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END SEMESTER EXAMINATION, JANUARY-2018**PROGRAM : DIPLOMA FIRST SEMESTER****COURSE CODE : DMCT105****COURSE TITLE : BASIC MECHANICAL AND CIVIL ENGINEERING****[Time allotted: Three hours]****[Max. Marks : 100]****Note:** Attempt all Sections & Questions.**Section (A)****(2 x 10 = 20)****Q. 1.** Attempt all questions.

- a. Write any two methods for selection of engineering materials?
- b. Define Tidal and Celestial source of energy?
- c. How will you differentiate between fine and coarse aggregate?
- d. Write any two terms used in casting?
- e. Explain endogenous trees?
- f. What are different types of manufacturing processes?
- g. What is the role of steel in concrete?
- h. What do you mean by mechanism?
- i. Define the function of roller bearing?
- j. Mention different types of welding flames and their operating temperatures?

Section (B)**(7 x 5 = 35)****Q. 2.** Attempt any 5 questions.

- a. What do you mean by bitumen, where it is used? Also write any one test performed on it.
- b. Explain the working of four stroke petrol engine in detail?
- c. Write and explain all the ingredients of varnish.
- d. Explain the process of casting in detail? Also mention its advantages and disadvantages?
- e. What do you mean by glass? Explain with suitable example, also write its properties?
- f. Draw and explain various energy sources and their application in detail?
- g. Explain nuclear and tidal energy power generation systems in detail.

Section (C)**(15 x 3 = 45)**

Attempt any 3 questions.

- Q. 3.**
 - a. What are the characteristics of an ideal paint? Also give the various examples of paints. (7.5)
 - b. Explain the various steps involved in the manufacturing of a brick. Also write the composition of a good brick earth. (7.5)
- Q. 4.**
 - a. Explain and give details about different types of bearing and types of keys with diagram? (7.5)
 - b. Explain difference between Spark ignition and Combustion ignition engine in detail? (7.5)
- Q. 5.**
 - a. Explain soil with the help of a suitable phase diagram. Also explain Unified Soil Classification System. (7.5)
 - b. What do you mean by concrete? Define all its ingredients also explain the process of curing on concrete. (7.5)
- Q. 6.**
 - a. Explain machine parts like V-Belt, Coupling, shaft and axle in detail? (7.5)
 - b. Explain fasteners and their types in detail? Also explain advantages and disadvantages of flat belt in detail? (7.5)
- Q. 7.**
 - a. What are the different modes of transportation? Explain the various classification of road. (7.5)
 - b. Write notes on: (7.5)
 - i. Classification of ferrous and non-ferrous metal
 - ii. Gear and Gear trains

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END SEMESTER EXAMINATION, JANUARY-2018
PROGRAM : DIPLOMA(CE) THIRD SEMESTER

COURSE CODE : DCET 205**COURSE TITLE : BUILDING CONSTRUCTION****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt **all** questions:**(2 x 10 = 20)**

- a. What are causes of dampness?
- b. How can we determine the width of foundation if we use 30cm wall?
- c. Write names different type of floor, explain requirement of good roof.
- d. What is roof?
- e. Define ventilator.
- f. Write the types of window based on position, also draw any one.
- g. What is lintel, draw figure of brick lintel?
- h. How we lay Arch over centering while construction of arch.
- i. Draw a neat figure of Horse Shoe and Semi Elliptical Arch.
- j. Write the function of wall.

Section (B)

Q. 2. Attempt **any 5** questions.**(7 x 5 = 35)**

- a. Write difference between bat and closure, explain English and Flemish bond in detail.
- b. Write a note on foundation and its function; classify pile foundation according to material.
- c. Explain method of bonding old brick work with new brick work
- d. Explain any seven types of buildings.
- e. Explain methods of DPC.
- f. Write the elements of Stairs.
- g. Explain any seven elements of Arch.

Section (C)

Attempt **any 3** questions.**(15 x 3 = 45)****Q.3.** Explain different types of stone masonry with neat sketches.

Q.4. a. Discuss English and Flemish bond used in brick masonry. Also sketch various types of bond.
b. Explain the different components of building in brief.

Q.5. a. Write about the construction of arch in detail.
b. Write about RCC and Steel Lintels.

Q.6. Write in detail about the door and window types.

Q.7. a. Write any Seven Elements of Pitch Roof.
b. Write a note on bounding of building blocks, how we break vertical bond in masonry.

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END SEMESTER EXAMINATION, JANUARY-2018
PROGRAM : DIPLOMA (CE) THIRD SEMESTER

COURSE CODE : DCET201**COURSE TITLE : SURVEYING-I****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**Section (A)****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- If magnetic bearing of a line is $42^{\circ}15'$. Calculate the true bearing if the magnetic declination is $4^{\circ}24'$ East
- What is plane and geodetic surveying?
- How do you check interior and exterior angle of a traverse?
- Define latitude and departure.
- What is accidental error?
- What do you mean by ranging?
- Convert the following quadrantal bearing to whole circle bearing
 - $S59^{\circ}20'W$
 - $N37^{\circ}18'W$
 - $N47^{\circ}67'E$
 - $S24^{\circ}32'E$
- Write name only 4 methods of plane table surveying.
 - Write the length & no of links of Gunter's chain, Engineer's chain.
- Convert the following whole circle bearing to quadrantal bearing
 - $137^{\circ}22'$
 - $287^{\circ}29'$
 - $79^{\circ}24'$
 - $140^{\circ}35'$

Section (B)**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- Explain various types of tapes
- The following bearings were observed in running a closed traverse

Line	F.B.	B.B
AB	$71^{\circ}05'$	$250^{\circ}20'$
BC	$110^{\circ}20'$	$292^{\circ}35'$
CD	$161^{\circ}35'$	$341^{\circ}45'$
DE	$220^{\circ}50'$	$40^{\circ}05'$
EA	$300^{\circ}50'$	$121^{\circ}10'$

Find out the correct interior angles.

- Explain various temporary adjustments of a level
- Write name of various tape corrections in which cumulative error is positive and also write their correction
- Find the missing terms:

Line	PQ	QR	RS	ST	TP
Length	200	210	190	195	?
Bearing	$87^{\circ}30'$	$20^{\circ}20'$	$280^{\circ}0'$	$210^{\circ}3'$	?

- Explain the following:
 - How entries are made in a field book?
 - How can you check the difference of level between two sides of a river?
- Explain the radiation method of plane table surveying.

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

Q. 3. a. Explain the following:

- i. Latitude and Departure
- ii. W.C.B system and Q.B. system
- iii. Plan and Map
- iv. Curvature and Refraction correction

(8)

b. The interior angles of a traverse are given below:

(7)

$\angle A = 114^\circ 51'$ $\angle B = 114^\circ 30'$ $\angle C = 108^\circ 15'$ $\angle D = 90^\circ 45'$ $\angle E = 111^\circ 39'$. If the bearings of line AB is $N36^\circ 45'W$, find the bearings of the remaining lines of the traverse.

Q.4.

a. Explain various types of instruments need in chain survey with their use.

(8)

b. Explain the following:

(7)

- i. Bench mark
- ii. Reduced level
- iii. True bearing
- iv. Magnetic bearing
- v. Local attraction
- vi. Magnetic declination
- vii. Cross staff and leveling staff

Q.5.

a. In leveling between two points A and B on opposite sides of a river, the level was set up near A and the staff readings on A and B were 2.642 and 3.228m respectively. The level was then moved and set up near B, the respective staff readings on A and B were 1.086 and 1.664. Find the true difference in level of A and B.

(8)

b. Write down the importance of surveying in the field of civil engineering

(7)

Q.6.

a. Explain the temporary adjustment of prismatic compass.

(6)

b. A steel tape 20 m long standardized at $55^\circ F$ with a pull of 10 kg was used for measuring abase line. Find the correction per tape length, if the temperature at the time of measurement was $80^\circ F$ and pull exerted was 16 kg. Weight of 1 cubic cm of steel is 7.86 g, weight of tape is .8 kg and $E = 2.1 \times 10^6 \text{ kg/cm}^2$. Coefficient of expansion of tape per $1^\circ F$ is 6.2×10^{-6} .

(9)

Q.7.

a. Differentiate between prismatic and surveyor's compass

(5)

b. The following staff readings were observed successively with a level, the instrument having been moved after eighth, sixth and third readings. Readings are 2.218, 1.626, 0.998, 2.090, 2.764, 1.362, 0.662, 1.992, 1.054, 2.694 m. Enter the readings in a level book and calculate the R.L. of points if first reading was taken with a bench mark of 432.484 m. Solve by rise and fall method.

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END SEMESTER EXAMINATION, JANUARY-2018
PROGRAM : DIPLOMA(CE) THIRD SEMESTER

COURSE CODE : DCET202**COURSE TITLE : CONSTRUCTION MATERIAL****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

Section (A)

Q.1. Attempt all the questions**(2 x 10 = 20)**

- a. Write the name of four bouges compounds.
- b. What are sedimentary rocks?
- c. Write different types of steel.
- d. Write two characteristic of an ideal paint.
- e. What is low heat cement?
- f. What are different processes of manufacturing of brick earth.what are different types of moulding process?
- g. Write two applications of lime.
- h. What are deciduous trees?
- i. Why is seasoning of timber done?
- j. Write the write down four common building stones.

Section (B)

Q.2 Attempt any 5 questions**(7 x 5 = 35)**

- a. Write down and explain five different properties of common building stones.
- b. How manufacturing of brick is done? Explain any two processes briefly.
- c. What are different laboratory test for testing of cement? Explain any two.
- d. What are different classification of trees on the basis of modes of their growth?
- e. Why preservation of timber is done? What are main properties of its treatment?
- f. What are paints? Write down the five characteristics of an ideal pain.
- g. Explain the process of casting cast iron. Write down the properties of cast iron.

Section (C)

Attempt any 3 questions**(15 x 3 = 45)**

- Q.3.**
 - a. Explain all the ingredients of lime? Write down its applications.
 - b. Explain mortar? What are the properties imparted by binding materials?
- Q.4.**
 - a. Explain the burning process of bricks? What are the different types of kiln? Explain bull's trench kiln.
 - b. What is the chemical classification of rocks? Explain the uses of any five building stones.
- Q.5.**
 - a. Explain different process of seasoning of tree? Write down different defects of timber.
 - b. How preservation of timbers can be done? Explain all the processes?
- Q.6.**
 - a. What are the different defects due to natural processes? Explain shakes defects with diagram? Draw the diagram of defects due to seasoning?
 - b. Explain all the parts of a tree cross-section with suitable diagram.
- Q.7.**
 - a. What are the BOGUES compounds? Explain all.
 - b. What are the field and lab tests of cement? Explain any three.

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END SEMESTER EXAMINATION, JANUARY-2018

PROGRAM : DIPLOMA(CE) FIFTH SEMESTER

COURSE CODE : DCET204

COURSE TITLE : APPLIED MECHANICS

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions. (2 x 10 = 20)

Explain the following:

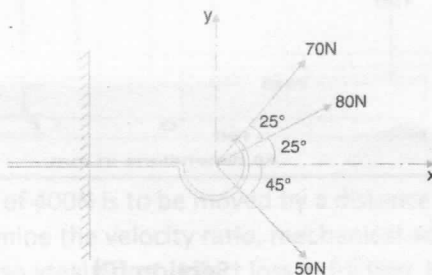
- Dynamics & Kinematics
- Continuum
- Newton's Second Law of mechanics
- Parallelogram Law
- Varignon's Theorem
- Couple
- Limiting Friction & Co-efficient of friction
- Cone of friction
- Types of support for beam
- Mechanical advantage & velocity ratio

Section (B)

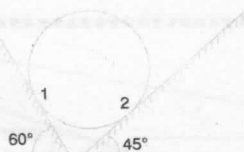
Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

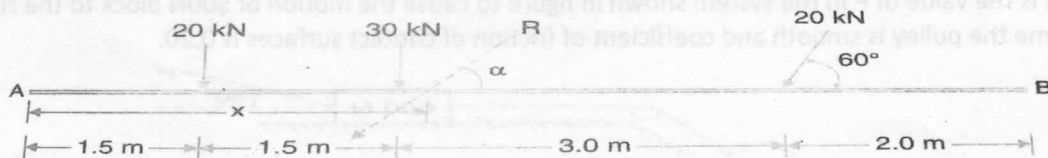
- a. What are the concurrent forces? Determine the resultant of the three forces acting on a hook as shown in figure.



