



KATHMANDU

DON BOSCO COLLEGE

Pre Board Examination - 2060

Class: XII

Time: 3 Hrs

Subject: Physics (Set "A")

F.M:75

P.M:30

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

1. Attempt all questions in brief. [8 X 2 = 16]
 - a. Why do clouds seem floating in the sky?
 - b. Can mechanical energy be converted continuously and completely into heat? Is reverse is also possible?
 - c. In using a magnifying glass, is the magnification greater when the glass is close to the object or when it is close to the eye, explain.
 - d. Why do you see lightening before you hear a thunder?
 - e. A bar magnet falls through a metal ring, will its acceleration be equal to g ? Justify your answer.
 - f. Why does electric discharge occur at low pressure?
 - g. Can the photoelectric effect be observed with all wave lengths of light? Explain.
 - h. What do you mean by energy crisis?

2. Attempt any four questions in brief. [4 X 2 = 8]
 - a. When a wire is bent back and fourth, it becomes hot, why?
 - b. What will be change in the internal energy of the system during the isothermal and adiabatic process?
 - c. A sales person claims that a pair of sun glass has polarized filters, but you suspect. How could you find out for sure?
 - d. Under what conditions beats are formed?
 - e. Why do the transformer core is laminated?
 - f. Why do certain element show natural radioactivity?
 - g. Distinguish between n-type and p-type semiconductor.
 - f. Why is it necessary to conserve the natural resources of energy?

3. a. What is Poisson's ratio? Derive an expression for the energy stored in a stretched wire. [4]

Or

Using dimensional consideration, deduce Poiseulle's formula for the rate of flow of liquid through capillary tube.

- b. In a test experiment on a model aircraft in a wind tunnel, the flow speeds on the upper and lower surfaces of the wing are 80 m/s and 73 m/s respectively. What is the lift on the wing, if its area is 2.5 m^2 ? (Density of air = 1.29 kgm^{-3}) [3]

4. a. What do you mean by isothermal and adiabatic expansions? Derive the relation, $C_p - C_v = R$, where symbols have their usual meanings. [4]

Or

State second law of thermodynamics. Find the expression for the efficiency of carnot engine.

- b. A mass of an air occupying initially 4 liters at a pressure $1.01 \times 10^5 \text{ Nm}^{-2}$ and a temperature of 27°C is expanded adiabatically and reversibly to twice its volume. Calculate its final pressure and temperature. (γ for air = 1.4) [3]

5. a. State Newton's formula for velocity of sound in a gas? Why and how was it corrected by Laplace? How does the velocity of sound in a gas vary with the pressure? [4]

Or

What is Doppler Effect? Derive the expression for the apparent frequency received when the source is moving towards the stationary observer.

- b. The equation of a certain traveling wave is $y = 2 \sin 2\pi \left[\frac{t}{0.01} - \frac{x}{30} \right]$ where x and y are in centimeters and t is in second. What is (a) amplitude (b) wavelength (c) frequency (d) speed of propagation of wave? [3]

6. a. Derive the magnifying power of astronomical telescope for the image to be formed at infinity. [4]

Or

What are the Huygen's principles for construction of wave fronts? Verify Snell's law on the basis of wave theory.

- b. In a young's double slit experiments of the separation of slit is 0.2 mm and the third brighter fringe is at a distance of 7.5 mm from the central fringe on a screen 1 m away from the slit. Find the wavelength of light used? [3]

7. a. State and explain Biot and Savart's law? Use it to find the magnetic field B at the centre of a circular coil of N turns carrying current I. [4]

Or

State Lenz's law and explain how it is consequence with the principle of conservation of energy?

- b. A capacitor of $1\mu\text{f}$ is used in a radio circuit where the frequency is 100 Hz and the current flowing is 2 mA (r.m.s). Calculate the voltage across C. What current flows when an a.c. voltage of 20 V (r.m.s.), $f = 50$ Hz is connected to this capacitor? [3]

8. a. Explain the experimental setup and theory of Thompson's method to find the value of e/m. [4]

Or

Explain the characteristics of p-n junction diode in the forward and reverse biased condition. [4]

- b. Cesium has a work function of 1.9 eV. Find (i) maximum energy of liberated electrons when metal is illuminated by light of wavelength 4.5×10^{-7} m (ii) stopping potential. [given, $1\text{eV} = 1.6 \times 10^{-19}$ J, $h = 6.6 \times 10^{-34}$ Js, $c = 3 \times 10^8$ m/s]

9. What is nuclear fission? Explain it with a suitable example and distinguished between the nuclear fission and fusion. [4]

Or

Derive Bragg's law and explain how this law is used to determine the crystal plane spacing.

10. What are the roles of physics in the development of a nation? [4]

Or

Derive the present sources of energy in our country.

“Our goals can only be reached through a vehicle of a plan, in which we must fervently believe, and upon which we must vigorously act. There is no other route to success.”

Stephen A. Brennan



KATHMANDU

DON BOSCO COLLEGE

Pre Board Examination - 2060

Subject: Physics (Set "B")

Class: XII

Time: 3 Hrs

F.M:75

P.M:30

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

1. Attempt all questions in brief. [2 X 8 = 16]
 - a. No heat engine has efficiency greater than Carnot's engine operating between the same two temperatures, explain.
 - b. Why photoelectric effect cannot be explained on the basis of classical theory.
 - c. What is eddy current? Give one of its uses.
 - d. If the intensity of the incident radiation is halved, what happen to the kinetic energy of electron emitted?
 - e. Explain, why the rain drops are spherical in shape.
 - f. What are quarks and what is quark model?
 - g. What is ozone hole and how can it be protected?
 - h. How do you increase the image in case of a telescope?

 2. Attempt any four questions in brief. [4 X 2 =12]
 - a. Why do we require the oil drops in Millikan's experiment to be of microscopic size but not bigger drops?
 - b. Why can ship not use internal energy of sea water to operate its engine? Explain.
 - c. What is the black hole?
 - d. What is visual angle? How does it affect the magnification of image on our eye?
 - e. Lenz's Law follows the law of conservation of energy. Explain.
 - f. Why is the grid of triode valve kept negative?
 - g. Why is the emitter of a transistor doped heavily?
 - h. Why does sound travel faster on a rainy day than on a dry day?

