



KATHMANDU

**DON BOSCO COLLEGE (10+2)**

**2nd Terminal Examination -2058**

Stream : Science

Class : XII

Subject : Physics

Time : 3 hrs.

F.M. : 75

P.M. : 30

1. Attempt all questions: [8×2 = 16]

- a. Explain why the sound produced by a vibrating tuning fork becomes louder when its stem is placed in contact with the table?
- b. The velocity of sound is greater in solids than in liquids, why?
- c. Define threshold wavelength and work function.
- d. Explain why ordinary diffraction gratings do not show the phenomenon of diffraction of X-rays.
- e. When some water is placed on a piece of cloth, it becomes waterproof, explain.
- f. It is impossible to construct a heat engine of 100% efficiency, why?
- g. When a charged particle is moved in a uniform magnetic field, what happens to its kinetic energy?
- h. A current is passed through a spring. What will happen to its length?

2. Attempt any four questions: [4×2 = 8]

- a. While crossing a bridge, soldiers are ordered to break their formation? Why?
- b. Why do the oil films on the surface of water appear to be colored?
- c. Why are alkali metals selected for photoelectric emission?
- d. Define Eddy current. Give one of its applications.
- e. Diffraction is not observed from a wide slit when illuminated by a monochromatic light, why?
- f. Write about the Internal energy of a gas in an adiabatic process.

3. a. State Newton's Law of Viscosity. Obtain an expression for the viscous force experienced by a small smooth spherical ball in a viscous fluid by the method of dimension. [4]

Or

State Hooke's Law. Explain Elastic Limit and deduce an expression for the energy stored in a stretched wire. [4]

b. A capillary tube of 4 mm diameter placed vertically inside a liquid of density  $800 \text{ kg/m}^3$ , surface tension  $3 \times 10^{-2} \text{ N/m}$  and angle of contact  $30^\circ$ , calculate the height to which the liquid rises inside the capillary tube. [3]

4. a. State the two assumptions on which Huygen's principle is based. Verify Snell's law using Huygen's Wave Theory. [4]

b. A compound microscope has lenses of fixed lengths 1 cm and 3 cm. An object is placed 1.2 cm from the object lens. If a virtual image is formed 25 cm from the eye, calculate the separation of lenses and the magnification of the instrument. [3]

5. a. What do you mean by Resonance? Describe the theory of resonance tube experiment for the measurement of speed of sound in air. [4]

b. A piano string has a length of 2.0 m and a density of  $8000 \text{ kg/m}^3$ . When the tension in the string produces a strain of 1%, the fundamental note obtained from the string in transverse vibration is 170 Hz. Calculate the Young's Modulus for the material of the string. [3]

Or

An open pipe, 30 cm long and a closed pipe 23 cm long, both of the same diameters, are each sounding their first overtone, and are in unison. What is the end correction of these pipes? [3]

6. a. State the second Law of Thermodynamics. With the help of P-V diagram, explain the working of a petrol engine. [4]

Or

Define molar specific heat capacities  $C_p$  and  $C_v$  of a gas. Establish the relation  $C_p - C_v = R$ . [4]

- b. Air, initially at  $27^\circ\text{C}$  and 750 mm of Hg pressure is compressed isothermally until its volume is halved then it is expanded adiabatically until its original volume is regained. Find the final temperature and pressure. ( $\gamma$  for air = 1.4) [3]
7. a. What are X-rays? How are X-rays produced by Coolidge Tube method? Also explain how are the intensity and quality of X-rays controlled in a Coolidge tube? [4]
- b. An electron of energy 20 eV comes into collision with a H-atom in its ground state. The atom is excited into a state of higher energy and the electron is scattered with reduced velocity. The atom subsequently returns to its ground state with the emission of a photon of wavelength  $1.216 \times 10^{-6}$  m. Determine the velocity of the electron scattered. [ $e = 1.6 \times 10^{-19}$  C,  $c = 3 \times 10^8$  m/sec,  $h = 6.625 \times 10^{-34}$  Jsec,  $m_e = 9.1 \times 10^{-31}$  kg][3]