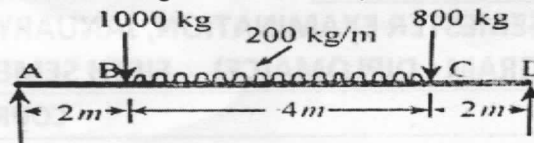
- b. A 200N sphere is resting in a trough as shown in figure determine the reactions developed at contact surfaces. Assume all contact surfaces are smooth.



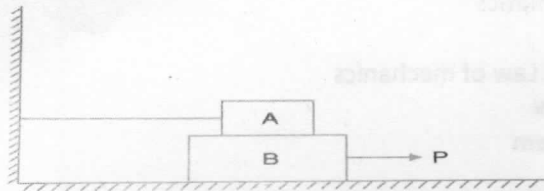
- c. Determine magnitude (R), direction (α) and the point of application (x) of the resultant of system of forces acting on a beam as shown in figure.



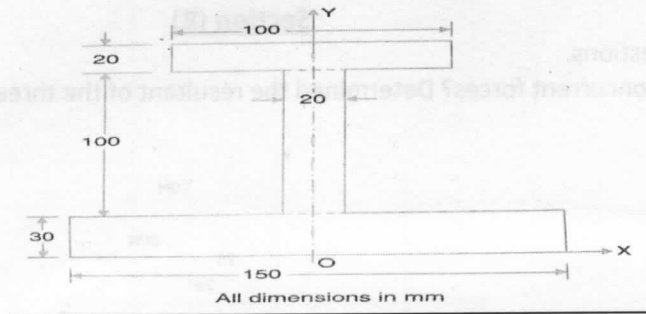
- d. Calculate the shear force and Bending moment at the points A,B,C,D for the following beam.



- e. Block A weighing 1000N rests over block B which weighs 2000N as shown in figure. Block A is tied to wall with a horizontal sting. If the coefficient of friction between blocks A & B is 0.25 and between B & floor is $\frac{1}{3}$, what should be the value of P to move the block if P is horizontal.



- f. Derive the expression for Centroid of a Semicircle of Radius R.
- g. Find the centroid of the I section as shown in figure.

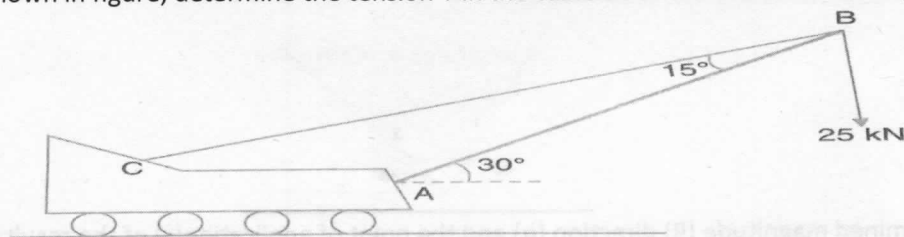


Section (C)

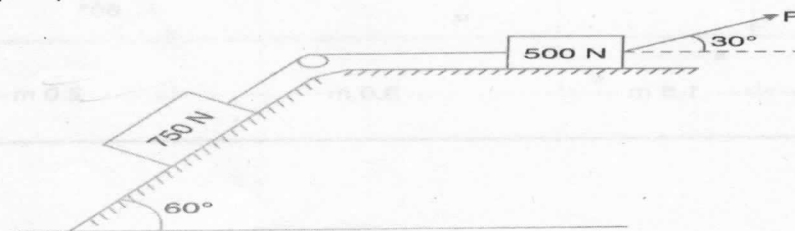
Attempt **any 3** questions.

(15 x 3 = 45)

- Q. 3. a. The 12 m boom AB weighs 10kN, the distance of the centre of gravity G being 6 m from hinge A. For the position shown in figure, determine the tension T in the cable BC and the reaction at hinge A. (7.5)



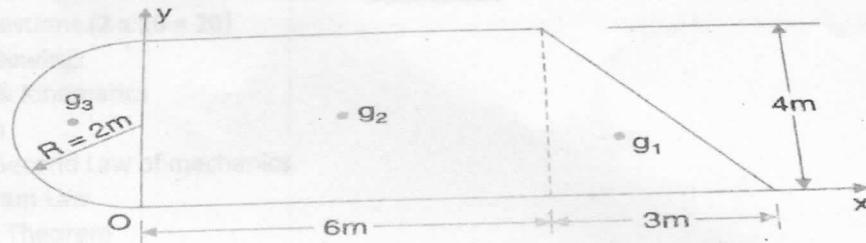
- b. What is the value of P in the system shown in figure to cause the motion of 500N block to the right side? Assume the pulley is smooth and coefficient of friction of contact surfaces is 0.20. (7.5)



Q. 4. a. What is a pulley? Explain the classification of pulley in detail with proper diagram. (7.5)

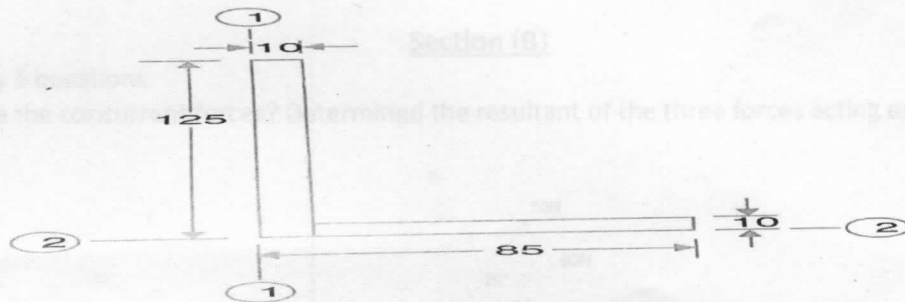
b. Derive the expression for Moment of Inertia of a Rectangle about its centroidal axis and also about base. (7.5)

Q. 5. a. Determine the centroid of the area as shown in figure with respect to axes shown. (7.5)



b. Derive the expression for Moment of Inertia of a circle about its Diameter. (7.5)

Q. 6. Determine the Moment of Inertia of the L section shown in figure, about an axis passing through centroid and parallel to the legs. Also determine polar moment of Inertia. Hence find radius of gyration. (15)



Q. 7. a. In a lifting machine an effort of 400N is to be moved by a distance of 20 m to rise a load of 8000N by a distance of 0.8 m. Determine the velocity ratio, mechanical advantage, input, output and efficiency of the machine. Determine also ideal effort, effort loss in friction, ideal load and frictional resistance. (7.5)

b. Derive the expression for Centroid of a triangle of height H. (7.5)

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END SEMESTER EXAMINATION, JANUARY-2018

PROGRAM : DIPLOMA(CE) FIFTH SEMESTER

COURSE CODE : DCET304

COURSE TITLE : SOIL MECHANICS AND FOUNDATION ENGINEERING

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

- What is Coefficient of uniformity?
- What do you mean by soil exploration?
- Name the methods for determining permeability of course grain and fine grain soil.
- What do you understand by normally consolidated and over-consolidated soil?
- What is called void ratio of soil, write its relation with porosity of soil.
- What are the sources of Aeoline Soil, Lacustrain Soil and Alluvial Soil?
- What do you mean by permeability of soil?
- Write a short note on bearing capacity of soil
- Name at-least three tests to find shear strength of soil.
- What do you mean by ultimate bearing capacity and net ultimate bearing capacity of soil?

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

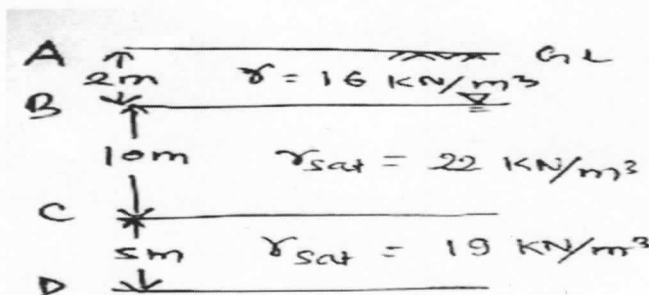
- How do a pile resist load comes over it, explain by giving formula of ultimate pile load capacity of soil. Explain shortly about different kind of piles according to way of resisting load.
- Explain Triaxial test of finding shear strength of soil, what do you understand CD, CU & UU tests.
- While doing proctor test, the optimum moisture content was found 14%. Find the bulk density of soil in gm/cc if at the time of maximum compaction weight of soil in proctor mould was 2.7 kg. Find also the maximum dry density MDD of soil. Volume of mould is 1000 cc.
- Explain falling head permeability test and range of permeability for different kind of soils.
- Explain the various types of foundations.
- Explain the various index properties of soil.
- What will be ultimate bearing capacity of a strip footing having width 3 meters, depth of footing is 2 mt. and bulk unit weight of soil is 20 kN/m^3 . Value of C is 35 kN/m^2 , $N_c = 25.2$, $N_q = 12.7$ & $N_{\phi} = 9.7$.

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3. a. Find total stress, pore pressure & effective stress at point A, B, C and D. Water table is at 2 mt. from the ground surface. Take unit weight of water 10 kN/m^3 . (15)



- Q. 4. a. Explain the various factors affecting permeability (7.5)
 b. Explain constant head permeability test of soil (7.5)

- Q. 5. a. Explain in detail about different kind of soil and their origins. (7.5)
b. Explain three phase system of soil and write in detail about all consistency limits of soil. (7.5)

- Q. 6. a. Soil have 62% grains which are less than 75μ , soil have plastic limit and liquid limit 45% and 65% consecutively. Classify the soil and assign the symbol. (7.5)
b. Explain grain size distribution chart, also explain how we find coefficient of uniformity and coefficient of curvature. (7.5)

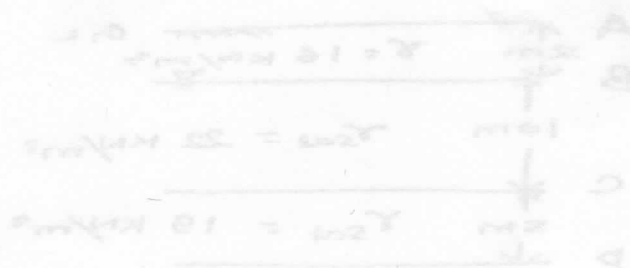
- Q. 7. At natural state soil have void ratio 0.63 and bulk unit weight 23 kN/m^3 now soil is compacted to its minimum void ratio i.e. 0.34. If in loosest state soil having void ratio 0.92 what is the relative density of soil. If soil will become completely saturated at 40% water content the will be dry unit weight and saturated unit weight of soil. Soil start flowing like liquid at 100% saturation and remains plastic till half of its liquid limit then what will be the value of its Liquid limit, Plastic limit and Plasticity index. $G=2.7$ and $\mu_w = 10 \text{ kN/m}^3$ (15)

Section (B)

- Attempt any 2 questions.
- How do a pile resist load comes over it. Explain by giving formulae of ultimate pile load capacity of soil. Explain shortly about different kind of piles according to way of resisting load.
 - Explain Thixal test of finding shear strength of soil, what do you understand CD, CU & UU tests.
 - While doing proctor test, the optimum moisture content was found 14.5%. Find the bulk density of soil in g/mc if at the time of maximum compaction weight of soil in proctor mould was 2.7 kg. Find also the maximum dry density MDD of soil. Volume of mould is 1000 cc.
 - Explain falling head permeability test and range of permeability for different kind of soils.
 - Explain the various types of foundations.
 - Explain the various index properties of soil.
 - What will be ultimate bearing capacity of a strip footing having width 3 meters, depth of footing is 3 mt. and bulk unit weight of soil is 20 kN/m^3 , Value of C is 35 kN/m^2 , $\phi_c = 25.3^\circ$, $\phi_p = 12.7^\circ$ & $N_p = 9.7$.

Section (C)

- Attempt any 3 questions.
- Find total stress, pore pressure & effective stress at point A, B, C and D. Water table is at 3 mt. from the ground surface. Take unit weight of water 10 kN/m^3 .