 3. a. Develop the theory for the measurement of surface tension of water? [4]

Or

Derive Bernoulli's equation from the work energy theorem. Explain why the equation is valid only for steady, on viscous and incompressible fluid.

 - b. Two spherical rain drops of equal size are falling vertically through air with a terminal velocity of 0.15 m/s. What would be the terminal velocity if two drops were to coalesce to form larger spherical drop? [3]
-
4. a. Derive the formula for the work done by an ideal gas in an adiabatic process. [4]

Or

Describe a diesel engine and explain its working. What are its advantages over petrol engine?

- b. A carnot's engine working between 300°K and 600°K has a work output of 800 J per cycle. What is the amount of heat energy supplied to the engine from source per cycle? [3]

- 5. a. Show that the frequency of the beats is equal to the difference in the frequencies of two forks. [4]

Or

Explain the formation of the overtones in an open and closed organ pipes.

- b. A whistle of frequency 1000 Hz is sounded on a car traveling towards a cliff with a velocity of 18 m/s, normal to the cliff. Find the apparent frequency of the echo on heard by the car driver. (Velocity of sound in air is to be 300 m/s.) [3]

6. a. With the help of labeled diagram, derive an expression of magnification for a compound microscope. [4]

Or

Show that in young's two slit experiment, the dark and bright fringes are of the same width.

- b. A certain person can clearly see objects at distances between 20 cm and 200 cm from his eye . What spectacles are required to enable him to see distance of distinct vision when he is wearing them? [3]

7. a. Find the expression for the torque on rectangular coil in a uniform magnetic field. Also mention the condition for maximum and minimum torque. [4]

Or

Derive expressions for the current flowing through an a.c. circuit containing resistance and inductor in series. What is mean by impedance in a.c. circuit?

- b. When a wheel with metal spokes 1.2 m long is rotated in a magnetic field of flux density 5×10^{-5} T normal to the plate of the wheel, an emf of 10^{-2} V is induced between the rim and axle. Find the rate of rotation of the wheel. [3]

8. a. Starting from Bohr's Postulates, derive an expression of radius of an electron in H-atom of nth orbit. [4]

Or

What are the laws of photoelectric effect? Derive Einstein's photoelectric equation.

- b. The space between the parallel plates of NaCl crystal is 2.82 \AA . The first order Bragg's reflection occurs at angle of 10° . What is the wavelength of the X-ray used? [4]

9. a. State decay law and derive a relation between the half-life and decay constant. [4]

Or

What is the junction diode? Discuss briefly the working of diodes as full wave rectification.

10. Describe the condition of present source of energy being used in Nepal. [4]

Or

What is air pollution? What are its sources? What are the effects of air pollution?

***What you are, is a God's gift to you.
What you make of yourself, is your gift to God.***



**KATHMANDU
DON BOSCO COLLEGE
Pre-Board Examination -2060**

Grade: XII'A'
Subject: C. English
Stream: Science

(SetI)

F.M:100
P.M.: 40
Time: 3 hr

Attempt all the questions:

1. Read the following passage and answer the questions that follow. [15]

The 1960s were marked by the greatest changes in morals and manners since the 1920s. Young people, college students in particular, rebelled against what they viewed as the repressed, conformist society of their parents. They advocated a sexual revolution, aided by the birth control pill and later by *Roe v. Wade* (1973), a Supreme Court ruling that legalized abortion. "Recreational" drugs such as marijuana and LSD were increasingly used. Opposition to U.S. involvement in Vietnam promoted the rise of a New Left, which was anticapitalist as well as antiwar. A "counterculture" sprang up that legitimized radical standards of taste and behavior in the arts as well as in life. Feminism was reborn and joined the ranks of radical causes.

Except for feminism, most organized expressions of the counterculture and the New Left did not long survive the sixties. Nevertheless they changed American life. Drug taking, previously confined largely to ghettos, became part of middle-class life. The sexual revolution reduced government censorship, changed attitudes toward traditional sexual roles, and enabled homosexuals to organize and acknowledge their identities as never before. Unrestrained individualism played havoc with family values. People began marrying later and having fewer children. The divorce rate accelerated to the point that the number of divorces per year was roughly half the number of marriages. The number of abortions rose, as did the illegitimacy rate. By the 1980s one in six families was headed by a single woman, and over half of all people living in poverty, including some 12,000,000 children, belonged to such families. Because inflation and recession made it hard to support even intact families on a single income, a majority of mothers entered the work force. Thus the stable, family-oriented society of the 1950s became a thing of the past.

1. What title do you suggest for this passage? Justify your title with reasons.

2. What remarkable shifts were observed in America in 1960s?

3. Do you find any difference in American and Nepalese social status? Explain.

2. Answer any one of the following questions: [10]

a. Write the main theme of *Purgatory* in your own words. Did the old man's mother's soul get purified? Explain.

b. To what contemporary crisis does Moti Nissani focus the reader's attention? Discuss the suggestions he has raised for solution. [Two Long Term Problems]

3. Answer any three: [5x3=15]

a. How does the boy develop to maturity? Explain. [*The Last Voyage of the ghost ship*]

b. What do the expanse of water and bird symbolize in *Hansel and Gretel*?

c. What is the tone of the poem: ironical, sympathetic, and indifferent? Explain. [*Traveling Through the Dark*]

d. How did Lydia Pinkham get success in her business?

e. Explain King's analogy of the "bad check" [I Have a Dream]

4. Write a sentence showing your attitude to each of the following using "the way..." [5]

i teachers ii parents iii doctors iv politicians v police

5. Look at the sets of words below and ask an "information question" about it. [5]

i stew/grill/roast

ii assault/arson/blackmail

iii armchair/table/wardrobe

iv major/sergeant/corporal

v crimson/scarlet/maroon

6. Write wish/regret for the following situations: [5]

i The power is cut, and you are stuck in lift.

ii Your beloved deceived you.

iii You are unemployed.

iv You failed the exam.

v. You missed the picnic.

7. Write a letter to your friend describing a narrow escape you had. [5]

8. Define the following types of people. [5]

eg. An optimistic person.

