

Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur

Regular/Back Exam-2079, Bhadra/Ashwin

Program: Diploma in Civil/Hydropower Engg.

Full Marks: 40

Year/Part: II/I (2013, 2017)

Pass Marks: 16

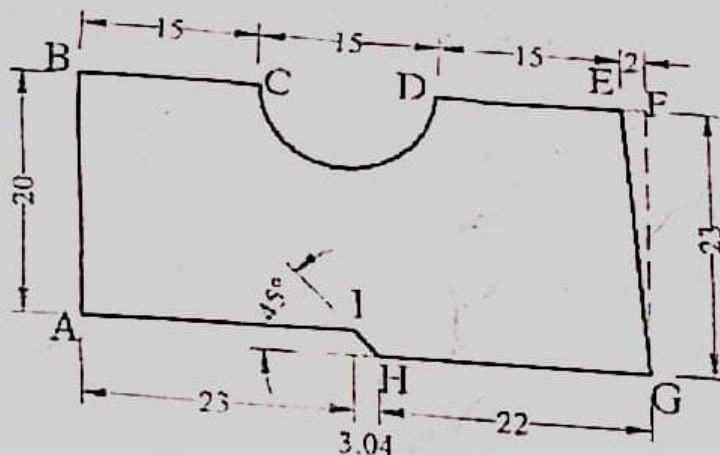
Subject: Computer Aided Drafting

Time: 1½ hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks

Attempt any FIVE questions.

- 1 Define manual drafting. Explain in detail how do you plot a drawing [4+4]
- 2 Explain in detail about the AutoCAD screen with necessary sketch [8]
- 3 List the drawing commands. Explain about dimensions and hatching [2+3+3]
- 4 Write procedural steps to draw the following figure using AutoCAD commands. [8]



5. Write the uses of working with block. Explain drawing [5+3]
6. Write short notes on: (any FOUR) [4×2]
 - a. Use of Modify Commands
 - b. Coordinate Input Methods
 - c. Layer Properties
 - d. Use of CADD with Water Supply Drawings
 - e. Chamfer and Fillet

Good Luck !

6. Write short notes on: (any **FOUR**)
- a. Temporary Adjustment of Level
 - b. Scale and Their Types
 - c. Principles of Chain Survey
 - d. Differential Leveling
 - e. Error in Compass

Good Luck !

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Office of the Controller of Examinations
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Regular/Back Exam-2079, Bhadra/Ashwin

Program: Diploma in Civil Engineering

Year/Part: III/I (2013)

Subject: Applied Mechanics

Full Marks: 80

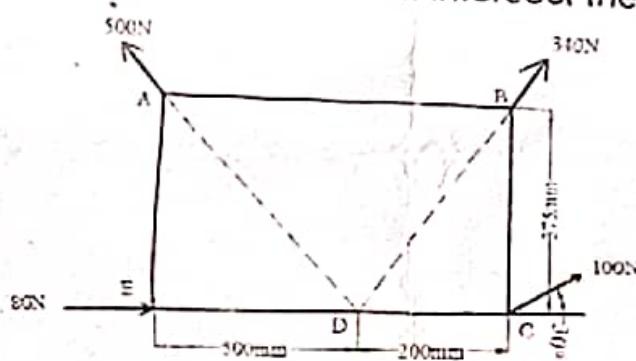
Pass Marks: 32

Time: 3 hrs.

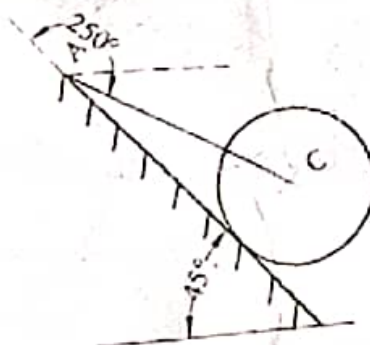
Candidates are required to give their answers in their own words as far as practicable
The figures in the margin indicate full marks

Attempt any FIVE questions.

1. a) Define Applied Mechanics with its scope. Write down the equation of static equilibrium in two and three dimensions. [3+3]
- b) Four forces act on a 700x375 mm plate shown in figure Find the resultant of the force and locate the points where the line of action of resultant intersect the edge of plate. [10]

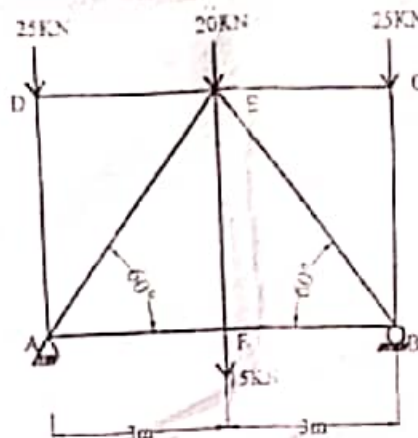


2. a) Define moment and couple. What are the characteristic of couple? [3+3]
- b) Explain about the principle of transmissibility of force with suitable diagram. [4]
- c) A Roller of weight 10KN rests on a smooth inclined plane and is kept free from rolling down by a string as shown in fig. below workout tension in the spring and reaction at the point of contact B. [6]