- Q. 4. a. Explain the various factors affecting permeability. (7.5)
b. Explain constant head permeability test of soil. (7.5)

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END SEMESTER EXAMINATIONS, JANUARY 2018
PROGRAM : POLYTECHNIC (CE) FIFTH SEMESTER

COURSE CODE : DCET301**COURSE TITLE : TRANSPORTATION ENGINEERING****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**Section (A)****(2 x 10 = 20)****Q. 1.** Attempt all questions.

- a. Write terrain classification with cross slope of the country
- b. What is taxiway?
- c. Write the use of fish plate.
- d. Write name only the historical development of road in sequence.
- e. Write down the difference between RC-2, MC-2, SC-2.
- f. A B.G. track has a sleeper density of M+6. If the track is laid with welded rails of 26 m length, find the number of sleepers on rail length.
- g. What are the stages of engineering survey for highway locations?
- h. Show the components layer of rigid and flexible pavement.
- i. Define slip and skid in roads.
- j. What is camber? also write their types

Section (B)**(7 x 5 = 35)****Q. 2.** Attempt any 5 questions.

- a. An ascending gradient of 1 in 120 meets a descending gradient of 1 in 100. A summit curve is to be designed for a speed of 100 km/h so as to have an overtaking sight distance of 460m. What is overtaking sight distance?
- b. Explain the types and class of airports.
- c. Describe the functions and requirements of rails in a railway track.
- d. Explain the following terms used in railway engineering
 - i. Rails
 - ii. Gauge
 - iii. Ballast
 - iv. Adzing of sleeper
- e. Calculate the extra widening required for a pavement of width 7 m on a horizontal curve of radius 250 m if the longest wheel base of vehicle expected on the road is 7 m. Design speed is 70 km/h. What is super elevation
- f. Describe in detail the different types of surveys to be carried out for taking up new highway project
- g. Draw a typical cross section of a permanent way. Discuss in brief the basic functions of various components of a railway track

Section (C)**(15 x 3 = 45)**

Attempt any 3 questions.

- Q. 3.**
 - a. What is an ideal transition curve? List the various types of transition curves used in highways. (7.5)
 - b. Write a short note on
 - i. Cant deficiency
 - ii. Grade compensation
 - iii. Gradients in railway track(7.5)
- Q. 4.**
 - a. Explain three road development plan in India. (7.5)
 - b. Explain the various rail failures. (7.5)
- Q. 5.**
 - a. Explain about the various sleepers used in a railway track. (7.5)
 - b. Calculate the cant required for a permissible speed of 83 km/hr on a B.G. track. Explain the term cant deficiency and cant excess. (7.5)
- Q. 6.**
 - a. What is ballast in permanent way? Explain the functions of ballast (7)
 - b. Explain the terms: i. Component parts of a turn out ii. Functional classification of railway station (8)
- Q. 7.**
 - a. Give answers to the following:
 - i. How camber is provided on roads?
 - ii. Explain the term negative super elevation
 - iii. Why prime coat is provided in road construction?
 - iv. Why dowel bars are used in expansion joints in rigid pavement?
 - b. Explain super elevation and compensation for curvature on gradients (6)

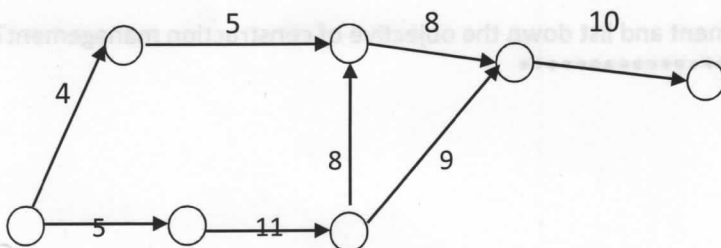
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- Write the three types of scrapper.
- What are the two factors affecting selection of equipment.
- Write the four features of bar chart.
- What is the size and output of power shovel.
- What is heavy or engineering construction.
- What are the two main objects for projects.
- What is EST and EFT.
- What is grad-ability.
- Write down the four different uses of trenching machine.
- Write the four items in construction job requiring quality control.

Section (B)**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- Enlist the various stages of inspection industry.
- What are the various causes of accidents in construction industry.
- Explain the earthwork equipment tractor with diagram and their types.
- Write down the different principles of organization.
- What are the features of bar charts. explain the scheduling by bar charts with suitable diagram?
- (i) Define the terms – CPM and PERT (ii) Find the project completion time of following:



- What are the various resources in construction industry? What are the various stages in construction?

Section (C)

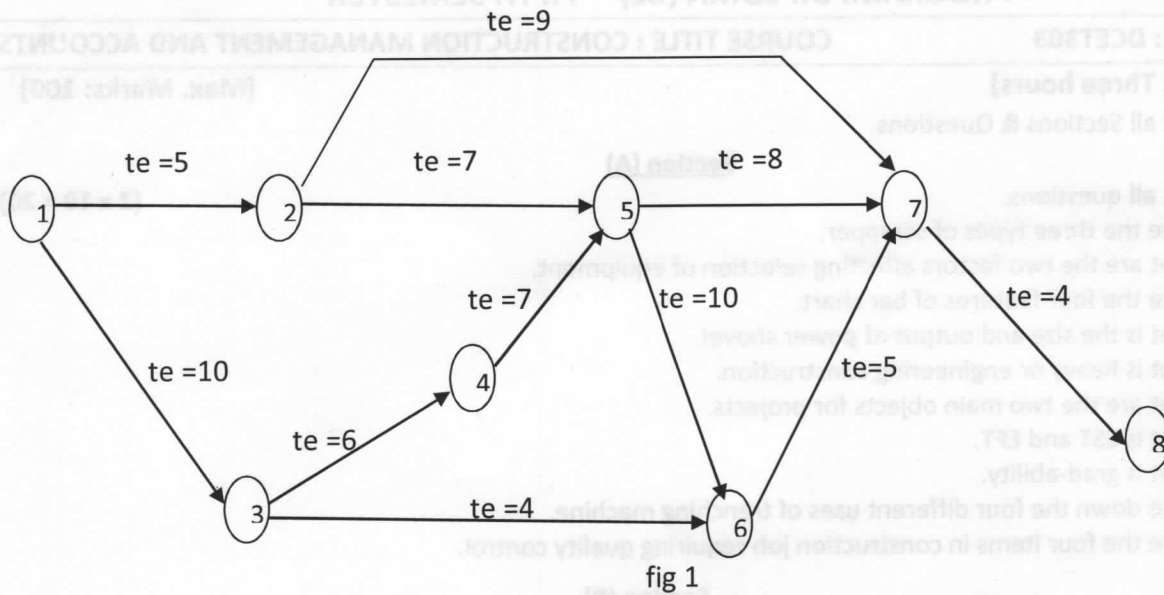
Attempt any 3 questions.

(15 x 3 = 45)

Q. 3. Draw the network diagram. Determine the project completion time, EST, EFT, LST, LFT, TOTAL FLOIAT, and identify the critical path for a project with the following activities.

Activity	Duration(days)	Remarks
1-2	3	1-2 and 2-3 are starting activities and can be taken up simultaneously
1-3	5	
2-4	0	Dummy activity
2-7	7	2-7 succeeds 1-2
3-5	4	1-3 preceded both 3-5 and 3-6
3-6	6	3-5 and 3-6 can be taken up simultaneously
4-7	5	4-7 succeeds 1-2
5-7	8	5-7 follows 3-5
6-7	9	3-6 preceded 6-7

- Q. 4.** A network is shown below with activity times (in days) marked on the arrows. Determine the project completion time. Compute total floats, EST, EFT, LST, LFT and critical path.



- Q. 5.** a. Describe the modes of failure in construction industry.
b. what are clamshell and scrapers?
- Q. 6.** a. What are the rules of drawing a network?
b. What are the limitations of bar chart?
- Q. 7.** a. What are the various stages in construction?
b. What are the steps of construction management and list down the objective of construction management?

Activity	Duration(days)	Remarks
1-1	3	1-1 and 1-2 are starting activities and can be taken up simultaneously
1-2	2	
1-3	0	Dummy activity
1-4	1	1-4 succeeds 1-3
1-5	4	1-5 preceded both 1-2 and 1-3
1-6	2	1-6 and 1-5 can be taken up simultaneously
1-7	3	1-7 succeeds 1-5
1-8	2	1-8 follows 1-6
1-9	3	1-9 preceded 1-7

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Q.3. a.** A pre-stressed concrete beam 400mm x 600mm in section has a span 6m & is subjected to a UDL 16kN/m including the self-weight of the beam. The pre-stressing tendons are located at the lower third point and provide an effective pre-stressing of 960kN. Determine the extreme fiber stress in concrete at a mid-span section. (7.5)
- b.** Design a short column, square in section, to carry an axial load of 1800kN using Fe415 steel and M20 concrete (7.5)
- Q.4.** Design a slab over a room 5.5m x 4m, simply supported in all direction. The live load on the slab is 5kn/m². The slab has a bearing of 120mm on supporting walls. Use M20 concrete and Fe415 steel. Check for shear only (Bending moment coefficient for long span 0.096 and for the short span 0.053) (15)
- Q.5 a.** A simply supported reinforced beam is 300 mm wide and 500mm deep to the centre of tensile reinforcement and it is reinforced with 5 bars of 18mm diameter as tensile steel. If the beam is subjected to a factored shear force of 65kN at the support, Design the shear reinforcement consists of stirrups (**by LSM**). Use M20 concrete and Fe250 steel. (7.5)
- b.** A simply supported reinforced beam of span 5m is 250 mm wide and 500mm deep to the centre of tensile reinforcement consist of 4 bars of 20mm diameter. If the beam is carries a load of 30kN. Design the shear reinforcement (**by WSM**). Use M20 concrete and Fe415 steel. (7.5)
- Q.6.** Design a reinforce concrete slab resting on masonry wall of 140 mm with clear span 3m, Live load = 4000 N/m², floor finish = 20 mm, clear cover 15mm. Use M 20 concrete and Fe 415 steel. Check for shear and development length. (15)
- Q.7. a.** What are the Under Reinforced, Over reinforced, and balance sections? Explain in detail, and draw the bending stress and diagram for each. (7.5)
- b.** What is pre-stressed concrete, what are the advantages of pre-stressed concrete, explain in detail with examples? (7.5)

Enrol. No. S R H U

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END SEMESTER EXAMINATIONS, JUNE - 2018
PROGRAM : POLYTECHNIC **SECOND SEMESTER**

COURSE CODE : DMCT105**COURSE TITLE : BASIC MECHANICAL AND CIVIL ENGINEERING****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt **all** questions.**(2 x 10 = 20)**

- a. Mention any two advantages of gear drive?
- b. What do you understand by capital energy?
- c. What do you understand by renewable energy?
- d. Give any two advantages of hot working?
- e. What do you understand by brazing?
- f. Write the purpose of taper roller bearing.
- g. What do you mean by foundation?
- h. Write the purpose of frog in the brick
- i. Write use of first class brick.
- j. Define liquid and gaseous waste.

SECTION B

Q. 2. Attempt **any 5** questions.**(7 x 5 = 35)**

- a. Explain the principle and working of tidal energy power generation.
- b. Explain the working of 4-stroke petrol engine with suitable diagram.
- c. What do you understand by fasteners, explain the rope drive with suitable diagram?
- d. What is the application of key; describe the various types of keys with suitable diagram.
- e. Explain the following
 - i. Heart wood ii. Size of brick iii. Concrete iv. Tread and riser v. Sap wood vi. Pith vii. Annular rings
- f. Explain sedimentary, igneous, metamorphic rocks with examples.
- g. Write classification of roads. What is coarse and fine aggregate, bitumen and tar?

SECTION C

Attempt **any 3** questions.**(15 x 3 = 45)**

- Q. 3.**
 - a. Explain the construction and working of nuclear thermal power plant. **(10)**
 - b. What is the application of coupling; describe the various types of bearing with the help of suitable diagram. **(5)**
- Q. 4.**
 - a. Explain the various types of manufacturing process with example. **(6)**
 - b. Explain the casting process with suitable diagram. **(5)**
 - c. Explain the any two welding process in detail? **(4)**
- Q. 5.**
 - a. Draw a neat sketch of cross section of timber and explain various part of it **(10)**
 - b. What are the different elements of a building? **(5)**
- Q. 6.**
 - a. Explain the classification of soil in detail. **(7)**
 - b. Explain the physical and chemical classification of rock. **(8)**
- Q. 7.**
 - a. Explain the manufacturing of a brick in detail. **(10)**
 - b. Define foundation, footing, beam, column, Plinth height. **(5)**

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END SEMESTER EXAMINATIONS, JULY-2018

PROGRAM : POLYTECHNIC (CE)

THIRD SEMESTER

COURSE CODE : DCET201

COURSE TITLE : SURVEYING - I

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

- Define surveying. What is the objective of surveying?
- Give the formula for pull correction with proper explanation of each term.
- Define fore and back bearing with proper diagram.
- What do you understand by local attraction?
- Define traversing? Explain close and open traverse with proper diagram.
- What is alidade?
- Define datum surface and reduced level.
- Define offsets.
- Define main stations.
- Write difference between plane surveying and geodetic surveying.