An optimistic person is someone who is always hopeful about good things to come.

i A stingy person ii A vain person iii A skeptical person iv A pessimistic person v An unreliable person

9. What happens when you ... [5]

- i put a lump of sugar in cold water?
- ii fill a glass with blood and leave it?
- iii put red hot iron in cold water?
- iv leave a bowl of water outside in sunny day?
- v leave rice in a bowl of water?

10. Rewrite the information given below as (i) a deduction, using must or can't (ii) a reason for deduction beginning 'if... [6]

- i I am sure he hasn't gone abroad because he didn't take his passport with him.
- ii I am sure he likes me because she bought me some flowers.
- iii i am sure he is still working because he hasn't come yet.
- iv I am sure he hasn't been swimming because his hair isn't wet

11. Look at the prompts below and a) join them using when (b) add another sentence beginning with when ... saying what you do next. [4]

- a) water/boil→pour/teapot
- b) cross/road→look / both ways
- c) turn on/ gas→light gas
- d) arrive/ border→show/ passport

12. Write a review of a movie that you recently watched. [5]

13. Write about pros and cons of living in a joint family. [5]

14. Write 120-180 words on one of the topics below. [10]

- I. Political Awareness
- ii Career Building



**KATHMANDU
DON BOSCO COLLEGE**

Pre-Board Examination -2060

Grade: XII'B'

Subject: C. English

Stream: Science

(SetII)

Time: 3 hr

F.M:100

P.M.: 40

Attempt all the questions:

1. Read the following passage and answer the questions that follow. [15]

The perception of pain is highly variable among individuals. The perception of an instance of pain results from the brain's processing of the new sensory input with existing memories and emotions, in the same way that other perceptions are produced. Childhood experiences, cultural attitudes, genetic makeup, and gender are factors that contribute to the development of each individual's perception of and response to different types of pain. Although some people may be able to physiologically withstand pain better than others, cultural factors rather than heredity usually account for this ability.

The point at which a stimulus begins to become painful is the pain perception threshold; most studies have found this point to be relatively similar among disparate groups. However, the pain tolerance threshold, the point at which pain becomes unbearable, varies significantly among groups. A stoical, none motional response to an injury may be a sign of velour in certain cultural or social milieus, but this behavior can also mask the severity of an injury to an examining physician. Thus, when assessing pain levels, the clinician should not isolate the pain but consider it within the circumstances of the patient's life.

Depression and anxiety have been noted to lower both types of pain thresholds; anger or excitement, however, can obscure or lessen pain temporarily. Feelings of emotional relief can also erase the painful sensation for a time. The context of pain and the meaning it has for the sufferer also play a part in pain perception. The effects that these psychological factors have on the perception of pain illustrate the importance of the patient's attitude toward the condition.

Pain associated with certain psychiatric conditions is believed to arise and be maintained by psychological forces alone. Somatoform disorders, psychosis, and depression are commonly accompanied by vague complaints of chronic pain, which can take on bizarre descriptions in the individual suffering from psychosis. Although chronic pain often gives rise to depression, sometimes the order is reversed, and vague localized pain for which no physiological cause can be found actually masks depression.

1. What title do you suggest for this passage? Justify your title with reasons.

2. What is the relation between pain and tolerance? Explain.

3. What factors contribute to erase pain?

2. Answer any one of the following questions: [10x1=10]

i. How did the businesswomen differ from their male counterparts? In what ways did they resemble male entrepreneurs of their day? Discuss the major stands that they adopted. [Women's Business]

ii. Sketch the character of Mr. Doran. How does he view his relations with Polly? Discuss. [*The Boarding House*]

3. Answer any three: [15]

i. What do you think is the meaning of the boy's newly discovered ability near the end of the story to control the ship's movement? (*The Last Voyage of The Ghost*)

ii. Explain the title of the poem, *The Lamentation of the old pensioners*.

iii. Point out two instances of humor in *A Story*.

iv. Why was the old man not willing to send his children to forest?

v. What are the major obstacles of the people of Karnali? Explain

4. Write the pros and cons of living in city centers. [5]

5. Rewrite the information given below as (i) a deduction, using must or can't (ii) a reason for deduction beginning 'if... [6]

i I am sure he hasn't gone abroad because he didn't take his passport with him.

ii I am sure he likes me because she bought me some flowers.

iii i am sure he is still working because he hasn't come yet.

iv I am sure he hasn't been swimming because his hair isn't wet.

6. Choose one of the verbs in the list to report each remarks below. [5]

Advice, warn, beg, promise, urge, insist, recommend

i I can't tell you how important it is for you to give up smoking.

ii I will buy you an ice-cream if you are good.

iii no, I have already told you-I am going to play.

iv. I didn't break the window.

v If you do not pay the balance within three days, we will have to take legal action.

7. Answer these questions using the hear say expressions. Use Apparently, I'm told, supposed to, People say [5]

i Do you know anything about life in Ancient Nepal?

ii I wonder what it's like to live in a remote area.

iii What does it feel like to be hypnotized?

iv Do you know if Alsations make good pets?

v I wonder what is happening in contemporary Nepal.

8. What happens when you ... [5]

i put a lump of sugar in cold water?

ii fill a glass with blood and leave it?

iii put red hot iron in cold water?

iv leave a bowl of water outside in sunny day?

v leave rice in a bowl of water?

9. Look at the prompts below and a) join them using when (b) add another sentence beginning with when ... saying what you do next. [4]

a) water/boil→pour/teapot

b) cross/road→look / both ways

c) turn on/ gas→light gas

d) arrive/ border→show/ passport

10. For each of the answers below, make a suitable question with: How long...? [5]

a) Q: How long . . .

A: Oh, quite a few years-I started in 1975, I think.

b) Q: How long . . .

A: Until October, probably unless the weather turns cold.

c) Q: How long . . .

A: I spoke to him for about ten minutes.

d) Q: How long . . .

A: About an hour, usually if there isn't too much cold.

e) Q: How long . . .