Or

Two plane metal plates 4 cm long are held horizontally 3 cm apart in vacuum, one being vertically above the other. The upper plate is at a potential of 300 V and the lower is earthed. Electrons having a velocity of  $1 \times 10^7$  m/sec are injected horizontally midway between the plates and in a direction parallel to the 4 cm edge. Calculate the vertical deflection of the electron beam as it emerges from the plates. [ $e/m = 1.8 \times 10^{11}$  C/kg] [3]

8. What is rectification? With the help of a well-labeled circuit diagram, explain full wave rectification using junction diodes. [4]

Or

What is a diode valve? What makes it to be called as a valve? Explain its action as a full wave rectifier with a circuit diagram. [4]

9. Discuss the J. J. Thompson's method for the determination of Specific Charge of an electron. [5]

10. a. State Faraday's Law of Electromagnetic Induction. Show how Lenz's Law is in accordance with the Principle of Conservation of Energy. [4]

Or

State Biot – Savart Law. Apply it to find an expression for the magnetic field at the center of a circular coil. [4]

- b. A copper wire has  $1 \times 10^{29}$  free electrons per cubic meter, a cross sectional area of  $2 \text{ mm}^2$  and carries a current of 5 A. calculate the force acting on each electron if the wire is now placed in a magnetic field of 0.15 T which is perpendicular to the wire. [3]

*Luck is the coincidence of hard work and opportunity!!*



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### Group "A"

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

- (1) Molar Conductivity increases with dilution but specific Conductivity decreases. Explain this statement .
- (2) Why  $\text{FeCl}_3$  is acidic in nature ?
- (3) Construct a electrochemical Cell and also Calculate Cell potential  
$$E^\circ \frac{\text{Al}^{+3}}{\text{Al}} = -1.66V \qquad E^\circ \frac{\text{Fe}^{+2}}{\text{Fe}} = -0.44V$$
- (4) Define (a) Specific Conductivity (b) Cell Constant.
- (5) A sample of  $\text{H}_2\text{SO}_4$  having sp. gravity 1.51 contain 60.65 % pure  $\text{H}_2\text{SO}_4$  by weight. What volume of this acid would be required to furnish 1 liter of 1N  $\text{H}_2\text{SO}_4$  ?
- (6) Aryl halides are less reactive than alkyl halides towards nucleophilic substitution reaction. Explain the statement.
- (7) Why  $\text{NO}_2^-$  group is meta director ?
- (8) What is peptide bond ? Write an equation of dipeptide bond ?
- (9) Write the open chain structure of glucose and Fructose .
- (10) Compare the basic strength of the following compounds with reasons  $\text{NH}_3$  ,  $\text{CH}_3\text{NH}_2$  , and  $\text{C}_6\text{H}_5\text{NH}_2$
- (11) Why is  $-\text{NH}_2$  group of aniline protected before nitration?
- (12) How is Zwitter ion formed by the reaction of aniline with Conc.  $\text{H}_2\text{SO}_4$ ?
- (13) Write the structural formula of TNT and TNB.
- (14) Which Compound on reaction with Grignard's reagent followed by hydrolysis gives 2 – propanol? Write the reaction involved in it.
- (15) What happens when aniline is controlled oxidized with acidified  $\text{K}_2\text{Cr}_2\text{O}_7$ .
- (16) Write Sand Meyer's reaction .
- (17) What reagent is used to diagnose sugar in human urine? Write the chemical reaction involved in it.
- (18) What is granulated Zinc? What happens when Zinc metal is treated with Conc.  $\text{HNO}_3$  ?
- (19) What is the action of heat on white vitriol ?
- (20) How are cast iron, wrought iron and steel different from each other ?.

