Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

.gular/Back Exam-2078, Magh/Falgun (Scholarship+Regular)

rogram: Diploma in Engineering All — **Full Mark: 80**

Year: I/II (New+Old Course) — **Pass Mark: 32**

Subject: Engineering Mathematics II — ***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) Construct a $3x3$ matrix whose elements are given by $a_{ij} = 3i - 2j$. [5]

   b) Solve using row equivalent matrix method or Cramer's rule. [5]

   $x + y - z = 3$

   $2y + z = 10$

   $5x - y - 2z = -3$

2. a) If Z and W are two complex numbers, prove that $|z| + |w| \geq |z + w|$ [5]

   b) State and prove De-Moivre's Theorem. [5]

3. a) Using vector method, prove that [5]

   $$\mathrm{Sin}(A + B) = SinA.CoSB + CoSA.SinB$$

   b) Find the area of the parallelogram determined by the vectors $\vec{i} + \vec{j} + \vec{k}$ and $\overrightarrow{-2i} + \overrightarrow{3j} + \vec{k}$. [5]

Group 'B'

Attempt All questions. **[10x5=50]**

4. From the following table calculate the coefficient of correlation. [5]

X	4	8	10	2	6
Y	8	7	5	11	9

Cont.....

5 Find the local maxima and minima and points of inflection :

$f(x) = 2x^3 - 9x^2 - 24x + 3$

6. Find the area of a circle $x^2 + y^2 = a^2$.

7. Calculate mean, standard deviation and C.V. from the following data : [5]

Age	0-10	10-20	20-30	30-40	40-50
No.of student	7	12	24	10	7

8. If the volume of the expanding cube is increasing at the rate of 24 cm^3/min, how fast is the surface area increasing when the surface area is 216 cm^2? [5]

9. Maximize and minimize $z = 12x + 3y$ subject to $x + y \geq 12$, $3x + 2y \geq 25$ *and* $x, y \geq 0$. [5]

10. A coin is tossed 5 times. Find the probability of getting [5]
i) exactly 2 head ii) no head

11. Prove that : [5]

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$$

12. Find the equation of the plane through the intersection of the planes $x + y + z = 6$ *and* $2x + 3y + 4z + 5 = 0$ and perpendicular to the plane $44x + 5y - 3z = 8$. [5]

13. A chance that A, B and C can solve a problem is $\frac{1}{3}, \frac{1}{4}$ *and* $\frac{1}{5}$ respectively. Find the probability that the problem will be solved. [5]

Good Luck!

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Program: Diploma in Geomatics/Civil/Hydro/ Architecture Engg. **Full Marks: 40**

Year/Part: I/II (2018, 2013, 2017, 2014) **Pass Marks: 16**

Subject: Computer Application **Time: 1.5 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 Four questions.

1. a) Differentiate between computer Hardware and Software. [5]
   b) Draw a well labelled block diagram of digital computer. [5]
2. a) What do you mean by an Operating System? What are its functions? [2+3]
   b) Differentiate between GUI and CLI with examples. [5]
3. a) Differentiate between a word processing package and a spreadsheet package. Why do we use MS Powerpoint? [3+2]
   b) Define Database. Explain DBMS. [1+4]
4. a) Define computer virus. List its removal techniques. [1+4]
   b) Explain the concept of client and server with a suitable figure. [2+3]
5. Write short notes on: **(Any Five)** **[5x2=10]**
   i) NIC
   ii) LAN
   iii) Disk Operating System
   iv) Web Browsers
   v) Auxiliary Memory
   vi) Optical Storage

Good Luck !

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Program:	**Diploma in Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (New + Old Course)**	**Pass Marks: 24**
Subject:	**Chemistry II**	**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. **[6x(5+5)=60]**

1. a) What do you mean by hardness of water? How can you remove the temporary hardness of water? [2+3]
   b) How nitric acid is manufactured by Ostwald's process? Explain with diagram? [5]
2. a) How is ammonia manufactured by Haber's process? Explain what happen when excess ammonia reacts with chlorine. [4+1]
   b) Define acid rain. Explain oxides of carbon as pollutants. [5]
3. a) Explain contact process of manufacture of ~~nitric~~ Sulphuric acid with labelled diagram. [5]
   b) How can you prepare hydrochloric acid in laboratory? Explain with figure. [5]
4. a) What do you mean by vital force theory? Why is it failed now? [4+1]
   b) What is meant by nitrogen fixation? Describe the nitrogen cycle with flow sheet diagram. [4+1]
5. a) What do you mean by alkali metals? Explain the properties of sodium. [5]
   b) Define allotropes. What are the properties of calcium as alkaline earth metal? [5]
6. a) Explain the properties of methane in brief. [5]
   b) Write short notes: **(Any Two)** [2x2.5=5]
      i) Homologous series
      ii) Functional group
      iii) Polymer
      iv) Aeromatic compounds

Good Luck !