A: I completed the report by 6 o'clock

11. Look at the sets of words below and ask an "information question" about it. [5]

i A/B/C

ii rubber/plastic/wood

iii armchair/table/wardrobe

iv major/sergeant/corporal

v crimson/scarlet/maroon

12. You arrive late at a meeting after being delayed by traffic. Apologize and explain why you are late. [5]

13. Recently people have become much more interested in physical fitness. Why do you think this is? [5]

14. Write 120-180 words on one of the topics below. [10]

i Political Awareness

ii Gender Inequality

Kathmandu Don Bosco H.S.S
Pre- Board Examination 2060
Grade XII (Science)

Subject: Mathematics
Time : 3 hours

SET I

F.M. 100
P.M. 40

ATTEMPT ALL QUESTIONS

Group A

(6x3x2= 36)

- 1.(a) If p is A.M. between q and r , q is G.M. between r and p , then prove that r will be H.M. between p and q .
- (b) Find the seventh term in the expansion of $(2x + y)^{12}$.
- © Find the equation of the circle which has its centre at (a, b) and touches the y -axis.
- 2.(a) In a certain election there are 3 candidates for president, 5 for secretary and only 2 for the treasurer. Find in how many way the result may turn out.
- (b) Find the derivative of $x^{\cosh x}$.
- © What type of locus is a parabola? Write down the equation of the parabola whose vertex is at the point (h, k) and the axis parallel to y -axis.
- 3.(a) Prove that $\log 2 =$
- (b) Show that the vectors $2i + 3j - 8k$ and $2i + 4j + 2k$ are orthogonal.
- © Two letters are selected at random from the word "examination". Find the probability that both of them are the same letters.
- 4.(a) If $a = (3, -1, 4)$, $b = (-2, 4, -3)$ and $c = (-5, 7, -1)$, find the unit vector along $a - 2b + c$.
- (b) Find the mean deviation from median of the numbers 5, 7, 10, 12 and 6.
- (c) Two dice are thrown. Determine the probability of getting a sum 5.
- 5.(a) The resultant of two forces P and Q is R . If Q is doubled, the new resultant is perpendicular to P , prove that $Q = R$.
- (b) Calculate the power of a pump which can lift 300 kgs. Of water through a vertical height of 4 m. in 10 secs. ($g = 10 \text{ m s}^{-2}$).
- © Find the points on the curve $4y = x^2 - 8x$ where the tangents are parallel to the x -axis.
- 6.(a) If u and θ be the velocity and angle of projection of a projectile, then find the time of flight.
- (b) Define the moment of a force about a given point. Express it mathematically.
- © Solve : $dy/dx = (x^2 + x + 1)/(y^2 + y + 1)$

Group B

(8x2x4 = 64)

- 7.(a) If a, b, c are in H.P., prove that $a(b+c), b(c+a), c(a+b)$ are in A.P.
- (b) From 10 football players, in how many ways can a selection of 4 be

- Made so that (i) one particular player is always included;
(ii) two particular players are always excluded.

- 8.(a) Find the middle-term in the expansion of $(1+2x)^{2n}$, where n is a positive integer.
(b) State and prove the “theorem of total probability”.
- 9.(a) Obtain the condition that the line $lx + my + n = 0$ may be tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$.

OR

What type of conic is an ellipse? Find the eccentricity, length of latus rectum and the coordinates of the foci of the ellipse

- (b) Find the focus, the vertex, the equation of the directrix and the length of the latus rectum of the parabola $(x+1)^2 + 8y - 16 = 0$.
- 10.(a) Show that the vectors $5a + 6b + 7c$, $7a - 8b + 9c$ and $3a + 2b + 5c$ are coplanar, where a, b, c are any three vectors. (Sin x)
(b) Find the derivative of $e^{\sin x}$ w.r. to x by definition.

OR

Water flows into an inverted conical tank at the rate of 27 cft./min. When the depth of water is 2 ft., how fast is the level of water rising? Assume that the height of the tank is 4 ft. and the radius of the top is 1 foot.

- 11.(a) In any triangle, prove by vector method that $\sin A/a = \sin B/b = \sin C/c$
(b) Integrate $\frac{1}{x+a} dx$

OR

Solve: $\cos x \frac{dy}{dx} + y = 1$.

- 12.(a) The expenditures of 50 persons is classified below:

Calculate the mean, median and mode.

Expenditure:	50-70	70-90	90-110	110-130	130-150
No. of Persons:	6	7	12	20	6

- (b) Prove that the correlation coefficient between two variables lies between -1 and +1.

- 13(a) State and prove “Triangle law of forces”

OR

A body of weight 65 N is suspended by two strings of lengths 5 and 12 m attached to two points in the same horizontal line whose distance apart is 13 m find the tensions of the string.

- 14 (a) Prove that the algebraic sum of moments of two like parallel forces about any point in their plane is equal to the moment of their resultant about the same point.

- (b) “The change in kinetic energy of a body is equal to the work done by the acting forces”. Prove this statement



KATHMANDU
DON BOSCO COLLEGE (10+2)
Pre-Board Examination -2060

Stream: Science
Class : XII
Subject: Extra Mathematics

Time: 3 hrs.
F.M. : 100
P.M. : 40

Group "A"

Attempt all the questions:

6 × 3 = 36

1. a) The sum of an infinite geometric series is 15 and the first term is 3. Find the common ratio.
b) From 10 persons, in how many ways can a selection of 4 be made when one particular person is always included?
c) Find the standard equation to the hyperbola with focus at (5,0) and vertex at (2,0).
2. a) Write down the series of e^x and $\log_e(1+x)$.
b) Determine the equation of the circle if the ends of a diameter be at (3,0) and (7,-1).
c) Prove that the tangents at the ends of the latus rectum of a parabola $y^2=4ax$ are perpendicular to each other.
3. a) Find the point on the curve $y = 2x - x^2$ where the tangent is parallel to x-axis.
b) Find the standard deviation of the numbers 10, 15, 20, 25.
c) Find the value of k so that the length of the tangent from (5, 4) to the circle $x^2 + y^2 + 2ky = 0$ is 1.
4. a) Prove: $\int \operatorname{Cosec} x \, dx = \log \left| \tan \frac{x}{2} \right| + c$.
b) A coin is tossed successively three times. Determine the probability of getting (i) all three heads (ii) 2 heads and one tail.
c) Find the focus and directrix of the parabola $y^2 - 4y - 8x - 20 = 0$.
5. a) Write the expression for the magnitude and direction of the resultant of two given forces acting at a given angle.
b) A car of mass 1000kg is accelerating at 2ms^{-2} . Find the force acting on it.
c) If mean = 49.8, mode 45 and standard deviation = 18.03, determine coefficient of skewness.
6. a) Two like parallel forces 30kg wt. and 20kg wt are acting at a distance 40cms apart. Where does the resultant of the forces act?
b) A ball is thrown vertically upwards at a speed of 4ms^{-1} . Find the maximum height reached ($g = 10\text{ms}^{-2}$)
c) Solve $x^2 dy - y^2 dx = 0$

Group "B"

Attempt all the questions:

8 × 2 = 64

7. a) Find the sum of the squares of 1st n-natural numbers.
b) How many numbers between 4000 and 5000 can be formed with the digits 2,3,4,5,6,7?
8. a) Find the term free from x in the expansion of $(2x+1/3x^2)^9$
b) State and Prove "theorem of total probability"

OR

Four coins are tossed simultaneously. What is the probability of getting (i) two heads and two tails
(ii) at least two heads (iii) all 4 heads.