### Group "B"

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

- (21) (a) State and explain Faraday laws of Electrolysis .  
(b) Calculate the mass of Nickel produced at cathode when a solution of  $\text{Ni}(\text{NO}_3)_2$  is electrolysed between Pt. electrodes using a current of 5 amperes for 30 minutes ( At. mass of Ni = 59).
- (22) State and explain Bronsted – Lowry concept for acids and bases.
- (23) How would you separate 1°, 2° and 3° amines from their mixture by Hoffman's method ?
- (24) Write short notes on following reactions (I) Reimer Tiemann's reaction (II) Diazotisation reaction .
- (25) An organic compound A on reduction yields parent hydrocarbon B which on nitration gives C, C on reduction in acidic medium gives D which on coupling with diazonium salt gives p-amino azobenzene. Give the names for A, B,C and D and also write the chemical reaction involved . .
- (26) Discuss the extraction of zinc by Carbon Reduction process .
- (27) How is Calomel prepared? How would you convert Calomel into corrosive sublimate and vice versa?

**Group "C"**

***Attempt any two questions: [10x2=20]***

- (28) How is aniline prepared in the laboratory? Starting from aniline how would you prepare (a) phenol (b) Sulphanilic acid and (c) p-nitroaniline.
- (29) Explain Ostwald Dilution law. Calculate the pH of  $\frac{M}{200}$   $\text{H}_2\text{CO}_3$  acid when it is 10% ionized.
- (30) How is mercury extracted from its sulphide ore ? How is it purified ?What happens when Potassium iodide solution is added to mercuric chloride ?
- (31) Write short notes on ( any two )
- Common ion effect .
  - Galvanisation .
  - Reduction of nitrobenzene in different media .

👍 **Best of Luck!**



KATHMANDU  
**DON BOSCO COLLEGE (10+2)**  
2nd Terminal Examination -2058

Stream : Science  
Class : XII  
Subject : Biology

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

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**Attempt all questions:**

Q.No. [1] Give short answer of following questions: [1x15=15]

- What is Central dogma ?
- Name the plant with open vascular bundle.
- What is Dihybrid Cross ?
- What do you mean by Epistasis ?
- What do you mean by photolysis of water ?
- Define fermentation ?
- Define the term pollination & Mention its type .
- Mention the objective of Bio- technology .
- Why the people of hilly region suffer from goiter ?
- What is cardiac cycle ?
- What is homeostasis ?
- Where do you find the mitral valve in human heart ?
- What are Nissl's body ?
- Name the causative agents of Tuberculosis ?
- Write the full form of AIDS ?

Q.No. [2] Answer the following questions: [3x10=30]

- Explain in brief the law of Independent Assortment ?
- What is Co- dominance ? Explain it with reference to Blood group in human beings .
- Mention three differences between self pollination and cross pollination
- Give the application of Auxin in plants .
- Write down the differences between aerobic and anaerobic respiration .
- Explain in brief about Adrenal Cortex ?
- Discuss in brief about the Pancreas ?
- What are Leucocytes and explain their function ?
- Why is SA-node known as pacemaker ?
- How are the 1<sup>st</sup> and 2<sup>nd</sup> heart sounds produced ?

Q.No. [3] Describe briefly about the Dark reaction of photosynthesis . [7]

or

Define the term plant tissue culture ? Discuss in brief the method of plant tissue culture and mention its two importances .

Q.No. [4] Explain the structure and Semi- Conservative mode of replication of DNA .

or

Explain that " DNA is the hereditary material " .[8]

Q.No. [5] What is a communicable disease ? Describe any one of bacterial disease . [8]

Q.No. [6] Describe in brief the structure of human brain with well – labeled diagram

or

Describe the structure of Human heart .[7]

👍 Best of Luck !



KATHMANDU

# DON BOSCO COLLEGE (10+2)

2nd Terminal Examination -2058

Stream : Science  
Class : XII  
Subject : Mathematics

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

### Group'A'

Attempt all questions :