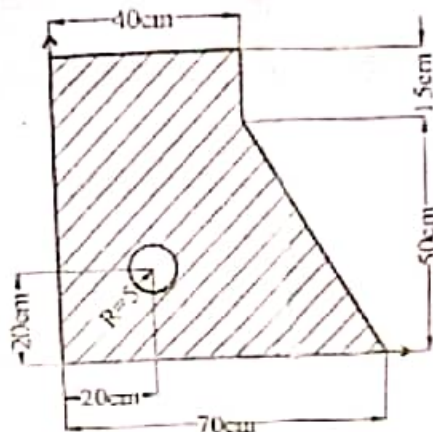


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3. a) Define friction. Write down the laws for dry friction.
b) Find the forces in the member of the given truss.

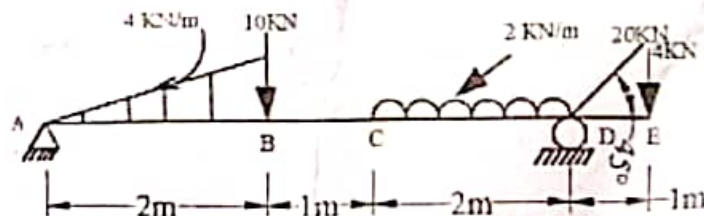


4. a) Locate the centroid of given shaded area.



- b) Derive the relation between load, shear force and bending moment for a beam. [6]

5. a) State and prove parallel axis theorem. [6]
b) Find support reactions of given figure. [10]



6. Write short notes : (any **FOUR**)

- Free body diagram
- Varignon's theorem
- Radius of gyration
- Statically determinate and indeterminate structure
- Condition of sliding and tipping of a body

Good Luck!

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Office of the Controller of Examinations
Sanothimi, Bhaktapur

Regular/Back Exam-2079, Bhadra/Ashwin

Program: Diploma in Civil/Computer/ Electronics
/Architecture/IT/Hydropower/ Engg.

Full Marks: 80

Year/Part: II/I (2013, 2018, 2014, 2016, 2017)

Pass Marks: 32

Subject: Engineering Mathematics III

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Group 'A'

Attempt All Questions.

[3x(5+5)=30]

1. a) Using definition, find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ when

$$f(x, y) = x^3 + y^3 + 3axy$$

- b) Find $\frac{du}{dt}$ of $u = e^{xyz}$, $x = t^3$, $y = \frac{1}{t}$, $z = e^t$.

2. a) Define Group. Prove that the identity element of group is unique. Also show that the inverse of group is unique.

- b) If $G = \{\dots, -6, -4, -2, 0, 2, 4, 6, \dots\}$ then prove that $(G, +)$ is a group.

3. a) Test whether the following series is absolutely or conditionally convergent:

$$1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \dots$$

- b) Find the Taylor's series expansion of $f(x) = e^{-x}$ about $x = 2$.

Group 'B'

Attempt All Questions.

[10x5=50]

4. Solve by separating the variables:

a) $e^{x-y} dx + e^{y-x} dy = 0$

b) $\frac{dy}{dx} = -\frac{1+\cos 2y}{1-\cos 2x}$

5. a)

5. Solve the homogeneous differential equation: $\frac{dy}{dx} = \frac{x^2 y}{x^3 + y^3}$

Cont

6. Find the Fourier series expansion of $f(x) = \begin{cases} 0 & -\pi < x < 0 \\ 1 & 0 \leq x < \pi \end{cases}$
7. Define periodic function. Find the smallest positive period of P of $\sin nx$.
8. Prepare Cayley table for the set $\{0,1,2,3,4,5\}$ under the operation multiplication module 6. Identify the identity element and the inverse of each element if possible.
9. Solve the partial differential equations : (Any One)
- i) $\frac{\partial z}{\partial x}xz + yz \frac{\partial z}{\partial y} = xy$. ii) $xp - yq + x^2 - y^2 = 0$
10. Find the interval and radius of convergence of the series:
- $$\sum_{n=1}^{\infty} (-1)^{n-1} \frac{x^n}{n^2}$$
11. Verify Euler's theorem for homogeneous function $f(x, y, z) = x^2 + y^2 + z^2$.
12. Define convergent and divergent series. Determine whether the followings series is convergent or divergent by ratio test
- $$\frac{1}{2}x^2 + \frac{2}{3}x^3 + \frac{3}{4}x^4 + \dots$$
13. Test whether the function is even or odd. Find the corresponding fourier series

$$f(x) = \begin{cases} \pi & -1 < x < 0 \\ -\pi & 0 \leq x < 1 \end{cases}$$

Good Luck!

$$e^x \frac{1}{e^y} dx + dy : \frac{1}{e^x} dy = 0$$

$$\frac{e^x}{e^y} dx = -e^y dy$$

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Regular/Back Exam-2079, Bhadra/Ashwin

Program: Diploma in Civil/Hydropower Engineering Full Marks: 80

Year/Part: II/I (2013, 2017)

Subject: Basic Hydraulics

Pass Marks: 32

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks

Attempt any FIVE questions.