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Explain various types of obstructions in chain surveying.
- Explain different types of tapes and chains.
- Differentiate between prismatic compass and surveyor compass.
- Define the following:
 - Magnetic meridian and true meridian
 - Isogonic line and agonic line
 - Magnetic bearing and true bearing
- Convert the following WCBs to QBs :
 - WCB of AB = 45030'
 - WCB of BC = 125045'
 - WCB of CD = 222015'
 - WCB of DE = 320030'
- Explain the following
 - Offset
 - R.L in leveling
 - R.F in plan
 - B.M in leveling
 - Bearing
- Explain any five tape corrections.

SECTION C

(15 x 3 = 45)

Attempt any 3 questions.

- Q.3. a. Explain the radiation method of plane tabling with diagram.
b. What do you understand by parallax? Explain the temporary adjustment of a level
- Q.4. a. Explain intersection method of plane table survey.
b. Explain the following.
i. height of instrument
ii. fore sight, back sight and intermediate sight
iii. fore bearing and back bearing
- Q.5. a. The following consecutive readings were taken with a levelling instrument at intervals of 15 m. The first reading was at a chainage of 165 m where RL is 98.085 m. The instrument was shifted after the fourth and ninth readings.
3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035 m
Find the RL of all the points by rise and fall method with proper table and calculation.
b. Explain prismatic compass with its various components
- Q.6. a. Explain the field procedure of observing bearing.
b. What are the various instruments used in plane table surveying? Explain.
- Q.7. a. Following are the bearings taken in a closed compass traverse.

Line	F.B.	B.B.
AB	S37°30'E	N37°30'W
BC	S43°15'W	N44°15'E
CD	N73°00'W	S72°15'E
DE	N12°45'E	S13°15'W
EA	N60°00'E	S59°00'W

Convert the bearing in WCB system, draw the traverse and compute the included angles.

- b. Explain the temporary adjustment of prismatic compass.

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END SEMESTER EXAMINATIONS, JULY-2018

PROGRAM : POLYTECHNIC (CE)

THIRD SEMESTER

COURSE CODE : DCET203

COURSE TITLE : FLUID MECHANICS AND HYDRAULIC MACHINES

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

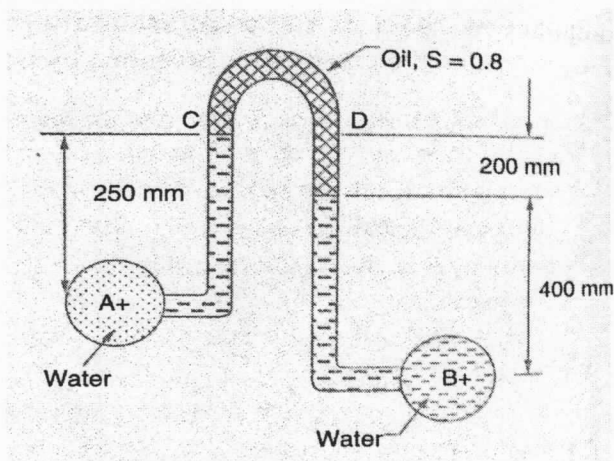
- Distinguish between Rotational and Ir-rotational fluid.
- Define density, specific volume and specific gravity.
- Fill in the blanks:
A liquid is defined as.....
A fluid is defined as
- Distinguish between steady flow and unsteady flow.
- Explain effect of temperature in fluid.
- Define the terms: vein and sill.
- Distinguish between vapour and gas
- What do you mean by Turbulent Flow?
- Define Mechanics.
- Sketch Pelton Wheel Turbine with its main parts.

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Differentiate between the three states of matter.
- What do you understand by the terms: Major energy losses and minor energy losses in pipes?
- An inverted differential manometer is shown in fig. Using the data, determine the difference in pressure between A and B



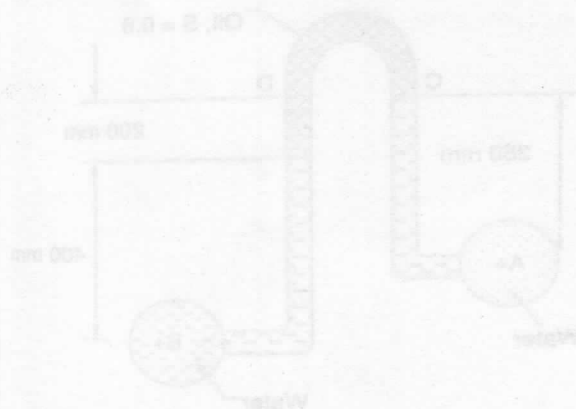
- State and prove Pascal's law. Explain the consequences of the law.
- A plate 0.025 mm distant from a fixed plate, moves at 50 cm/s and requires a force of 1.471 N/m² to maintain this speed. Determine the fluid viscosity between the plates in poise.
- Define an orifice and a mouthpiece. What is the difference between the two?
- What are the advantages of Triangular Notch or Weir over Rectangular Notch or Weir?

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3. a. With a neat sketch, explain the principle and working of centrifugal pump. (7.5)
b. Explain how hydraulic turbines are classified. (7.5)
- Q. 4. Define the equation of continuity. Obtain an expression for continuity equation for three dimensional flows. (7.5)
- Q. 5. a. Determine the height of a rectangular weir of length of 6 m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.8 m and discharge is 2000 liters/sec. Take $C_d = 0.6$ and neglect end contractions. (7.5)
b. Find the expression for the discharge over a rectangular weir in terms of head of water over the crest of the weir. (7.5)
- Q. 6. a. Find the head lost due to friction in a pipe of diameter 300 mm and length 50m, through which water is flowing at a velocity of 3 m/s using (i) Darcy formula, (ii) Chezy's formula for which $C = 60$. Take kinematic viscosity for water = 0.01 stoke. (7.5)
b. What do you understand by total energy line, hydraulic gradient line, pipes in series, pipes in parallel and equivalent pipe. (7.5)
- Q. 7. a. What are the main differences between impulse and reaction turbines? (7.5)
b. Explain how hydraulic turbines are classified. (7.5)



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END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : POLYTECHNIC **THIRD SEMESTER**

COURSE CODE : DCET202**COURSE TITLE : CONSTRUCTION MATERIAL****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt **all** questions.**(2 x 10 = 20)**

- a. What do you understand by hydraulicity of lime?
- b. Why no lifting equipment is required for bricks? Give reasons.
- c. Define slop moulded bricks.
- d. In a 33 Grade ordinary Portland cement(OPC), what does the term "33" represent?
- e. Which equipment is used for normal consistency test of cement?
- f. Find the volume of 1 bag of cement of 50kg.
- g. Name the equipment is used for pugging of clay.
- h. What is lime?
- i. What do you understand by blending of clay?
- j. Soft wood is obtained by which type of tree?

SECTION B

Q. 2. Attempt **any 5** questions.**(7 x 5 = 35)**

- a. Explain the complete procedure of burning of bricks.
- b. Explain the compressive test for cement with aim, apparatus, procedure, observation, calculation and result.
- c. Write short note on poor lime.
- d. Give a neat sketch of Hoffman's kiln showing all the operations.
- e. Write a short note on rapid hardening cement.
- f. What is the size of cement?
- g. Write short note on granite.

SECTION C

Attempt **any 3** questions.**(15 x 3 = 45)**

- Q. 3.**
 - a. Explain burning of cement in rotary kiln with proper diagram in detail.
 - b. Explain the composition of clinker in detail with all its components.
- Q. 4.**
 - a. What are the various qualities of a good building stone?
 - b. Draw the flow diagrams for mixing of raw materials by dry process for the manufacture of ordinary cement.
- Q. 5.**
 - a. Explain the compressive strength test for cement with aim, apparatus, procedure, observation, calculation and result.
 - b. Write a short note on 1st and 2nd class bricks.
- Q. 6.**
 - a. What are the various guiding factors while selecting site for a cement factory? Explain.
 - b. What are the requirements of a good preservative?
- Q. 7.**
 - a. Explain the composition of raw material of cement in detail.
 - b. Explain the complete procedure of natural seasoning with diagram.

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END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : POLYTECHNIC (CE) THIRD SEMESTER

COURSE CODE : DCET205**COURSE TITLE : BUILDING CONSTRUCTION****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions**(2 x 10 = 20)**

- a. What are the requirements of good buildings?
- b. Explain bat and closer used in brick masonry.
- c. What is the difference between relieving arch and inverted arch?
- d. How do we do centering while construction of arch?
- e. Draw a neat figure of arch with their elements.
- f. Why do we use DPC? Write materials used for damp proofing.
- g. How can we determine the width of foundation if we use 30cm wall?
- h. What is roof; explain difference between flat arch and RCC lintel.
- i. Explain shoring process while construction of buildings.
- j. Explain the purpose of wall.

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Explain the queen and king closure. Also explain Header and Flemish bond in detail.
- b. Discuss different parts of buildings with their cross section.
- c. Discuss the steps followed while providing DPC for plinth.
- d. Write any seven elements of stairs.
- e. Write a note on foundation's function, and classify pile foundation according to load transfer.
- f. Explain expansion and contraction joints in buildings.
- g. Explain any five elements of Arch. Why do we use key on arch?

SECTION C

Attempt any 3 questions.**(15 x 3 = 45)**

- Q. 3.**
 - a. Define shallow foundation with its various types. **(7.5)**
 - b. Discuss English and Flemish bond used in brick masonry. Also sketch various types of bond. **(7.5)**
- Q. 4.** Write in detail with figures, about classification of walls. **(15)**
- Q. 5.**
 - a. Classify various types of stairs based on material. **(7.5)**
 - b. Define ventilators. Explain various types of windows used in buildings. **(7.5)**
- Q. 6.**
 - a. Write a remedy to control dampness in details. **(7.5)**
 - b. Define floors and roofs. Discuss various types of roofs used in buildings. **(7.5)**
- Q. 7.**
 - a. Write a note on bonding of building blocks. How do we break vertical bond in masonry? **(7.5)**
 - b. Explain any Seven Elements of Pitch Roof. **(7.5)**

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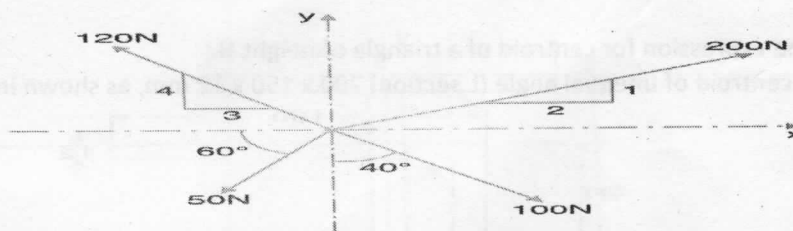
END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : POLYTECHNIC (CE) THIRD SEMESTER

COURSE CODE : DCET204**COURSE TITLE : APPLIED MECHANICS****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)****Explain the following:**

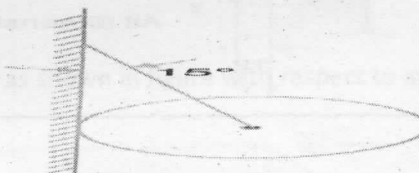
- | | |
|--|---|
| a. Statics & kinetics
b. Momentum & friction
c. Newton's first law of mechanics
d. Tringle law
e. Lami's theorem | f. Static & dynamic friction
g. Angle of repose
h. Input & output of lifting machine
i. Vector & scalar quantity
j. Types of load on beam |
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SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

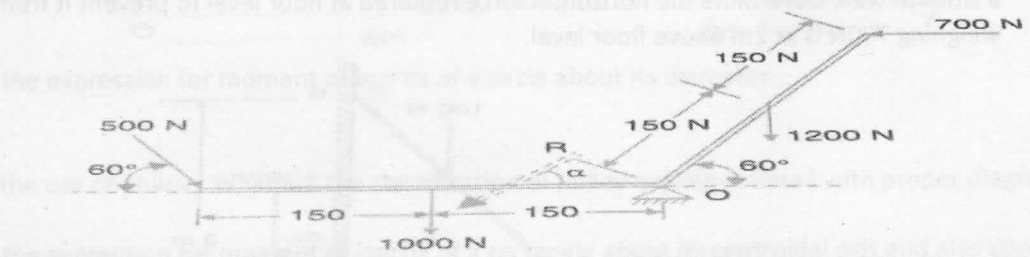
- a.**
- A system of four forces acting at a point on a body as shown in figure determined the resultant.



