KATHMANDU

DON BOSCO COLLEGE

1st Terminal Exam – 2060

Stream: Science **F. M. : 75**

Class: XII **P. M. : 30**

Subject: Chemistry **Time: 3 Hrs.**

Group A

Attempt any fifteen questions: ***[15x2=30]***

1. Predict the geometry of CH_4 and NH_3 molecule on the basis of VSEPR theory.
2. Define sigma and pi bond.
3. Give one visual test to distinguish between methyl alcohol and ethyl alcohol.
4. 'Phenol is more acidic than ethyl alcohol' verify the statement.
5. Identify X,Y and Z in the following sequence of reaction.

$$CH_3CHO \xrightarrow{CH_3CH_2MgI} x \xrightarrow{H_2O/H^+} Y \xrightarrow{HBr} z$$

6. Convert on propyl alcohol into isopropyl alcohol.
7. What is fermentation?
8. Why is boiling point of ethanol greater than its isomer methoxy methane?
9. How is bakelite formed?
10. Write down the structure of (a) phenetole (b) 2 ethoxy propane.
11. What is Gattermann's reaction?
12. Define Normality and Molarity.
13. What do you mean by equivalent wt. of oxidising agent? Calculate the equivalent wt. of $KMnO_4$ in the following reaction $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{+2} + 4H_2O$
14. What is indicator? Why indicator is not used in the redox titration?
15. Identify the following acid and base according to your concept

    i. H_2CO_3 ii. $FeCl_3$ iii. RNH_2 iv. NH_2^-

16. Prove that HSO_4^- is an amphoteric ion.
17. 0.62 gm of monohydrate Na_2CO_3 is treated with 100 ml of 0.1 MH_zSo_4 whether the solution is acidic, basis or neutral.
18. What happens when zinc is exposed to moist air?
19. What is granulated zinc?
20. Why is zinc not considered as a transitional element?

Group B

Attempt any five questions: ***[5x5=25]***

21. What are the concepts of Arrhenuis theory of ionization?
22. A solution of 2.5 gm of sample of impure sodium carbonate is titrated with N/2 HCl of which 55c.c is required for neutralization. Calculate the percentage purity of anahydrous sodium carbonate in the sample.
23. Explain in brief Bronsted Lowry Concept.
24. How would you distinguish between primary, secondary and tertiary alcohol by Victor Meyer's method?
25. Write a short notes on any two of the followings:
    i. Kolbe's reaction ii. Reimer Tiemann's reaction iii. Williamson's synthesis.

26. Describe the laboratory method of preparation of iodoethane with a well labelled diagram.
27. Give a brief note on galvanisation.

Group C

Attempt any two questions: ***[2x10=20]***

28. Describe the laboratory method of preparation of diethyl ether with a neat and labelled diagram. What happens when it is treated with
    a. Cold and conc. mineral acid
    b. Cl_2 in dark condition and in presence of light?

29. Name the two ores of zinc. How would extract the pure zinc from its sulphide ore? Write the action of Zn on (a) Conc HNO_3 (b) Caustic soda solution
30. Explain the hydrolysis of salt with suitable examples.
    How many millilitre of Conc H_2SO_4 of sp. Gravity 1.84 containing 98-/ of sulphuric acid by the weight are required to prepare 200ml of $0.5NH_2SO_4$?
31. Write a short note on (ANY TWO)
    i. Hybridisation ii. Lewis Concept of acids and bases
    iii. Chemistry of white vitrol.

Best of Luck

KATHMANDU

DON BOSCO COLLEGE

1st Terminal Examinations - 2060

Class: XII **Subject: Physics** **F.M: 75**
Time: 3 Hrs **P.M: 30**

(Answers to the numerical problems should be in SI units.)

