinforced Concrete		
		Minimum Cement Content kg/m^3	Maximum Free W/C Ratio	Minimum Grade of Concrete
i)	Mild	300	0.55	M20
ii)	Moderate	300	0.50	M25
iii)	Severe	320	0.45	M30
iv)	Very Severe	340	0.45	M35
v)	Extreme	360	0.40	M40

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S.E. (Civil Engineering) (Semester - IV) (Revised) Examination, May - 2019
CONCRETE TECHNOLOGY
Sub. Code : 63346

ay and Date : Monday, 20 - 05 - 2019   **Total Marks : 100**
ime : 2.30 p.m. to 5.30 p.m.

structions :   1)   All questions are compulsory.
           2)   Assume suitable data if necessary.
           3)   Figures to the right indicate full marks.

SECTION - I

1) a)   Enlist the types of cement. Explain suitability of any three types. **[8]**

    b)   Explain the role of aggregates in concrete. State the requirements of good aggregate. **[8]**

2) a)   Explain the importance of compaction of concrete. Explain various methods of compaction. **[8]**

    b)   Define workability of concrete. Enlist the tests for measuring workability. Explain any one test with sketch. **[8]**

OR

    b)   Explain the conditions where the following admixtures are used, **[8]**

       i)   Superplasicizers

       ii)   Accelerators

       iii)   Fly ash

       iv)   Silica fume

a) Explain the factors affecting the strength of concrete. [9]

b) What is shrinkage of concrete? Explain the types of shrinkage. [9]

SECTION - II

) Write notes on any Three. [18]

a) Hot weather concreting

b) High performance concrete

c) PQC

d) High density concrete

i) a) Explain how permeability affects the durability of concrete. Explain the factors affecting permeability of concrete. [8]

b) Explain different exposure conditions as per IS 456-2000. [8]

OR

b) Enlist various non - destructive tests conducted on hardened concrete. Explain one test in detail with sketch. [8]

i) Design M 30 concrete using the following data as per IS: 10262 – 2009 guidelines. [16]

Exposure condition -- Severe for R.C.C.

Type of cement – O.P.C. 43 Grade

Workability – 100 mm slump

Specific gravity of cement – 3.15

Specific gravity of coarse aggregate –2.8

Specific gravity of fine aggregate –2.7

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Water absorption of coarse aggregate –0.33%

Water absorption of fine aggregate – 1.20%

Surface moisture on coarse aggregate – 0.20%

Surface moisture on coarse aggregate –2.00%

Sand conforming to Zone I of IS 383–1970

Standard deviation – 5 N/mm^2

Table 2 (IS 10262 - 2009)

Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate

Nominal Maximum Size of Aggregate	Maximum Water Content kg
10	208
20	186
40	165

Table 3 (IS 10262 - 2009)

Volume of Coarse Aggregate per Unit Volume of Concrete for Different Zones of Fine Aggregate

Nominal Maximum size of Aggregate (mm)	Volume of Coarse Aggregate per Unit Volume of Concrete for Different Zones of Fine Aggregate			
	Zone IV	Zone III	Zone II	ZoneI
10	0.50	0.48	0.46	0.44
20	0.66	0.64	0.62	0.60
40	0.75	0.73	0.71	0.69

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