9. a) Obtain the condition for the straight line $y = mx + c$ to be tangent to the circle $x^2 + y^2 = a^2$.

b) Find the equation of the parabola in the standard form $y^2 = 4ax$.

OR

Find the eccentricity, length of the latus rectum and coordinates of the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1$

10. a) Prove that the following vectors are coplanar.
 $\vec{a} - 2\vec{b} + 3\vec{c}, -2\vec{a} + 3\vec{b} - 4\vec{c}, -\vec{b} + 2\vec{c}$

b) Find from first principles the derivative of $e^{\tan x}$

OR

A spherical ball of salt is dissolving in water in such a manner that the rate of decrease in volume at any instant is proportional to the surface area. Prove that the radius is decreasing at constant rate.

11. a) Find the vector method, the area of a triangle with vertices (1,1,1), (1,2,3) and (2,3,1)

b) Integrate: $\int \sqrt{x^2 + a^2} dx$

OR

Solve $(1+x) \frac{dy}{dx} - xy = 1-x$

12. a) Find the mean and upper quartile Q_3 from the following data.

Marks	0-10	0-20	0-30	0-40	0-50
No. of Students	4	16	26	41	50

b) Find out standard deviation and the coefficient of variation from the following data.

Class Intervals	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	5	10	12	8	2	4

13. a) P and Q ($P > Q$) are two parallel forces acting at A and B. Show that if they interchange position,

the point of application of the resultant is displaced by a $\frac{P-Q}{P+Q} AB$.

b) A railway train goes from one station to another moving during the first part of the journey with uniform acceleration f when steam is shut off and the brakes are applied, it moves with retardation f^1 . If a be the distance between the stations, show that the time the train takes is

$$\sqrt{\frac{2a(f + f^1)}{ff^1}}$$

14. a) Define moment of a force. Prove that the algebraic sum of the moments of any two forces, meeting at a point, about any point in their plane is equal to the moment of their resultant about the same point.

OR

The sum of two acting at a point is 18N and their resultant which is perpendicular to the smaller of the two forces is 12N. Find the magnitude of the forces.

b) The horizontal and vertical components of the initial velocity of a projectile are U and V

respectively. If R be the range and H be the greatest height attained, prove that: $\frac{4H}{R} = \frac{V}{U}$

OR

Prove that the sum of the kinetic and potential energies of a moving body remains constant throughout the motion.

"The End"



KATHMANDU
DON BOSCO COLLEGE

Pre-Board Examination -2060

Grade: XII
Subject: Chemistry
Stream: Science

(Set 1)

F.M:100
P.M.: 40
Time: 3 hr

Group A

Attempt any fifteen questions:

[15x2=30]

1. How would you interpret on the basis of hybridization that all four C-H bonds of methane are identical.?
2. Convert iodopropane to propyne.
3. What are) Rectified spirit b) Methylated spirit.
4. Identify the organic compounds A and B
$$A + CO + H_2 \xrightarrow{[CO(Co)_4]_2} \quad B \xrightarrow{H_2/Ni} (CH_3CH_2CH_2OH)$$
5. Account for the fact that acid anhydride is better acylating agent over acid chloride.
6. Give two reactions where amide can be converted to amine with a) same number of carbon atoms
b) lesser number of carbon atoms.
7. Suggest a suitable chemical test to identify methanoic acid from ethanoic acid.
8. Give an example of cannizaro's reaction with reference to aromatic aldehyde.
9. What is zwitter ion ?
10. How does glucose differ from fructose? Draw their open chain structures.
11. What do you understand by the term chemotherapy ? What is the name given to the medicine used for getting relief from pain?
12. Give any two examples of azo dyes with their structures.
13. What volume of N/5 HCl solution is required to neutralize 10 ml of NaoH containing 3.5 gm NaoH in one litre solution?
14. Identify the reaction order for the rate constant $k=2.3 \times 10^{-5}$ litre /mole/sec.
15. The resistivity of a 0.1 M solution per litre of an electrolyte is 10 ohm cm. Calculate the molar conductivity of the electrolyte at this concentration.
16. Draw the energy profile diagrams for exothermic and endothermic reactions.
17. Explain the statement with examples " All Lewis bases are bronsted bases but all lewis acids are not bronsted acids".
18. What is entropy? State the effect of increased temperature on the entropy of a substance.
19. What is the difference between cast iron, wrought iron and steel?
20. What happens when mercuric iodide reacts with excess of potassium iodide solutions?

Group -B

Attempt any five questions.

[5x5=25]

21. An alcohol A(C₄H₁₀O) on oxidation with acidic dichromate gives a carboxylic acid B (C₄H₈O₂). Treatment of A with hot conc sulphuric acid brings about dehydration and gives compound C (C₄H₈). Treatment of C with warm aqueous sulphuric acid gives D (C₄H₁₀O), a new alcohol isomeric with compound A. Compound D is resistant to oxidation. Identify A,B,C and D. Give equations for all reactions.
22. How would you synthesize?
a) picric acid from nitrobenzene.