1. ***Answer all the questions in short:*** **[8×2 = 16]**

(a) Why are bridges declared unsafe after being used for long time?
(b) Oil spreads on cold water but not on hot water, why?
(c) Why is astronomical telescope not suitable for viewing terrestrial objects?
(d) What will happen to the shift of the image in Foucault's method if a tube full of water is placed in between the fixed mirror and the rotating mirror?
(e) What is the principle behind the liquefaction of gases when they are suddenly injected from a compressed chamber to a region of very low pressure?
(f) What is the difference between the internal energy of an ideal gas and a real gas?
(g) What types of metals are suitable for observing photoelectric effect?
(h) Why does a discharge tube appear dark when evacuated to a very low pressure?

2. ***Answer any four in short:*** **[4×2 = 8]**

(a) Ploughing the field helps retain the soil moisture, why?
(b) How can a detergent wash clothes properly?
(c) Earthen vessels are used to cool water in summer, why?
(d) What is the role of inertia in engines?
(e) Why do gases conduct at a very low pressure?
(f) Why can't the photoelectric effect be observed with all wavelengths of light?

3. a. Explain, with necessary theory, the capillary tube method for the measurement of surface tension of a liquid. **[4]**

b. A copper wire, 200 cm long and 1.22 cm in diameter, is fixed horizontally to two rigid supports 200 cm long. Find the mass in grams of the load which when suspended at the midpoint produces a sag of 2 cm at that point. [Young's Modulus of copper = 12.3×10^{10} N/m^2]. **[3]**

4. a. State Huygen's principle and prove the laws of reflection based on it. **[4]**

b. A refracting telescope has an objective of focal length of 1 m and eyepiece of focal length 20 cm. A real image of the sun 10 cm in diameter is formed on the screen, 24 cm from the eyepiece. What would be the angle subtended by the sun at the objective? **[3]**

5. a. Define adiabatic process. Find the relationship between pressure, volume and temperature in an adiabatic change. **[4]**

b. Gas in a cylinder, initially at a temperature of 17 ^{0}C and a pressure of 1.01×10^5 N/m^2, is to be compressed to one-eighth of its volume. What would be the difference between the amounts of work done it the compressions were done isothermally and adiabatically? [R = 8.31 J/molK, γ = 1.4] **[3]**

6. a. Describe the theory of Millikan's Oil drop experiment for determining the charge of an electron. [4]

or

Describe an experiment to determine the ratio of charge to mass (e/m) for an electron. [4]

b. An electron having 450 eV of energy moves at right angles to a uniform magnetic field of the magnetic field density 1.5×10^{-3} T. The electron then moves in a circle. Find the radius of the circle. [Given: $\frac{e}{m_e} = 1.76\times10^{11}$ J/kg.] [3]

7. a. Describe the working of a petrol engine with appropriate illustrations. Also derive an expression for the efficiency of the engine. [5]

b. A point object is placed on the axis of, and 3.6 cm from, a thin converging lens of focal length 3.0 cm. A second thin converging lens of focal length 16.0 cm is placed coaxial with the first and 26.0 cm from it on the side remote from the object. Find the position of the final image produced by the two lenses. [4]

8. a. Describe an experiment to determine the velocity of light by Foucault's method. [4]

b. Cesium has a work function of 1.9 eV. Find the threshold wavelength, the maximum energy of the liberated electrons when the metal is illuminated with a radiation of wavelength 4.5×10^{-7} m, and the stopping potential.

[Given: 1 eV = 1.6×10^{-19} J, h = 6.6×10^{-34} Js, c = 3×10^{8} m/sec] [3]

9. What is elasticity? Derive an expression for the energy density in a stretched wire. [3]

10. Calculate the angle of contact if mercury in a capillary tube of radius 0.05 cm is depressed by 1.22 cm. [Surface tension of mercury = 540 dynes/cm, density of mercury = 13.6 gm/cm^3.] [4]

"We cannot teach people anything. We can only help them discover it themselves."

Galileo Galilei

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KATHMANDU

DON BOSCO COLLEGE

1st Terminal Exam – 2060

Stream: Science **F. M. : 75**
Class: XII **P. M. : 30**
Subject: Biology **Time: 3 Hrs.**

Section 'A' Zoology

Attempt all questions:

1. Answer the following questions in short: **[1x8=8]**

a. Mention the exocrine glands found in alimentary canal.
b. Write the dental formula of man.
c. How do you differentiate duodenum & ileum histologically?
d. Give one important effect of fertilization.
e. What happens during contraction of lips of blastopore?
f. What is organogenesis?
g. Which hormone stimulates the growth of groaflain follicle?
h. What is menopause?