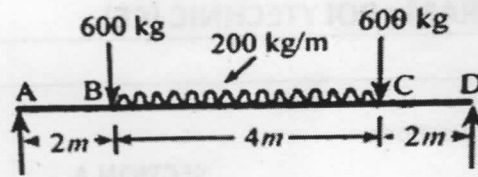
- b.**
- A sphere weighing 100N is tied to a smooth wall by a string as shown in figure. Find the tension T in string and the reaction R from the wall.



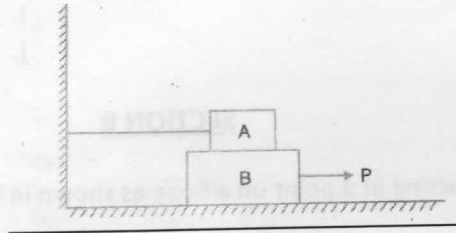
- c.**
- The system of forces acting on a Bell crank is shown in figure. Determine the magnitude, direction and the point of application of the resultant.



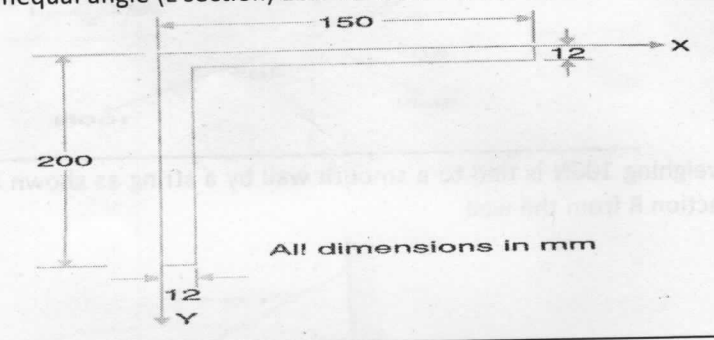
- d. Calculate the shear force and bending moment at the points A, B, C, D for the following beam.



- e. Block A weighing 1000N rests over block B which weighs 2000N as shown in figure. Block A is tied to wall with a horizontal string. If the coefficient of friction between blocks A & B is 0.25 and between B & floor is $1/3$, what should be the value of P to move the block if P act at 30° upwards to horizontal.



- f. Derive the expression for centroid of a triangle of height H.
g. Find the centroid of unequal angle (L section) $200 \times 150 \times 12$ mm, as shown in figure.

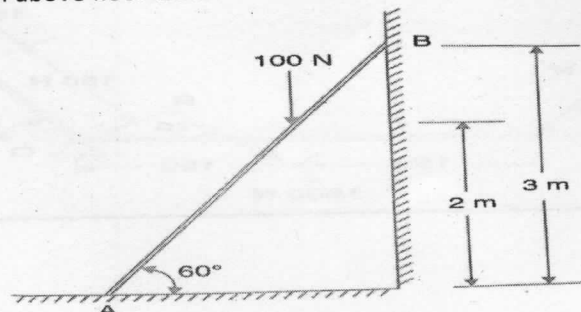


SECTION C

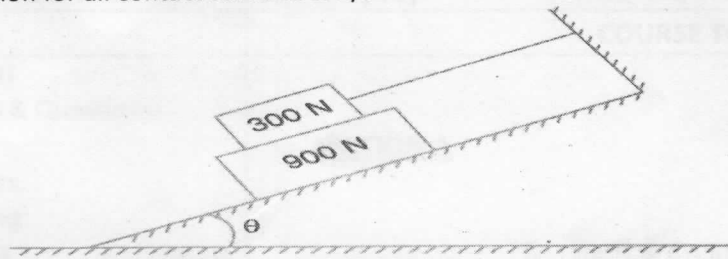
Attempt any 3 questions.

(15 x 3 = 45)

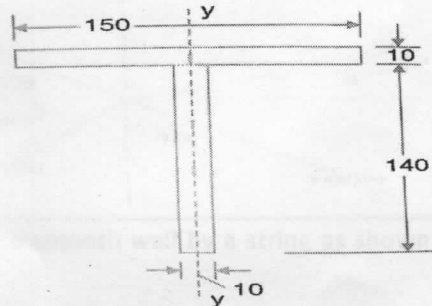
- Q. 3. a. A ladder weighing 100N is to be kept in the position shown in figure, resting on a smooth floor and leaning on a smooth wall. Determine the horizontal force required at floor level to prevent it from slipping when a man weighing 700N is at 2m above floor level. (7.5)



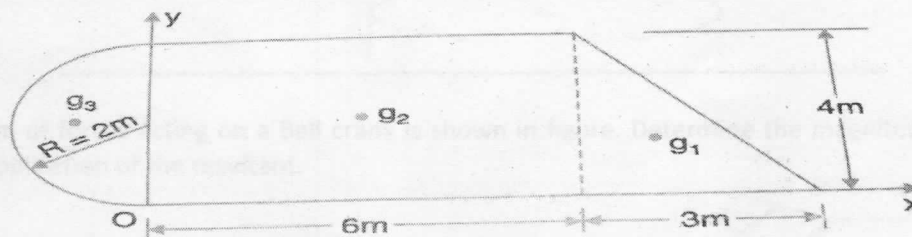
- b. What should be the value of θ in figure? That will make the motion of 900N block down the plane of impend? The coefficient of friction for all contact surfaces is $1/3$. (7.5)



- Q. 4. a. In a lifting machine an effort of 500N is to be moved by a distance of 20m to rise a load of 10000N by a distance of 0.8m. Determine the velocity ratio, mechanical advantage, input, output and efficiency of the machine. Determine also ideal effort, effort loss in friction, ideal load and frictional resistance. (7.5)
- b. Derive the expression for moment of inertia of a triangle about its base and also about centroidal axis. (7.5)
- Q. 5. Determine the moment of Inertia of the T section shown in figure about an axis passing through centroid and parallel to the top most fiber of the section. Also determine moment of inertia about the axis of symmetry and polar moment of Inertia. Hence find radius of gyration. (15)



- Q. 6. a. Determine the centroid of the area as shown in figure with respect to axes shown. (7.5)



- b. Derive the expression for moment of inertia of a circle about its diameter. (7.5)
- Q. 7. a. Define the use of pulley? What are the classification of pulley explain in detail with proper diagram. (7.5)
- b. Derive the expression for moment of inertia of a rectangle about its centroidal axis and also about base. (7.5)

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END SEMESTER EXAMINATIONS, JUNE - 2018
PROGRAM : POLYTECHNIC (CE) FOURTH SEMESTER

COURSE CODE : DCET212**COURSE TITLE : HYDROLOGY & IRRIGATION ENGINEERING****[Time allotted: Three hours]****[Max. Marks : 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. Explain importance of irrigation engineering.
- b. Explain necessity of irrigation.
- c. With a neat sketch, draw canal cross section in fully filling.
- d. What is GCA and CCA?
- e. What is the difference between hygroscopic water and gravitational water?
- f. Define spillway.
- g. Draw hydrological cycle with its various components.
- h. Define energy dissipaters.
- i. Define catchment area.
- j. Explain meander behaviour of river.

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. A canal was designed to supply irrigation needs of 1000ha of land growing rice of 140 days base periods with delta 130cm. If canal water is used to irrigate wheat of 119 days base period and delta is 50cm, how much area can be irrigated?
- b. Explain hydrograph with its components.
- c. What are the various techniques used for water distribution in the farms?
- d. A reservoir with a surface area of 250ha has the value of saturated vapor pressure as 17.54mm of Hg and actual vapor pressure is 7.02mm of Hg. The wind velocity at 1m above ground is 16km/hr. Find the daily average evaporation from the lake and the volume of water evaporated from lake in 1 week.
- e. Design a regime irrigation canal by Lacey's theory, to carry a discharge of 35m³/sec with silt factor of 0.9 and taking side slopes as 1H: 2V. Assume value of m is 1 and n is 0.0225.
- f. Discuss stability design consideration of gravity dam.
- g. Define tubewell with its various types.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. For a distributary GCA is 500 hec, CCA is 80% of GCA the intensity of irrigation is 30% for wheat and 12% for rice. If the kor period is 3 weeks for the former and 2 weeks for the latter, neglecting losses determine the outlet discharge. Assume suitable depths for kor watering. **(10)**
 - b. Explain Rock fill dam. **(5)**
- Q. 4.**
 - a. Explain drainage system for efficient irrigation. **(7.5)**
 - b. What are the various techniques used for ground water recharge? **(7.5)**
- Q. 5.**
 - a. Explain canal falls with its types. **(7.5)**

b. Explain various types of cross drainage works with their suitable sketches.

(7.5)

Q. 6. a. Discuss various zones of underground water.

(7.5)

b. Find the radius of tube well which yield of tube well is found $2500\text{m}^3/\text{day}$. A tube well is driven in a confined aquifers of 20m thickness. Permeability is 50m/day and hydraulic gradient is 3.5 m. Assume radius of influence is 275m.

(7.5)

Q. 7. a. Explain with sketches of different canal cross sections.

(7.5)

b. Define outlets with its various types and also discuss the requirements of good modules.

(7.5)

SECTION B

SECTION C

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JUNE-2018

PROGRAM : POLYTECHNIC (CE)

FOURTH SEMESTER

COURSE CODE : DCET216

COURSE TITLE : ESTIMATION AND COSTING

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections and Questions.

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

- Explain earthwork in excavation.
- Explain separate or individual wall method.
- Write the qualities of a good contractor.
- What do you mean by soiling? Why it is done?
- What do you mean by gravity distribution of water?
- Write all the deductions in calculating the quantity of masonry.
- What are traps? Classify them according to their shapes.
- What are the three methods for calculating the quantity of earthwork in Road?
- Write the objectives of security deposit.
- What do you mean by specifications?

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Explain any 7 main items of work in construction also write their brief specification.
- Write detailed specifications for earthwork in excavation in foundation.
- Explain briefly the function of septic tank. Also write its constructional and design features.
- Write short notes on:-
 - Earnest money
 - Balanced and unbalanced tender
- A lift has been installed in a building at a cost of Rs. 13,500. Assuming the life of lift as 10 year, work out the amount of annual installment of sinking fund required to be deposited to accumulated the whole amount at 4% compound interest.
- Explain various types bills submitted by the contractor
- A pumping set with a motor has been installed in a building at a cost of Rs. 3,500. Assuming the life of pump as 15 year, work out the amount of annual installment of sinking fund required to be deposited to accumulate the whole amount at 4% compound interest.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