[6x4=24]

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Program:	**Diploma in Civil/Hydropower Engineering**	**Full Marks: 80**
Year/Part:	**I/II (2013)**	**Pass Marks: 32**
Subject:	**Engineering Materials**	**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 Stone. How is compressive strength of stone is tested? Describe. [2+6]

   b. Write the source, properties and types of asbestos. [8]

2. a. What are the characteristics of good building stone. [8]

   b. What are the method of moulding the brick? Explain any one. [3+5]

3. a. Explain the classification of lime. [8]

   b. Explain the quality of good brick. [8]

4. a. With the flow diagram, show how you manufacture of cement by wet process. [8]

   b. What do you mean by seasoning of timber? Explain the defect in timber with sketches. [2+6]

5. a. Explain about plywood and glass. [4+4]

   b. Differentiate between ferrous and non-ferrous material. [8]

6. a. What is the uses of varnishes? Differentiate between varnishes and paint. [5+3]

   b. How consistency test of cement is carried? Explain. [8]

Good Luck !

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Program:	**Diploma in Engineering ALL**	**Full Marks: 60**
Year/Part:	**I/II (New + Old Course)**	**Pass Marks: 24**
Subject:	**Physics II**	**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 Any Four questions. [4x6=24]

1. Define electric potential and intensity at a point due to a charge Obtain an expression for the potential difference between two points r_1 and r_2 from charge +Q.
2. Describe the Wheastone bridge circuit and deduce the condition for balance using Kirchhoff's law.
3. State Bio Savart's law. Use this law to find the magnetic field at a point due to current carrying long straight conductor.
4. Explain, why it is not possible to have interference with two head light of a motor car. Describe young's double slit experiment for the measurement of wavelength of monochromatic source of light.
5. Define work function and stopping potential. Derive Einstein's Photo electric equation.
6. State Bohr's postulates and hence derive expression for the energy of electron in n^{th} orbit of hydrogen atom.

Group 'B'

Attempt Any Four questions. [4x3=12]

7. Derive an expression for energy stored in a capacitor.
8. What is galvanometer? How is a galvanometer converted into Ammeter?
9. State and explain Lenz's law.
10. Explain the use of PN diodes as Half wave rectifier.
11. Write Newton's formula for velocity of sound in air. What correction was applied by Laplace and why?

Cont.....

12. State and prove Brewster's law.

Group 'C'

Attempt <u>Any Six</u> questions. [6x4=24]

13. Three charges of $3x10^{-9}c$, $-3x10^{-9}c$ and $1.5x10^{-9}c$ are placed in air at the corners A, B and C of an equilateral triangle ABC having side 5cm. Find the force acting on the charge $1.5x10^{-9}c$.
14. A metallic wire has a diameter of 4.12mm. When the current in the wire in 8.0 A, the drift velocity of electron is $5.40x10^{-5}$ m/s. What is the density of free electrons in the metal?
15. A 40Ω resistance, 3mH inductor and 2μf capacitor are connected in series to a 110V, 50Hz a.c. source. Calculate the value of current in the circuit.
16. Find the force and energy density when 2m long and 3mm thick wire is extended by 1.4mm (Young's modulus of wire is $2x10^{11}$ N m^{-2}).
17. Find the temperature at which velocity of sound is double to the velocity of sound at N.T.P.
18. A capillary tube of 0.3cm diameter is placed vertically inside a liquid of density 800 kg/m^3, surface tension $5x10^{-4}$ N/m and angle of contact 30°. Calculate to which the liquid rises in the capillary tube.
19. Light of wave length 6000Å falls on a photosensitive plate of work function 1.9 eV. Find i) Kinetic energy of the photo electron emitted and ii) Stopping potential. ($h=6.62x10^{-34}$Js)
20. The half-life of $_{92}U^{238}$ is $4.5x10^9$ years. Calculate the activity of 1 gm sample of $_{92}U^{238}$.

Good Luck !