- b) Nitrolic acid from ethanol.
 c) Benzoic acid from aniline.
23. What are amines? How are they classified? How do different classes of amines react with diethyl oxalate?
24. State and explain Hess's law with suitable example.
25. The reaction $2\text{N}_2\text{O}_5 \longrightarrow 4\text{NO}_2 + \text{O}_2$ is carried out in a closed vessel .
 It is found that the concentration of NO_2 increases by 1.6×10^{-2} mole in four secs. Calculate
 a) Rate of reaction b) Rate of disappearance of N_2O_5 c) Rate of formation of NO_2 .
 d) Rate of appearance of oxygen
26. What is electrode potential ? Predict which of the following reactions occur spontaneously.
 a) $\text{Zn}_{(s)} + 2\text{Ag}^+_{(aq)} \longrightarrow \text{Zn}^{2+}_{(aq)} + 2\text{Ag}_{(s)}$
 b) $2\text{Ag}_{(s)} + \text{Zn}^{2+}_{(aq)} \longrightarrow 2\text{Ag}^+_{(aq)} + \text{Zn}_{(s)}$
 Given standard reduction potentials of Zn^{2+}/Zn and Ag^+/Ag are -0.76V and $+0.80\text{V}$ respectively.

- 27) Name the important ores of zinc. Describe the extraction of pure zinc from its sulphide ore

Group C

[10x2=20]

- 28) How is Trichloro methane prepared in the laboratory? Give its action upon the followings:
 a) $\text{C}_6\text{H}_5\text{NH}_2/\text{alc.KOH}$ b) Conc.HNO_3 c) aq.KOH
- 29) Describe the preparation of pure and dry nitrobenzene in the lab. How is it converted into a Phenol
 b) hydrazobenzene
- 30) a) Calculate the PH of the solution obtained by mixing 100 cc of solution with $\text{PH} = 3$ with 400 cc of solution with $\text{PH} = 4$
 b) 1.5 litres of 1M NaOH is mixed with 2 litres of 0.5 M HCL solution. Calculate the strength of the salt formed.
- 31) Write Short notes on any two:
 a) General methods of preparing aldehydes and ketones
 b) Solubility product principle.
 c) Chemistry of litharge.
 d) Manufacture of steel by an open-hearth process.



KATHMANDU
DON BOSCO COLLEGE
Pre-Board Examination -2060

Grade: XII
Subject: Chemistry
Stream: Science

(Set: II)

F.M: 100
P.M.: 40
Time: 3 hr

Group - A

Attempt any 15 questions:

15 x 2 = 30

1. How do you interpret on the basis of VSEPR theory that all four C-H bonds of CH₄ are identical?
2. How would you convert Acetaldehyde to lactic acid (2-hydroxy propanoic acid)?
3. Why is boiling point of diethyl ether is lesser than its isomer n-butyl alcohol?
4. Identify A, B and C in the following reactions:
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_3 \end{array} \xrightarrow{\text{LiAlH}_4} \text{A} \xrightarrow{\text{SO}_2\text{Cl}_2} \text{B} \xrightarrow{\text{alc-KOH}} \text{C}$$
5. Account for the fact that acid anhydride is better acylating agent over acid chloride.
6. Amides are the least reactive of all the acid derivatives towards nucleophilic substitution reaction. Account for it.
7. What is esterification? Why esterification is carried out in presence of a dehydrating agent?
8. What type of Ketones give iodoform reaction?
9. How does DNA differ from RNA with respect to:
i) Sugar and ii) base residues?
10. What are α-amino acids? How are they related to proteins?
11. Describe the function of antibiotics and antiseptics.
12. What are mordant dyes? Give one example.
13. What volume of 0.1 M Na₂CO₃ solution is required to react completely with 10ml of NaOH containing 4 gm NaOH in one litre solution?
14. Identify reaction order for the rate constant k = 3.1 × 10⁻⁴ sec⁻¹.
15. The conductivity of a 0.12N solution of an electrolyte of the type M⁺ A⁻ is 0.024 s cm⁻¹, calculate its 1) equivalent conductivity 2) molar conductivity.
16. Explain the statement with examples " All Lewis bases are Bronsted bases but all Lewis acids are not Bronsted acids".
17. What is physical concept of entropy?
18. Why is aqueous Na₂O₃ basic?
19. What is quenching of steel?
20. How can you obtain calomel from corrosive sublimate and vice versa?

Group - B

Attempt any five questions

5 x 5= 25

21. An alcohol A (C₄H₁₀O) on oxidation with acidic dichromate gives a carboxylic acid B (C₄H₈O₂). Treatment of A with hot conc. Sulphuric acid brings about dehydration and gives compound C (C₄H₈). Treatment of C with warm aqueous Sulphuric acid gives D (C₄H₁₀O), a new alcohol isomeric with compound A. Compound D is resistant to oxidation. Identify A, B, C and D. Give equations for all reactions.
22. How would you synthesize?
a) Ethanoic acid from propanoic acid
b) propanoic acid from ethanol.
23. Discuss the Hoffmann's method for the separation of 1^o, 2^o, 3^o amines from their mixture.
24. State and explain Hess's law with a suitable example.
25. a) The rate of a gaseous reaction is halved when the volume of the vessel is doubled. What is the order of the reaction?
b) The rate law for a reaction is found to be Rate = k [NO₂] [I⁻] [H⁺]²
How would the rate of reaction change when I) concentration of H⁺ is doubled. II) Concentration of I⁻ is halved.
26. What is standard electrode potential? Predict which one of the following reactions occurs spontaneously.
a) $2\text{Fe}^{+2} + \text{Sn}^{+4} \longrightarrow 2\text{Fe}^{+3} + \text{Sn}^{+2}$
b) $2\text{Fe}^{+3} + \text{Sn}^{+2} \longrightarrow 2\text{Fe}^{+2} + \text{Sn}^{+4}$
Given standard reduction potentials of Fe⁺³ / Fe⁺² and Sn⁺⁴ / Sn⁺² are +0.77V and +0.15V respectively.
27. Describe the extraction of pure mercury from its sulphide ore.

Group - C

Attempt any two questions

10 x 2= 20

28. How is aniline prepared in laboratory? Give its action upon:
a) C₆H₅N₂Cl b) AgCl c) C₆H₅SO₂Cl
29. Describe the preparation of trichloromethane in laboratory? How is it converted into
a) Phenyl isocyanides b) propane
30. a) Calculate the PH of the solution obtained by mixing 150 cc of solution with PH=5 with 450 cc of solution with PH=3.
b) 2 liters of 1N NaOH is mixed with 1.5 liters of 0.5N HCl solution. Calculate the strength of the salt formed.
31. Write short notes on any two:
a) General methods of preparing carboxylic acids.
b) Common ion effect.
c) Chemistry of white vitriol
d) Rusting of iron.