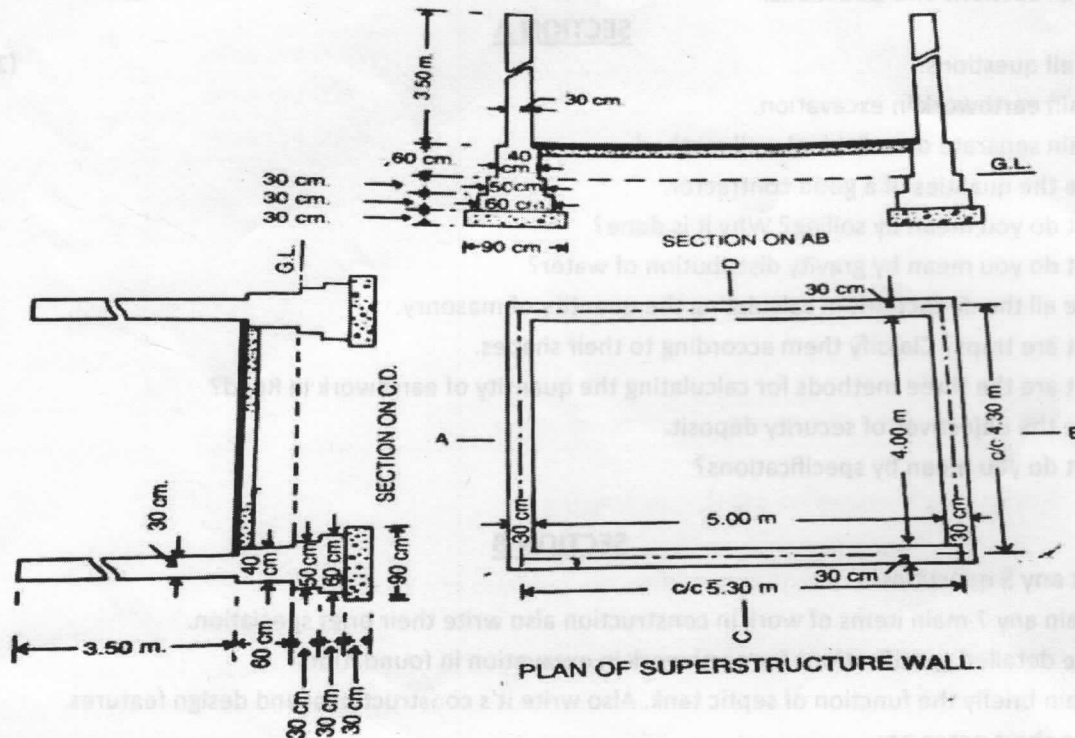
- Prepare a detailed estimate for supplying and laying 50mm diameter C.I water supply pipe for 100 meter length including jointing and trenching up to depth of 60cm. Necessary material and labour shall be provided in the estimate. Assume length of each pipe be 4 meter. (7.5)
- Design a septic tank for small residential colony having population of 500 persons. The rate of supply is 150 liter and rate of sludge per person per year be 15 liter. Assume depth and freeboard of septic tank. (7.5)

- Q. 4. a. In the figure given below, the plan represents the plan of a superstructure wall of a single room building 5m X 4m, and sections represent the cross sections of the walls with foundation.

Estimate the quantities of-

- Earthwork in excavation in foundation
- Concrete in foundation
- Brickwork in foundation and plinth
- Brickwork in superstructure

(10)



- b. Calculate the quantity of earthwork for 200m length for a portion of a road in a uniform ground the height of banks at the two ends being 1.00 meter and 1.60 meter. The formation width is 10 meter and side slopes 2:1 (Horizontal: Vertical). Assume that there is no transverse slope.

(5)

- Q. 5. a. Reduced level (R.L) of ground along the center line of a proposed road from chainage 10 to 20 are given below. The formation level at the 10th chainage is 107 and the road is in downward gradient of 1 in 150. Formation width of road is 10 meter and side slopes of banking are 2:1 (horizontal: vertical). Length of chain 30 meter. Draw longitudinal section of the road and a typical cross-section and prepare an estimate of earthwork at the rate of Rs. 300 per 100 cu m.

(10)

Chainage	R.L of ground
10	105.00
11	105.60
12	105.44
13	105.90
14	105.42
15	104.30
16	105.00
17	104.10
18	104.62
19	104.00
20	103.30

- b. What are the three cases of an irrigation canal sections? Write the formula for calculating the earthwork and area of permanent land for each three cases. (5)

- Q. 6. a. Prepare the total cost for cement concrete in foundation for ratio 1:4:8 (Cement: Sand: Aggregate) Data regarding cost of material, labour, Number of labour is given. (7.5)

Particular	Quantity	Rate	Cost
Materials			
aggregate	?	2000 per cu m	
sand	?	2500 per cu m	
cement	?	8700 per cu m	
Labour			
Mistri	1	?	
Mason	1.5	?	
Mazdoor	14	?	
Coolie	16	?	
Bhishti	5	?	
Sundries, T and P testing etc.	Lump sump		

- b. Write general specifications for a first class building. (7.5)

- Q. 7. a. Explain various types of contracts. Also write the qualities of a good contractor. (7.5)

- b. A four storied building is standing on a plot of land measuring 700 square meters. The plinth area of each storey is 400 square meter. The building is of RCC framed structure and the future life may be taken as 70 years. The building fetches a gross rent of Rs. 16000.00 per month. Work out the capitalized value of the property if the rate of interest is 6 percent. For sinking fund 4 percent compound interest may be assumed. Cost of land may be taken Rs. 50 per square meters. Other data required may be assumed suitably. (7.5)

- Q. 2. a. Prepare a detailed estimate for supplying and laying 50mm diameter C.I water supply pipe for 120 meter length including jointing and trenching up to depth of 1.5m. Necessary material and labour shall be provided in the estimate. Assumed length of each pipe be 4 meter. (7.5)
- b. Design a septic tank for small residential colony having population of 500 persons. The rate of supply is 150 liter and rate of sludge per person per year be 15 liter. Assume depth and treatment of septic tank. (7.5)

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JUNE-2018

PROGRAM : POLYTECHNIC (CE)

FOURTH SEMESTER

COURSE CODE : DCET213

COURSE TITLE : SURVEYING - II

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections and Questions.

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

- What is contour interval?
- What is transit and non-transit theodolite?
- Draw a suitable table for measurement of horizontal angle by repetition method.
- What is ridge line?
- Write the name of different types of horizontal curve.
- Draw contour line for a pond.
- Draw contour line for overhanging cliff.
- Write the relation between degree of curve radius of curve for 30 m and 20 m arc.
- What is the centrifugal force?
- What is transition curve?

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Write the procedure and derive expression for setting out a simple circular curve by taking offset from long chord.
- What is theory of stadia tachometry, derive relation for multiplying constant and additive constant with neat sketch.
- How vertical angle is measured with the help of tangent clinometer.
- What are the methods of measurement of horizontal angle with the help of theodolite explain anyone method in detail.
- Explain indirect method of contouring.
- Explain the construction of tangent clinometer with diagram.
- From the following data calculate the total volume of water impounded by trapezoidal Formula:-

Contour in meter	410	400	390	380	370	360	350
Area in meter ²	26400	23200	19100	16000	12500	9600	7700

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

Q. 3.

- Derive the expression for horizontal and vertical distance in tachometry surveying for angle of depression when line of sight is inclined staff held perpendicular to it (7.5)
- Derive the expression for horizontal and vertical distance in tachometry surveying for angle of elevation when Line of sight is inclined and staff held vertically. (7.5)

Q. 4.

What is the use of Abney level? Explain the function of different parts of Abney level with the help of diagram. How is the testing and adjustment of Abney level done? Explain the following procedure performed by Abney level.

- i. Measurement of Vertical angle
- ii. Trace a grade of contour
- iii. Setting out gradient by Abney level

(15)

Q. 5.

- (a) What is the total station? What are the temporary adjustments of theodolite?
- (b) Explain any 10 parts of theodolite.

(7.5)

(7.5)

Q. 6.

- (a) What are the sources of error in theodolite serving explain in details?
- (b) Two Straights intersecting at a chainage 2000m having deflection angle 60° . The degree of curve is 5° , if chain length is 30m. Find the following: -
 - i. radius of curve
 - ii. tangent length
 - iii. length of long chord
 - iv. chainage at the beginning and at the end of curve
 - v. number of full and sub-chord

(5)

(10)

Q. 7.

- (a) Explain various characteristics of contour lines
- (b) Write the procedure and derive expression for setting out a simple circular curve by taking offset from long chord.

(7.5)

(7.5)

350	360	370	380	390	400	410	Contour in meter
7700	9600	12500	16000	19100	22300	26400	Area in meter ²

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Enrol. No.

S R H U

Regn. No.

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END SEMESTER EXAMINATION, JUNE-2018
PROGRAM : POLYTECHNIC (CE)

FOURTH SEMESTER

COURSE CODE: DCET211

COURSE TITLE : STRENGTH OF MATERIAL

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

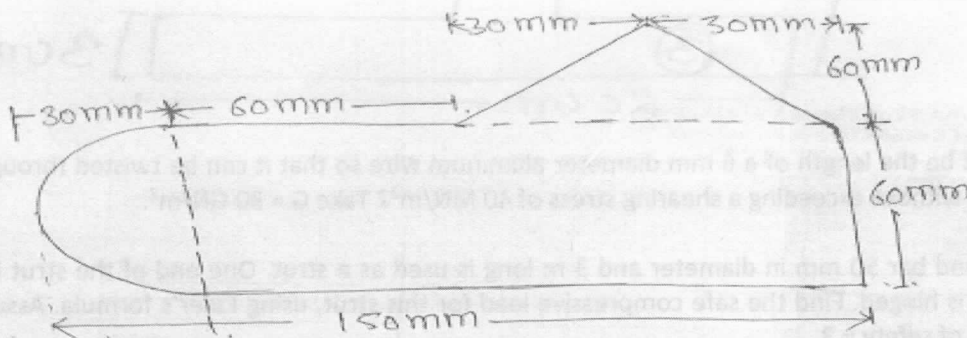
- Define different causes of failure of long columns.
- Write down difference between bending moment and torsion.
- Write down relationship between E and K.
- Define Poisson's ratio and explain what is the range of Poisson's ratio value.
- Write down difference between malleability and ductility.
- Which stresses resist tensile and compressive forces?
- Draw SFD and BMD for simply supported beam carrying UDL on whole span.
- What is shear stress and shear strain?
- Write down difference between pressure intensity and stresses?
- Define moment of resistance and write down relation between M, I, E, R, σ and Y.

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Explain and sketch stress strain diagram for mild steel.
- Derive the expression for slope and deflection of simply supported beam subjected to uniformly distributed load over the entire length of the beam with the help of moment area method.
- Determine centre of gravity of the plane uniform lamina as shown in fig.



- An element in a stressed material has tensile stress of 400 MN/m^2 and a compressive stress of 300 MN/m^2 acting on two mutually perpendicular planes and equal shear stresses of 80 MN/m^2 on these planes. Find principal stresses and position of the principal planes. Find also maximum shearing stress by Graphical method.
- Draw SFD and BMD for a simply supported beam of span 12 m carry a concentrated load 12 KN, 14 KN, 12 KN @ 3 m, 6 m, and 9 m from the left end support respectively. Clearly mark the position of maximum bending moment and determine its value.
- A cantilever 5 m long is of rectangular section 200 mm wide and 350 mm deep. It carries a UDL of 25 KN/m for a length of 3.5 m from the left fixed end and a point load of 5 KN at the free end. Find the deflection and slope of a cantilever beam.
- A hollow circular shaft 22 mm thick transmits 300 KW at 180 r.p.m. Determine the diameters of the shaft if shear strain due to torsion is not exceed 8.1×10^{-4} . Take Modulus of rigidity as 82 GN/m^2 .

SECTION C

Attempt any 3 questions.