2. Answer the following questions: **[3x5=15]**

a. Write in brief about marasmus & kwashiorkor disease.
b. Describe in brief the structure of thecodont teeth.
c. Give a short account gastrulation.
d. Explain the process of coelom formation.
e. Discuss the population growth in brief.

3. Describe in brief the physiology of digestion in man. [8]

Or

With well-labelled diagram describe the human digestive tract.

4. Discuss the process of gastrulation during the development of frog. [7]

Or

Explain the important changes that take place in Menstrual cycle.

Section 'B' Botany

1. Answer the following questions in short: ***[1x7=7]***

a. Define ascent of sap.

b. What is root pressure?

c. What is micropropagation?

d. Define the term double fertilization.

e. Give different histogen layers in plants.

f. Give an example of Polygenic inheritance.

g. What is cistron.

2. Answer the following questions: **[3x5=15]**

a. Give outline sketch of vegetative propogation.

b. Draw a well-labelled diagram of L.S. of ovule.

c. Justify "Transpiration is called as necessary evil."

d. What is monohybrid cross? Describe Mendel's monohybrid cross with an example.

e. Differentiate between dicot stem and Monocot stem.

3. Describe the process of development of microspore within micro-sporangium with well labelled diagram. [8]

Or

Enumerate the various factors affecting transpiration.

4. What is secondary growth? Describe the process of secondary growth in dicot stem. [7]

Or

What is epistasis? Explain in brief about the dominant and Recessive epistasis.

Best of Luck

KATHMANDU

DON BOSCO COLLEGE

1st Terminal Exam – 2060

Stream: Science **F. M. : 100**

Class: XII **P. M. : 40**

Subject: Mathematics **Time: 3 Hrs.**

Attempt all questions:

GROUP A

Short Answer Questions: **[(6x3)x2=36]**

1. (i) Find the equation of the circle which touches the positive x-and y-axis and whose radius is 5 units.
   (ii) If the line $\lambda x + my = 1$ touches the circle $x^2 + y^2 = a^2$, prove that the point (λ, m) lies on a circle whose radius is 1/a.
   (iii) Find the equation of the parabola whose focus is at (-1,2) and directrix $x = 5$.

2. (i) Find the scalar projection of $\vec{a} = \hat{i} + 3\vec{j} + 6\vec{k}$ on $\vec{b} = 3\hat{i} - 3\vec{j} + 4\vec{k}$.
   (ii) If the position vectors of A and B are $3\hat{i} + \vec{j} - 3\vec{k}$ and $4\hat{i} + 2\vec{j} - \vec{k}$, find the direction cosines of $\overrightarrow{AB}$.
   (iii) If $\left|\hat{a} + \hat{b}\right| = \left|\hat{a} - \hat{b}\right|$, then prove that $\vec{a}$ is perpendicular to $\vec{b}$.

3. (i) Prove vectorially the projection law
   $c = a\cos B + b\cos A$
   (ii) Draw a pie chart of the following data.

Food	Rent	Clothing	Education	Other item
6000	2000	1000	1500	500

   (iii) Find the model mark of the following frequency distribution.

Marks:	0-10	10-20	20-30	30-40	40-50
No. of Students	4	12	15	20	16

4. (i) If a,b,c be in AP, b,c,a in HP, then prove that c,a,b are in G.P.
   (ii) Sum to infinity:
   $1 - 5a + 9a^2 - 13a^3 + \ldots\ldots\ldots\ldots$ to ∞ $(-1 < a < 1)$
   (iii) From a group of 11 men and 8 women, how many committees consisting of 3 men and 2 women are possible?

5. (i) In how many ways can the letters of the word 'Don Bosco' be arranged so that it starts with D?