----- Best of Luck -----



KATHMANDU

DON BOSCO COLLEGE

Pre-Board Examination - 2060

Class: XII

Stream: Science

Subject: Biology

SET I

F.M: 75

P.M: 30

Time: 3 hrs.

Attempt all questions

1. Answer the following questions.

[1x15=15]

- Name different types of Parenchymatous tissues.
- What are tyloses ?
- Define operon .
- What do you mean by pleiotropic gene ?
- What is micro- sporogenesis ?
- Name the organism responsible for alcoholic fermentation .
- What is the function of carboxylase gene.
- Define Phytohormone.
- What is choroids plexus.
- Name the neurohormone secreted by sympathetic and parasympathetic
- Define the term emasculation.
- Why is glomerular filtration known as ultrafiltration ?
- Name the steps in the formation of gastrula
- Write the full form of FSH, STH, TSH. & ACTH
- Write the function of adipose tissue.

[3x10=30]

2. Answer the following questions:

- Discuss in brief the method of plant tissue culture.
- List various method of natural vegetative propagation. Give reasons,
- Write about complementary gene with an example.
- What is glycolysis ? Write different steps involved in the process.(description not required).
- Explain the structure of DNA.
- Describe the structure of thecodont teeth.
- Write in brief about CO₂ transport.
- Write short note on population growth and its control strategies.
- How can kidney help in the osmoregulation.
- Give a short account on human eye.

3 . Describe the internal structure of Dicot root. How does it differ from monocot root. [7]

Or

What do you mean by transpiration ? Describe the mechanism of stomatal transpiration.

4. What is crossing over ? Explain the theories of crossing over .

[8]

5. Describe the structure and function of human brain. With well labeled diagram.

[8]

Or

Discuss the origin and conduction of heart beat in man.

6. What is non -communicable disease? Discuss the causative agent, symptom, effect and control measure of any one non- communicable disease you have studied.

[7]

Best of Luck



**KATHMANDU
DON BOSCO COLLEGE**

Pre-Board Examination - 2060

**Class: XII
Stream ; Science
Subject: Biology**

SET I I

**F.M: 75
P.M. 30
Time: 3 hrs**

Attempt all questions.

1. Answer the following questions:

[1x15=15]

- a) What do you understand by Exarch xylem ?
- b) Give an example of lateral meristem .
- c) What is embryony ?
- d) Write the function of ABA .
- e) Define criss-cross mechanism.
- f) List two advantages of cross pollination ?
- g) Mention any two major importance of plant tissue culture.
- h) Give an example of Polygenic inheritance.
- i) Name the disease caused by mal-nutrition and Vitamin D
- j) Why is liver a homeostatic organ . Give two reasons.
- k) Mention the enzymes secreted by pancreas.
- l) Why is an individual with blood group O+ called universal donor?
- m) Which photoreceptor cell is responsible for vision in the dim light?
- n) Name the causative agent of TYPHOID, AIDS and T. B.
- o) Define tissue. Mention the name of different types of epithelial tissue.

2. Answer the following questions:

[3x10=30]

- a) What is crossing over ? Discuss in brief about the mechanism of crossing over .
- b) Write short note on complex tissue .
- c) Give the application of Gibberellin plant.
- d) Draw a well labeled diagram of L. S. of ovule (no description)
- e) Explain in brief about application of biotechnology.
- f) Discuss coelom formation during development of Frog.
- g) Describe the selective absorption in uriniferous tubules.
- h) Give an account on conduction of nerve impulse.
- i) Write short note on thyroid gland.
- j) Describe the role of surrogate mother in test tube baby.

3. Define digestion. Explain the physiology of digestion in human alimentary canal. **[8]**

4. Explain briefly about Calvin and Benson cycle.

Or

Describe the anatomical structure of Dicot stem with suitable diagram. **[7]**

5. Discuss in brief about Mendelism. **[8]**

6. Describe the process of microspore formation in angiospermic plant **[7]**

Or

Describe the development of frog up to the formation of gastrula.

Best of Luck



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(Set II)

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 #_ lj Bfylx; k]ltbg kfF 306f k9b5g\ -cEo:t klf_
 \$ _ uf]f]s}f]slj tf nV5 . -lnE_
 %_ kfgl k/] af9l cfof]. -; Defj gfy{

\$_ sg}b0 kZgsf pQ/ nVgxf] \M %x@ = !)
 -s_ s]t / t]4tft zAb]lar s]s]le]gtf 5g\pbfx/of; lxt b]fpgxf] \
 -v_ lgdg ln]vt pk; u{/ k]oo nuf0{Ps Ps zAb agfpgxf] \M
 pk; u{Ma] la, k| ck, clt .
 k]oo M td, cfn' 0t, Onf] P .
 -u_ ; df; eP lj ux / lj ux eP ; df; u/L ; df; sf]gfd; d] nVgxf] \M
 lbuda/, e]g]bg, sfnf]5 lha]h; sf] lqzhl, hljg /x] Dd .

%_ sg}rf/ kZgsf pQ/ nVgxf] \M %x\$ = @)
 -s_ sd\$ cfwf/df lsf slt lsl; dsf 5g\pbfx/of; lxt lrgfpgxf] \
 -v_ sf]7sdf lb0Psf ; f]sf cfwf/df vfnl 7fpFegxf] \M
 -c_ dh]rf/ j 6f slj tf===== . -n\; fdf]o et_
 -cf_ lj i0f' ; kgfdf ; u/dfyf===== . -r9\c1ft klf_
 -0_ kfgl k/]eg]af9l===== . -cfp, ; Defj gf_
 -0{ gkflnx; csf\$]k]hf]egdf ===== . -k/\cEo:t klf_
 -p_ clxn]g]fx;n]kf7===== . -l; s\k0f]j t]dfg_
 -u_ sf]7sdf lb0Psf ; f]sf cfwf/df tnsf j fSoff0{k]j t]g ugxf] \M

-c_ Plzofsf]dfemdf xfdln]lxdfn p7fof; -sd]fRo_
 -cf_ sDolgi6 g]fn]; fylx;nf0{nfn ; nfd u/]. -k]olf syg_
 -0_ d d/]klg of]b}z affr/x] \ -; fdf]ofy{
 -0{ s]l e]af]Rg rfxGg HoBf]df]g; Sj}klg . -Jofs/l0fs kbsd_
 -p_ xl/ ci6]nof uof]. -k]offy\$_
 -3_ jfSo lj Zn]f]of ugxf] \M
 /ft la]g\$. laxfg xg\$. ; b{pbfpg\$. sdnx; km]lg\$g\ kVj lnf0{; f]bof]n]
 r]dg\$.
 -a_ cwf]yfl t kbx;df sf/s / ljelst 5b}df0{ltgsf gfd ; d] nVgxf] \M
 dh]csf\$]3/df u0; s\$]l 5f]lnf0{hflu/ lbnfPF/ p; sf]rfxgf cg' f/

cfkny}vr6]pRr lzIff k9fPF.