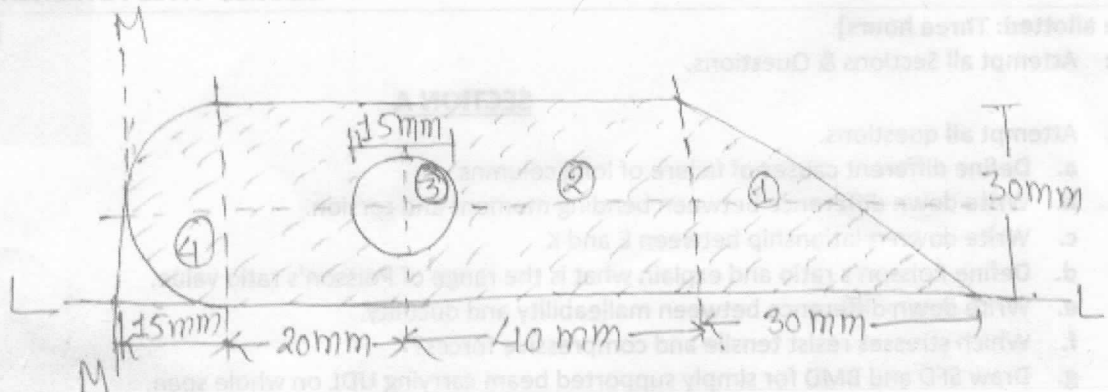
(15 x 3 = 45)

Q. 3. Derive the torsion equation.

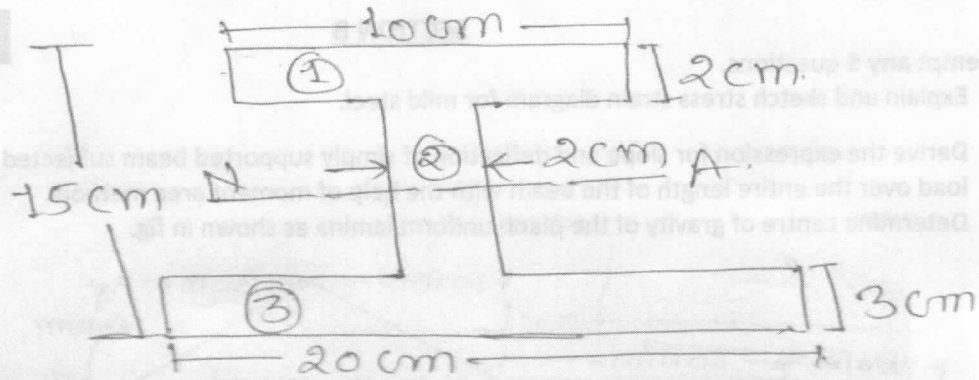
(15)

Q. 4. For the shaded area shown in fig. find the following:

- (i) the position of the centroid, (ii) the M.O.I about the base, (iii) the radius of gyration about the base. (15)



Q. 5. a. The cross section of a cast iron beam as shown in fig. This beam is simply supported at the ends and carries a UDL of 20 kN/m. If the span of the beam is 4 m, determine maximum tensile and compressive stresses in the beam. (16)

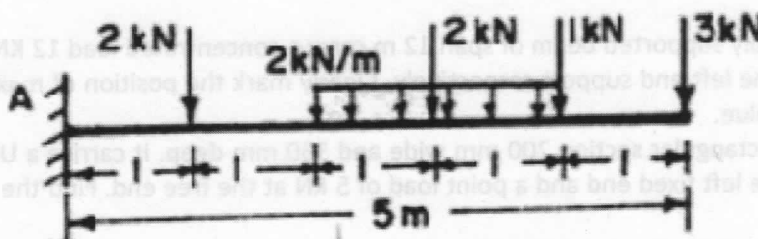


b. What must be the length of a 6 mm diameter aluminum wire so that it can be twisted through one complete revolution without exceeding a shearing stress of 40 MN/m²? Take $G = 30 \text{ GN/m}^2$. (5)

Q. 6. a. A solid round bar 50 mm in diameter and 3 m long is used as a strut. One end of the strut is fixed, while the other end is hinged. Find the safe compressive load for this strut, using Euler's formula. Assume $E = 200 \text{ GPa}$ and factor of safety = 3. (7.5)

b. A 300 mm long cantilever of rectangular section 40 mm wide and 30 mm deep carries a UDL. Calculate the value of 'w' if the maximum deflection in the cantilever is not exceed 0.5 mm. Take $E = 70 \text{ GPa}$. (7.5)

Q. 7. Draw shear force and bending moment diagram for beam shown in figure. (15)



Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JUNE - 2018
PROGRAM : POLYTECHNIC (CE) FOURTH SEMESTER

COURSE CODE : DCET214**COURSE TITLE : WATER SUPPLY & WASTE WATER ENGINEERING****[Time allotted: Three hours]****[Max. Marks : 100]****Note:** Attempt all Sections & Questions.**SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- a. Define water supply engineering.
- b. Draw the flow diagram of water supply system.
- c. What is meant by design period and population forecasting?
- d. Write permissible and rejection value of dissolved solid, hardness, temperature and turbidity.
- e. Write any two empirical formulae's for calculating fire demand.
- f. Define continuous and intermittent system used in water supply scheme.
- g. What are coagulants? Name any two.
- h. Why ferrule is provided in water distribution system?
- i. Define sanitary engineering.
- j. Draw flow diagram of activated sludge process.

SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- a. What are the advantages and disadvantages of conservancy system and water carriage system?
- b. Describe various types of pipe joints with their neat sketches.
- c. Explain any three sewer appurtenances used in sewerage system.
- d. Compare combined and separate system of sewerage.
- e. What are different water supply fixtures? Describe any four of them.
- f. Compare methods of sewage disposal by dilution and disposal by land treatment.
- g. The population of city is as follows:

YEAR	1941	1951	1961	1971
POPULATION	30000	34500	39500	45200

Calculate its population in 2001 by geometric increase method and decrease rate growth methods.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. What are the various operations involved in laying and construction of sewers. **(7.5)**
 - b. Define per capita demand. What are the factors which affects per capita demand? **(7.5)**
- Q. 4.**
 - a. What is turbidity? How it is determined? What are the causes of turbidity in water? **(7.5)**
 - b. Calculate one day 37°C BOD of sewage sample whose five days 20°C B.O.D. is 100mg/l. **(7.5)**
- Q. 5.**
 - a. The 3 days 15°C BOD of a sample of sewage is 150mg/l. Draw a graph of 5 days B.O.D. as a function of temperature in the range of 10°C to 25°C in steps of 5°C. **(7.5)**
 - b. Compare slow sand filter and rapid sand filters in details. **(7.5)**

Q. 6. a. Define B.O.D. How it can be determined in the laboratory?

(7.5)

b. Data from an unseeded domestic waste water B.O.D test are : 5ml of waste in 300ml bottle, initial D.O. of 7.8mg/l, and 5 days DO equal to 4.3mg/l. Determine the B.O.D and ultimate B.O.D.

(7.5)

Q. 7. a. Explain functions of different treatment unit in sewage treatment plant:-

(7.5)

i. Screening ii. Grit chamber iii. Skimming tank iv. Oxidation pond v. Oxidation ditch

b. The population of city is as follows:

(7.5)

YEAR	1950	1960	1970	1980	1990
POPULATION	75000	100000	150000	200000	242000

Calculate its population in the year 2000 and 2010 by geometric increase method and decreased rate of growth methods.

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JUNE-2018
PROGRAM: POLYTECHNIC (CE) FOURTH SEMESTER

COURSE CODE : DCET215**COURSE TITLE : CONCRETE TECHNOLOGY****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. What is rate of hydration?
- b. What are the tests used for determining the workability of concrete?
- c. How will you know that aggregate is flaky or elongated?
- d. Write a note bleeding of aggregate.
- e. What is ready mix concrete?
- f. What is retarder?
- g. What is bulk density?
- h. What is effect of segregation of concrete?
- i. What is permeability?
- j. Write the difference between accelerator and retarder in concrete.

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Write notes on cold weather concreting and hot weather concreting.
- b. Write difference between weigh batching and volume batching.
- c. Why do we use flow table test, what is the difference between compaction factor and slump of concrete.
- d. What is segregation of concrete, write its reason?
- e. Write the compaction factor test in detail.
- f. Write requirement, uses and advantages of concrete.
- g. Write factors which affect workability.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)**Q. 3.** What is composition of cement? Write in detail about different kind of cement and their applications.**Q. 4.** What is curing? Write in detail about the different methods used for curing.**Q. 5.** Write in detail about different steps involve in manufacturing of concrete.**Q. 6.** a. What do you understand by admixture? Write in detail about air entrapping admixture. **(7.5)**b. Write in detail about a concrete test used to determine as compressive as well as tensile strength. **(7.5)****Q. 7.** Explain the property of water and impurities of water used in concreting. Write the limit of impurities in water.

Enrol. No.

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END SEMESTER EXAMINATIONS, JULY-2018**PROGRAM : POLYTECHNIC (CE)****FIFTH SEMESTER****COURSE CODE : DCET302****COURSE TITLE : REINFORCED CONCRETE DESIGN****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions. *IS 456-2000 is Allowed in Examination Room (Hard binding only)***SECTION A****Q. 1.** Attempt all questions.**(2 x 10 = 20)**

- Define characteristic strength of concrete.
- Write the expression for nominal shear for a beam of varying depth
- Define development length.
- What is the minimum percent of steel required in slab for different grade?
- Explain, how the load over a slab is distributed?
- What are the limits to control the deflection?
- Why over-reinforced section is not preferred.
- Draw a design stress strain curve for concrete in WSM.
- Define limit state of serviceability.
- What is flat slab?

SECTION B**Q. 2.** Attempt any 5 questions.**(7 x 5 = 35)**

- The cross section of singly reinforced concrete beam 300mm wide and 400mm deep to the centre of tensile reinforcement which consist of 4 bars of 16mm diameter. If the stress in concrete and steel are not to exceed 7N/mm^2 and 140N/mm^2 , determine the moment of resistance of section. Take $m=13.33$
- A beam of reinforced concrete is 250mm wide and 400mm deep to the centre of tensile reinforcement. It is reinforced with 4 bars of 16 mm diameter as compression steel and 4 bars of 20mm diameter as tension steel. Determine the moment of resistance of the section by WSM. Covers at both ends are 50mm. If the stress in concrete and steel are not to exceed 7N/mm^2 and 230N/mm^2 , determine the moment of resistance of section. Take $m=13.33$
- A singly reinforced concrete beam 200 mm wide 400 mm deep to the centre of tensile reinforcement, Determine limiting moment of resistance of the section using LSM. Use M20 concrete and Fe250 steel.
- A doubly reinforced beam section is 200mm wide and 350mm deep to the centre of tensile reinforcement. It is reinforced with 200mm^2 steel in compression zone and 1800mm^2 steel in tension. If the effective cover is 50mm, determine moment of resistance. Use M20 and Fe250 steel.(by LSM)
- What is prestressed concrete? Explain in detail with examples the advantages of prestressed concrete.
- A short RCC column 400mm x 400mm has to carry an axial load of 1200kN. Find the area of steel required. Use M20 concrete and Fe415 steel.

- g. A simply supported beam is 25cm by 50 cm and has 2-20mm TOR bars going into the support. If the shear force at centre of support 110kN at working loads determined the anchored length. Assume M20 Mix and Fe415 TOR steel.

SECTION C

Attempt **any 3** questions.

(15 x 3 = 45)

- Q. 3. a. What are the under reinforced, over reinforced, and balance sections explain in detail, and draw the bending stress and diagram for each. (7.5)
- b. Write the comparison between reinforced concrete beam and Prestressed Beam in detail. (7.5)
- Q. 4. a. A prestressed concrete beam is provided with a bent tendon. Tendon is coming out at a depth of 150mm above from the centroidal axis and at the mid span tendon lowest point is 100mm below the centroidal axis. The beam carries a point load of 160kN at the center. The beam has a span of 6m and cross section 400mm x 600 mm and prestressing force of 1000kN. Determine the stress distribution for the end section of the beam. The dead load of the beam is 6kN/m. (7.5)
- b. A reinforced concrete column of 2.75m effective length carries an axial load of 1600kN. Design the column using M20 Mix and Fe415steel. (7.5)
- Q. 5. Design a simply supported slab on masonry walls to the following requirement. Clear span = 2.5 m, Live load = 4 kN/m², Use M 20 concrete and Fe 415 steel. Also check for shear and development length. (15)
- Q. 6. a. A simply supported reinforced beam is 250 mm wide and 500mm deep to the centre of tensile reinforcement and it is reinforced with 4 bars of 20mm diameter as tensile steel. If the beam is subjected to a factored shear force of 95kN at the support, Design the shear reinforcement consists of stirrups (**by LSM**). Use M20 concrete and Fe415 steel (7.5)
- b. A simply supported reinforced beam of span 5m is 250 mm wide and 500mm deep to the centre of tensile reinforcement consist of 4 bars of 20mm diameter. If the beam is carries a load of 30kN. Design the shear reinforcement (**by WSM**). Use M20 concrete and Fe415 steel (7.5)
- Q. 7. Design a slab over a room 4m x 6m, simply supported in all direction .The live load on the slab is 3kn/m² .The slab has a bearing of 150mm on supporting walls. Use M20 concrete and Fe415 steel. Check for shear only (Bending moment coefficient for long span 0.103 and for the short span 0.047) (15)

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATIONS, JULY-2018
PROGRAM : POLYTECHNIC (CE) FIFTH SEMESTER

COURSE CODE : DCET301**COURSE TITLE : TRANSPORTATION ENGINEERING****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.**SECTION A**

- Q. 1.** Attempt all questions. (2 x 10 = 20)
- A B.G. track has a sleeper density of M+6. If the track is laid with welded rails of 26 m length, find the number of sleepers on rail length?
 - Draw a typical cross section of a permanent way. Discuss in brief the basic functions of various components of a railway track
 - What is camber? Write their types.
 - Show the components layer of rigid and flexible pavement.
 - Write the use of fish plate.
 - What is frost heave?
 - What is taxiway?
 - Write name only the historical development of road in sequence.
 - What is pusher gradient?
 - Define slip and skid in roads.