1. a. Define the terms: mass density and specific gravity. Explain [4+4]
Newton's law of viscosity with all necessary diagram.
b. A rectangular plate of $0.5 \text{ m} \times 0.5 \text{ m}$ dimensions weighting 500 N slides down on inclined plane making 30° angle with horizontal, at a velocity of 1.75 m/sec . If the 2 mm gap between the plate and inclined surface is filled with a lubricating oil, find its viscosity and express it in poise as well as Ns/m^2 . [8]
2. a. Derive an expression to find total pressure and center of pressure on inclined plane submerged surface. [8]
b. Find the total pressure and position of center of pressure on a triangular plate of base 2 m and height 3 m which is immersed in water in such a way that the plane makes an angle of 60° with free surface of water. The base of plate is parallel to the water surface and at a depth of 2.5 m from water surface. [8]
3. a. Water flows through a pipe of AB 1.2 m diameter at 3 m/sec and then passes through a pipe BC 1.5 m diameter at C the pipe branches. Branch CD is 0.8 m in diameter and carries one third of flow in AB. The flow velocity in branch CE is 2.5 m/sec . Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and diameter of CE. [8]
b. Derive Bernoulli's theorem with all necessary assumption and its applications. [8]
4. a. What is venturimeter? Derive an expression for the discharge through venturimeter. [2+6]
b. An orifice meter with orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauge fitted upstream and downstream of orifice meter gives reading of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. Coefficient of discharge for the meter is given 0.6. Find the discharge of water through the pipe. [8]
5. a. A crude oil of kinematic viscosity 0.4 stroke if flowing through a pipe of diameter 300 mm at the rate of 30 lit/sec . Find the head loss due to friction for a length of 50 m of the pipe. [8]

Cont.

Regular/Back Exam-2079, Bhadra/Ashwin

Program: Diploma in Civil/Hydropower Engineering Full Marks: 80

Year/Part: III/I (2013, 2017)

Subject: Building Construction

Pass Marks: 32

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt any **FIVE** questions.

1. a. Write down the general components of a building. Explain [2+6]
briefly the general rules of vastu
b. What do you mean by bearing capacity of soil? Explain [2+6]
methods of improving bearing capacity of soil
2. a. Explain the objectives of partition wall with listing its types. [6+2]
b. Define masonry. Explain the uses of reinforced brickwork. [2+6]
3. a. Define damp proofing. Explain the method of damp [2+6]
proofing
b. Explain concreting process. Describe steel formwork in [5+3]
brief.
4. a. Define door and its parts. Explain the difference between [2+6]
paneled door and flush door with details.
b. Define floor and its components. Describe detail [2+6]
constructions process of marble floor finish.
5. a. Define lintel. Explain types of lintels in terms of materials [2+6]
used.
b. What are the requirements of a good stair case? Describe [2+6]
the technical terms used in the stair case with neat
sketches.
6. Write short notes on: (any **FOUR**) [4×4]
 - a. Method of Proportioning Concrete Mixes
 - b. Parqueting
 - c. Types of Shoring
 - d. Causes of Earthquake
 - e. Effect of Earthquake on Buildings
 - f. Water Cement Ratio

Good Luck !

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Program: Diploma in Civil Engineering

Year/Part: II/I (2013)

Subject: Surveying I

Full Marks: 80

Pass Marks: 32

Time: 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt any FIVE questions.

1. a. Write difference between plane survey and geodetic survey. [3+5] ✓
Explain the basic principle of surveying.
- b. What is direct ranging? Write down the steps of direct ranging. [2+6]
2. a. Define accuracy and precision. Explain indirect method of chaining on sloping ground with neat sketches. [2+6]
- b. Explain field procedure of chain survey. [8]
3. a. A 50 m steel tape weighing 0.68 kg was standardized on the catenary and found to have length 49.99 m at 20°C, tension 5 kg. Calculate length of 30 m span at 26°C. [8]
Take $E = 2.1 \times 10^6 \text{ kg/cm}^2$
 $\alpha = 3.5 \times 10^{-6} / ^\circ\text{C}$
- b. Define meridians, bearing angles, fore bearing and back bearing. [4×2]
4. a. Explain about two peg test. [8]
- b. The following bearings were taken in closed compass traverse. [8]

Line	Fore Bearings	Back Bearings
AB	124°30'	304°30'
BC	68°15'	246°0'
CD	310°30'	135°15'
DA	200°15'	17°45'

Find the stations which are affected by local attraction. Find correct bearing of lines and compute the interior angles too.

5. a. Define line of collimation. List out and explain the classification of levelling based on principle. [2+6]
- b. The following consecutive reading were taken with a level and 3 m levelling staff on a continuous sloping ground at a common interval of 20 m. 1.324, 1.860, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824. The RL of first point was 150 m. Calculate RL of every station by any method. [2+6]

Cont.