   (ii) Find the seventh term in the expansion of $(2a + 3x)^{10}$

   (iii) A ball is thrown vertically upwards at a speed of 4.0 ms^{-1}. Find the maximum height reached and the time taken to attain its original position.

6. (i) A bullet is fired into a target loses half its velocity after penetrating 3 cms. How much further will it penetrate?

(ii) If $\vec{a}$ and $\vec{b}$ are the vectors determined by the two adjacent sides of a regular hexagon, what are the vectors determined by the other sides taken in order?

(iii) A variate takes the value a, ar, ar^2,……, ar^{n-1} with frequency unity. Then prove that its arithmetic mean, A.M is

$$\text{A.M.} = \frac{a(1-r^n)}{n(1-r)}$$

GROUP B

Long answer questions: **[(8x2)x4=64]**

7. (i) A cat seeing a mouse at a distance of 15m before it, starts from rest with an acceleration of $2m/s^2$ and pursues it. If the mouse be moving uniformally with a velocity of 14 m/s, find when and where the cat will catch the mouse.

(ii) A stone falling from the top of a vertical tower has descended x metre, when another is let fall from a point y metre below the top. If they fall from rest and reach the ground together, show that the height of the tower is $\frac{(x+y)^2}{4x}$ metres.

8. (i) Prove that the following vectors are coplanar:

$$\vec{a}-2\vec{b}+3\vec{c},\ -2\vec{a}+3\vec{b}-4\vec{c},\ -\vec{b}+2\vec{c}$$

(ii) Find the angles of a triangle whose vertices are given by the vectors

$$2\vec{i}-\vec{j}+\vec{k},\ \vec{i}-3\vec{j}-5\vec{k},\ \text{and}\ 3\vec{i}-4\vec{j}-4\vec{k}$$

9. (i) Prove by vector method,

Sin (A+B) = SinA CosB + CosA SinB.

(ii) If $\vec{a}=\vec{i}+3\vec{j}+2\vec{k}$ and $\vec{b}=2\vec{i}-4\vec{j}+\vec{k}$. Find a unit vector along $\vec{c}$ such that $\vec{a}.\vec{c}=0$ and $\vec{b}.\vec{c}=0$.

10. (i) Prove that the A.M., G.M. and H.M. between any two positive unequal quantities form a G.P. and hence prove that they are in descending order.

(ii) Show that the sum of the cubes of the first n natural numbers is the square of the sum of the first n natural numbers

11. (i) Prove that: $P(n,r) = \frac{n!}{(n-r):}, (r \le n)$

where the notations have their usual meaning.

(ii) Prove that: c(n,r) + c(n,r+1) = c(n+1, r+1) and hence find the value of 10_{C_5} + 10_{C_6}

12. (i) A body is projected upwards with a certain velocity and it is found that when in its ascent it is 58.8m from the ground, it takes 4 secs, to return to the same point again. Find the velocity of projection and the whole height ascended. ($g=9.8m/sec^2$)

(ii) When will the general equation of second-degree $ax^2+2hxy+by^2+2gx+2fy+c=0$ represent a circle? Find the equation of a circle passing through the point of intersection of two circles,

$x^2+y^2+3x-4y-3=0$ and $x^2+y^2-3x-8y-5=0$ and whose centre lies on the y-axis.

13. (i) Find the equation of the line through the point (1,-1) which cuts off a chord of length $4\sqrt{3}$ from the circle $x^2+y^2-6x+4y-3=0$

(ii) The following frequency distributions is the marks obtained by 40 students in a terminal examination. Find median and mean marks.

Marks (more than)	40	50	60	70	80	90
No. of Students	40	32	26	16	8	2

14. (i) What do you mean by conic section? Find the equation of the parabola in the standard form $y^2=4ax$.