SECTION B

- Q. 2.** Attempt any 5 questions. (7 x 5 = 35)
- Calculate the stopping sight distance on a highway at a descending gradient of 4% for a design speed of 100 km/h. Assume other data as per IRC recommendations. What do you mean by stopping sight distance?
 - Describe the functions and requirements of rails in a railway track.
 - Explain the various components of turnouts
 - Explain super elevation and compensation for curvature on gradients
 - A vertical summit curve is formed at the intersection of two gradients, +5 % and -2 %. Design the length of summit curve to provide a stopping sight distance for a design speed of 110 km/h. Assume other data
 - Describe in detail the different types of surveys to be carried out for taking up new highway project
 - Explain the types and class of airports.

SECTION C

- Attempt any 3 questions. (15 x 3 = 45)
- Q. 3.**
- A vertical summit curve is formed when an ascending gradient of 4% meets another ascending gradient of 1%. Find the length of the summit curve to provide the required for a design speed of 80 km/h for :
 - The stopping sight distance (7.5)
 - The overtaking sight distance (7.5)
 - Explain the classification of sleepers. (7.5)
- Q. 4.**
- Explain three road development plan in India (7.5)
 - Write short notes on:
 - Ballast crib
 - Gauge
 - Sleeper density
 - Fish bolt (7.5)
- Q. 5.**
- What is an ideal transition curve? List the various types of transition curves used in highways (7.5)
 - An ascending gradient of 1 in 50 meets a descending gradient of 1 in 80. A summit curve is to be designed for a speed of 110 km/h so as to have an overtaking sight distance of 390 m. (7.5)

- Q. 6. a. What is ballast in permanent way? Explain the functions of ballast. (7)
 b. Give answers to the following: (8)
 i. How camber is provided on roads?
 ii. Explain the term negative super elevation.
 iii. Why prime coat is provided in road construction?
 iv. Why dowel bars are used in expansion joints in rigid pavement?

- Q. 7. a. Calculate the cant required for a permissible speed of 83 km/hr on a B.G. track. Explain the term cant deficiency and cant excess. (7)
 b. Explain the following terms: (8)
 i. Functional classification of railway station
 ii. Component parts of a turnout

SECTION B

SECTION C

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END SEMESTER EXAMINATION, JUNE-2018
PROGRAM : POLYTECHNIC (CE) SIXTH SEMESTER

COURSE CODE: DCET312**COURSE TITLE : POLLUTION & CONTROL****[Time allotted: Three hours]****[Max. Marks: 100]****Note:** Attempt all Sections & Questions.

SECTION A

Q. 1. Attempt all questions.**(2 x 10 = 20)**

- a. Explain community and ecosystem.
- b. Explain abiotic and biotic factors.
- c. Write health hazards of water pollution.
- d. What do you mean by reuse of wastewater?
- e. What is the effect of pesticides and fertilizers on land resources?
- f. What is the significance of wetlands?
- g. Write the dimensions of deforestation in India.
- h. Explain the use of solar energy for the purpose of space heating of building.
- i. Write the objectives of EIA.
- j. What do you mean by Environmental Audit?

SECTION B

Q. 2. Attempt any 5 questions.**(7 x 5 = 35)**

- a. Define "Environmental Science" and "Ecology". List the various branches of ecology.
- b. What is soil pollution? Write the sources and names of soil pollutants.
- c. Discuss the role played by the government in controlling water pollution.
- d. Write short notes on:-
 - (i) Vibration damping
 - (ii) Cost of noise pollution
- e. Justify the necessity of developing non-conventional sources of energy.
- f. Explain the concept of sustainable development and carrying capacity.
- g. Discuss the role played by the non-conventional energy resources towards the protection of the environment?

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.**
 - a. Discuss the concept of "balance of nature" and "carrying capacity" of the environment? **(7.5)**
 - b. Comment on the statement, "All the solar energy trapped by green plants ultimately returns to the environment". **(7.5)**
- Q. 4.**
 - a. Define wetlands. Briefly discuss the formation and classification of wetlands? **(7.5)**
 - b. List the measures required to be taken for efficient land management? **(7.5)**
- Q. 5.** Justify the need for waste water treatment. Briefly outline the different steps of waste water treatment? **(15)**
- Q. 6.**
 - a. What measure can be taken for suppression of noise at sources? Also write a short note on control at receivers end? **(7.5)**
 - b. Justify the need for a forest management. List the strategies adopted for conserving the forest wealth? **(7.5)**
- Q. 7.**
 - a. Justify the need of Environmental Impact Assessment with flow chart of its process. **(7.5)**
 - b. What are the prevailing practices of environment audit in developed countries? Explain them. **(7.5)**

Enrol. No.

S R H U

Regn. No.

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END SEMESTER EXAMINATIONS, JUNE - 2018

PROGRAM: POLYTECHNIC (CE) SIXTH SEMESTER

COURSE CODE : DCET311

COURSE TITLE : STEEL STRUCTURE DESIGN

[Time allotted: Three hours]

[Max. Marks: 100]

Note: Attempt all Sections & Questions.

❖ Use IS 800-2007 and Steel Tables is permitted.

❖ Use if required - A_{nb} for 18 mm dia. Bolt is 157 mm², 20 mm dia. bolt is 245 mm², 22 mm dia. bolt is 303 mm², 24 mm dia. bolt is 353 mm².

SECTION A

Q. 1. Attempt all questions.

(2 x 10 = 20)

- Define nominal diameter of rivet.
- What is meant by pitch of rivet?
- What are the various types of tension members?
- What is net sectional area?
- What is meant by a strut?
- What are the assumption made in Euler's analysis?
- Why fillet weld are preferred in comparison to butt welds?
- Why concave shape fillet weld are avoided?
- What are the reasons, the riveted joints have lost their importance?
- Explain cast iron, mild steel and wrought Iron.

SECTION B

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- Distinguish between working stress design and limit state design of steel structures.
- Explain the advantage and disadvantages of a bolted connection over a welded connection.
- Explain the advantage of steel roof trusses.
- Calculate the strength of Double cover butt joint; each of the cover plate being 8 mm thick for 22 mm diameter bolt for grade of steel $f_u = 410$ MPa and for bolt of grade 4.6 $f_{ub} = 400$ MPa. The main plates to be jointed are 14 mm thick.
- Determine the service load which can be applied to the fillet weld as shown in Fig.-1. Consider the weld size to be 3mm.

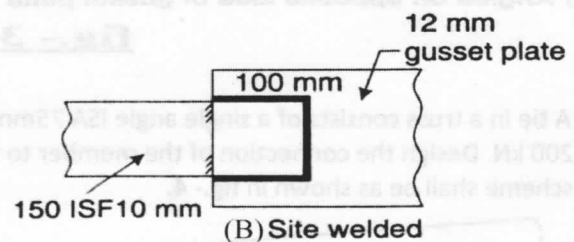
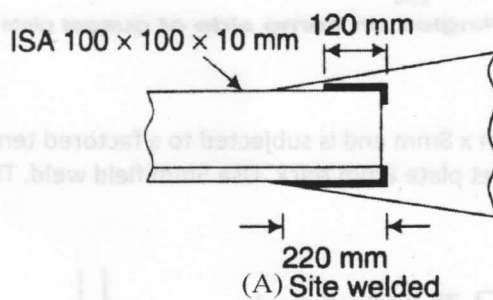


Fig.- 1

- Explain the different types of beams and laterally supported beam & laterally unsupported beams.
- An ISHB 400@ 806.4 N/m is to be used as a column 4 m long with both end restrain against translation and rotation. Determine the design compressive load for the column. Use Fe 410 grade steel.

SECTION C

Attempt any 3 questions.

(15 x 3 = 45)

- Q. 3.** A single bolted double cover butt joint is used to connect two plates of 8 mm thickness. Assume 20mm bolts at 50 mm pitch, calculate the efficiency of the joint. The thickness of cover plates is 4mm. use Fe 410 grade steel.
- Q. 4.** A tie member 75mm x 8mm connected to a 10mm thick gusset plate is to transmit a load of 90 kN. Design the fillet weld and calculate the necessary over lap. Assume site welding. Use Fe 410 grade steel.
- Q. 5.** Calculate the design compressive load which the member shown in **fig.- 2** can support, if the member is of 505m effective length. Use steel grade Fe 410.

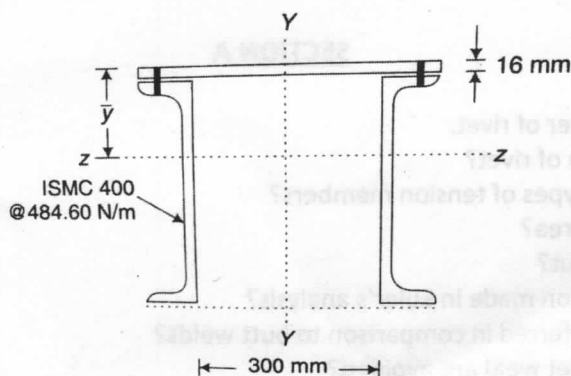
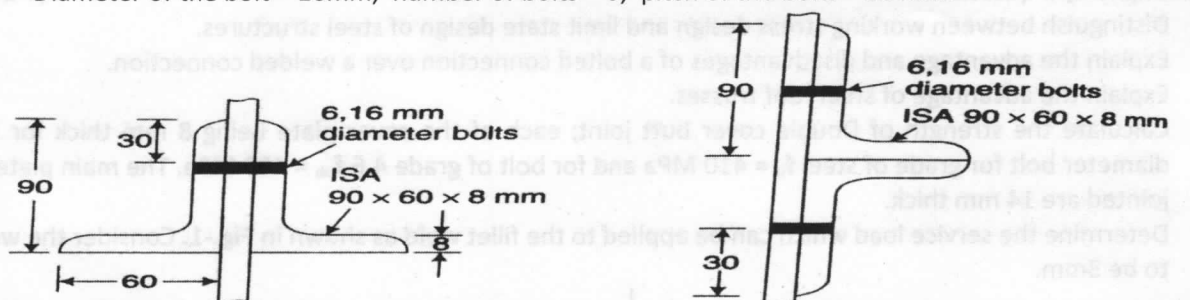


fig.-2

- Q. 6.** Determine the effective net area of double angle section connected to a gusset plate, 12mm in thickness, as shown in **fig.- 3**, for the following data .
Diameter of the bolt = 16mm, number of bolts = 6, pitch of the bolts = 30 mm.



(a) Angles on opposite side of gusset plate

(b) Angles on same side of gusset plate

fig.- 3

- Q. 7.** A tie in a truss consists of a single angle ISA 75mm x 50mm x 8mm and is subjected to a factored tensile force of 200 kN. Design the connection of the member to the gusset plate 8mm thick. Use 5mm field weld. The welding scheme shall be as shown in **fig.- 4**.

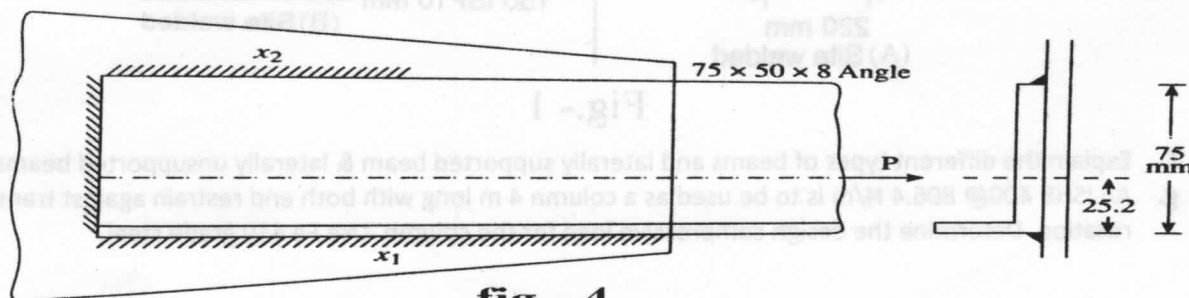


fig.- 4