-r_ n] \s] \d6 \x; / k9\wftaf6 c1ft etsflns lsfkfb lgdf0f u/l kfF
j fSodf cfknyf]; kgfsf]JofVof ugxf] \

^_ tn lb0Psf]cgR5} k9L ; f]wPsf kZgx; sf]hj fkm n]vgxf] \M -!)_
jf:tjdf g kf7ssf]:t/ Pp6}x65 g ; a}slj tf g}Pp6}:t/sf x65g\ . t/ ; a}kf7ssf] cfknyf :t/n]EofP; Dd
slj tf aemg] kfs[ts clwsf/ rflxFx65, x65 , Io; nf0{slj x65n]s107t xg lbg' x65 . slj s[0feif0f e6g' x65, aslj tf
cfef; xf]. h; /L cfwlgs lrqsnf hDd}alemg t/ stf stf /fd]g/fd]e6g]rflxFcfef; x65 . slj tf klg loxl xf]. slj /
; fdf6o kf7ssf]; f] / :t/ km/skm/s xg ; S5 ; fdf6o kf7sn]slj n]em}slj tf gaemvfg\t/ slj tfsf]cfef; sf]5gs; Dd
kfpj]kf7ssf]g}lu\$ clwsf/ xf]. o; nf0{o; /L egf}+sb}c6wf]vf]hf lsgf/af6 lx8b5 eg]p; n]kftx; 6\$] h^vnsf]
cfef; kfpj ; S5, slj tfn]klg o:t]5gs; Dd lbg ; Sgk5{.A kto\$ kf7sdf Gogtd ; x6otf rflxFx65 x65, p; E slj tf
aemg]lj zif b]i6 gepklg ; fdf6o b]i6 x65 . loxl b]i6 g}p; sf]slj tf aemg]kfs[ts clwsf/ xf]. af6/n]/^ux; ntkk
kf/] ePsf]cdt}lrqsnf h:tf]x65g slj tf, slj tf t dfgj dfgsf]; jfQd /rgf xf]; jfQd snf xf] cleJolStsf]; jfQd ;k
xf]. zSn ohj }df elgPsf]5, .slj dglifl kl/em :jodeM. slj s[6tbzl{x65 . slj eljiobi6f x65 . dglifl jf d]vjl x65 jf
; j1 x65, kl/e"x65 jf ; a66bf dflysf]x65 / hf]:jode"jf :jo+ePsf]x65 . o; af6 s]yxf kf065 eg]slj xg ; lhnf]5g
/ ; fRr \$f]slj tf ; fRr \$f]slj n]dfq n]vg ; S5 . Io; h]slj n]ca cfknyf]sd\$]ddhf0{aem] dfq snd rnfpgk5{. ol
jt0fg gkfnl slj tfdf b]vPsf ; \$6 / rbf]l :jlsf/ u/] g}gkfnl slj tfsf]/fhdfuf0{kz:t kfg{; lsg5 / o:t}jf
otfl/s}ofqdf kltefx; ; odtfk] \$ nfu]eg]g}gkfnl slj tfsf ; \$6 / rbf]l sd ug{; lsg5 tyf kf7slo kl8fdf dnxd
nufpg ; lsg5 .

kZgx; M

s_ slj s[0feif0fsf lj rf/df slj tf s]xf]
v_ kf7ssf]kfs[ts clwsf/nf0{s; /L kl/eflft ug{; lsg5 ?
u_ j t0fg gkfnl slj tfsf ; \$6 / rbf]l]sf]; fdgf s; /L ug{; lsg5 ?
3_ o; cgR5}sf nflu pkoSt zlif\$ s]xf]hf ?
a_ /yflit kbx; sf]tflko{vhfP/ cy{n]vgxf] \

&_ kZg g+^ sf]cgR5}sf]; ^Nkls/0f ugxf] \ -%_

*_ .lxdfnl ; f]bo{zlif\$df Gogtd !)) zAbsf]Pp6f cgR5} n]vgxf] \ -%_

(_ sb)Ps zlif\$df #)) zAb g36f0{lga6w n]vgxf] \ -!)_
!_ /fi6kgdf0df o]fj u\$]eldsf @_ dnf0{dg kg]lj ifo
#_ gkfnf]k\$[ts ; Dkb

cyjf
s_ .a9bf]; x/ls/0f...zlif\$df !%) zAb g36f0{l6k6f0l n]vgxf] \
v_ cfknyf]lj Bfnosf]j flif\$]f; j dgfpj]vr hf0{s]blagbdf /fv] k]rfo{; dlf k]
ug{ldNg]k]f6df]gt kl]tj }g n]vgxf] \
!)_ .gfnfkfgldf...Psf]ln]gkfnl hftlo :j fledfg / /fli60tfnf0{s; /L dvl/t u/\$f]5,
lj j]rgf ugxf] \
cyjf
.a; f0Epk6of; sf cfwf/df df6\$fsf{/ l/s6\$rf rfl/lqs le6gtfdfly cfd; dliff
k}tt ugxf] \
!!_ sb}b0{kZgsf pQ/ n]vgxf] \M %x@ = !)
s_ .g]ts b[66t...slj tfn]s]s:tf g]ts pkbz lbPsf]5 ?
v_ .l; kfxL...syfsf cfwf/df l; kfxLsf]rl/q lrqof ugxf] \
u_ .j l/x; ...lga6wsf]efj s]xf]?