(ii) Find Q_3, D_7 and P_{85} from the data given below:

Income	Below 100	100-150	150-200	200-400	Above 400
No. of person	15	25	40	20	10

Best of Luck

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DON BOSCO COLLEGE

1st Terminal Exam – 2060

Stream: Science **F. M. : 100**

Class: XII **P. M. : 40**

Subject: Extra Mathematics **Time: 3 Hrs.**

Attempt all questions:

GROUP A

Short Answers Questions: **[(5x3)x3=45]**

1. (i) Find the equation of the circle whose centre is at (4,5) and tangent being the line $3x-4y+2=0$.
   (ii) Find the equation of tangent and normal to the circle $x^2+y^2-2x-4y+3=0$ at the point (2,1)
   (iii) Find the value of k so that the length of tangent from (4,5) to the circle $x^2+y^2+2ky=0$ is 1.

2. (i) If a,b,c be in H.P, prove that : $\frac{b+a}{b-a}+\frac{b+c}{b-c}=2$.
   (ii) The sum of an infinite number of terms in G.S. is 15 and the sum of their squares is 45, find the series.
   (iii) Sum to infinity: $1+3x+5x^2+7x^3+\ldots\ldots\ldots\ldots$ to ∞

3. (i) Sum to n terms of the series: $2.3+3.4+4.5+\ldots\ldots\ldots\ldots$
   (ii) Draw a pie chart of the data:

Education	Clothing	Rent	Food	Miscellaneous
1500	1000	2000	5000	500

   (iii) A ball is thrown vertically upwards at a speed of $4.0ms^{-1}$. Find the maximum height reached and the time taken to attain its original position.

4. (i) A bullet is fired into a target loses half its velocity after penetrating 3 cms. How much further will it penetrate?
   (ii) A point traveling at 20 cm/s accelerates uniformly at $5cm/s^2$. Find the distance traveled in 6^{th} second.
   (iii) Find the equations of the tangent to the circle $x^2+y^2=4$ which are parallel to $3x+4y-5=0$.

5. (i) In how many ways can the letters of the word 'Don Bosco' be arranged so that it starts with D?
   (ii) How many number of different digits less than 500 can be formed from the integers 1,2,3,4,5,6?
   (iii) From a group of 11 men and 8 women, how many committees consisting of 3 men and 2 women are possible?

GROUP B

Long Answers Questions: **[(11x5=55]**

6. Find the sum of the squares of first n natural numbers and hence find the sum $1^2+2^2+\ldots\ldots\ldots+(36)^2$

7. Prove that the A.M., G.M. and H.M. between any two unequal positive numbers form in G.P. and hence: A.M. > G.M. > H.M.
8. The A.M. between two numbers exceeds their G.M. by 2 and G.M. exceeds the H.M. by 1.6, find the numbers.
9. Find the condition that the straight line $y = mx + c$ to be a tangent to the circle $x^2 + y^2 = a^2$. Using this condition, does the line, $y = -x + 4$ is tangent to the circle $x^2 + y^2 = 8$?
10. Prove that the two circles $x^2 + y^2 + 2ax + c^2 = 0$ and $x^2 + y^2 + 2by + c^2 = 0$ touch if $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$
11. Find the equation of the circle, which touches the x-axis at the point (3,0) and passes through the point (1,2). Further write down the equation of family of concentric circles with centre at (3,-4)
12. Two cars start off to race with velocities v_1 and v_2 travel in a straight line with uniform accelerations a_1 and a_2. If the result be a dead heat, prove that the length of the course is $\frac{2(v_1 - v_2)(v_1 a_2 - v_2 a_1)}{(a_1 - a_2)^2}$
13. A stone falling from the top of a vertical tower has descended x metre, when another is let fall from a point y metre below the top. If they fall from rest and reach the ground together, show that the height of the tower is $\frac{(x+y)^2}{4x} metres.$
14. Prove that the total number of permutations of a set of n objects taken r at a time is $n_{p_r} = \frac{n!}{(n-r)!}$
15. Prove that $C(n+1, r+1) = C(n, r) + C(n, r+1)$ and hence find the value of $10_{c_4} + 10_{c_5}$

Or

Form 10 persons in how many was can a selection of 4 be made?

i) When one particular person is always included.
ii) When two particular persons is always excluded.

16. A motor car travels 200 metres in 2 seconds of its motion and 360 meters in the next 3 seconds. If the acceleration be uniform, find how far it will travel in the next 4 second?

Best of Luck