6x3x2=36

1. (a) Find the sum to infinity :  $1 + \frac{3}{4} + \frac{7}{16} + \frac{15}{64} + \dots$
- (b) Find the middle terms in the expansion of  $\left(1 + \frac{x}{2}\right)^{15}$
- (c) Determine the value of k so that the length of tangent from (5,4) to the circle  $x^2 + y^2 + 2ky = 0$  is 5.
2. (a) In how many ways can 6 people be seated around a table if two people insist on sitting to each other ?
- (b) Find the equation of the parabola with vertex at (2,3) and focus at (4,3).
- (c) Determine the equation to the circle passing through origin and making intercepts equal to 3 and 4 from positive x and y axes .
3. (a) Find the equation of tangent to curve  $y = x^3 - 2x^2 + 4$  at (2,4)
- (b) Prove  $\int \cos ex dx = \log \left| \tan \frac{x}{2} \right| + c$
- (c) If  $\vec{a} = (2,3)$  and  $\vec{b} = (4,2)$  Find  $|4\vec{a} - 3\vec{b}|$
4. (a) A committee is to be chosen from 12 men and 8 women and is to consist of 3 men and 2 women. How many committee can be formed ?
- (b) Find the angle between two equal forces acting at a point whose resultant is also equal to one of the force.
- (c) Find the maximum height attained by a ball projected vertically upwards at the rate of 78.4m/s ( $g = 9.8 \text{m/s}^2$ )
5. (a) A vector  $\vec{r}$  is perpendicular to each of the vectors  $2\vec{i} - \vec{j} + \vec{k}$  and  $3\vec{i} + 4\vec{j} - \vec{k}$ . Find  $\vec{r}$
- (b) A body of mass 0.5 kg, initially at rest, is subjected to a force of 2N for 1 sec. Find the velocity acquired during the time .
- (c) Solve :  $xdy + (x+y) dx = 0$ .
6. (a) Test the continuity of  $f(x) = \frac{e^{1/x} - 1}{e^{1/x} + 1}$  at  $x=0$  .
- (b) Find the equation of normal to the parabola  $y^2 = 3x$  parallel to the line  $y = 2x + 1$ .
- (c) Construct an ordinary frequency table from the following data:

Income (in Rs.)	No. of person
Above 0	100
Above 100	96
" 200	76
" 300	49
" 400	35
" 500	23
" 600	15



**Group 'B'**

Attempt all questions :

8x2x4=64

- 7 (a) Prove that AM,GM and HM between two unequal positive quantities satisfy :  
(i)  $GM^2=AM \times HM$  (ii)  $AM > GM > HM$
- (b) In how many ways can the letters of the word 'Sunday' be arranged ? How many of these arrangements do not begin with 's' ? How many begin with 's' and end with 'y' ?
- 8(a) Find the term independent of x in the expansion of  $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^9$ .
- (b) Find the equation of tangent to a circle  $x^2+y^2=a^2$  drawn at a point  $(x_1,y_1)$  on it .
- 9 (a) Obtain the condition for the straight line  $y=mx+c$  to be a tangent to a parabola  $y^2=4ax$  .
- (b) Prove that the vectors  $\vec{a}-2\vec{b}+3\vec{c}$ ,  $-2\vec{a}+3\vec{b}-4\vec{c}$  and  $\vec{a}-3\vec{b}+5\vec{c}$  are coplanar .
- 10(a) Find from first principles the derivative of  $e^{\tan x}$  .
- (b) 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. Prove that the radius is decreasing at constant rate .
- 11(a) Integrate  $\int \sqrt{x^2+a^2} dx$
- (b) Solve  $\frac{dy}{dx} + y = xy^2$
- 12(a) Prove by vector method:  $\cos(A-B) = \cos A \cos B + \sin A \sin B$
- (b) The resultant of two forces P and Q is R . If Q be doubled the new resultant is perpendicular to P; prove that  $Q=R$  .
- 13(a) A railway train goes from one station to another moving during the first part of journey with uniform acceleration f and second part with retardation  $f^1$ . If s be the distance between them, prove that the time taken by train is  $\sqrt{\frac{2s(f+f^1)}{ff^1}}$
- (b) A body of weight 65N is suspended by two strings of lengths 5m and 12 m attached to two points in the same horizontal line whose distance apart is 13m. Find the tension of the strings.
- 14(a) Find the K.E of a car weighing 2000 kg and traveling at the rate of 30 m/s. How much additional energy must be spent to the car so as to increase its speed to 40m/s ?
- (b) Mention different types of diagrams and graphs. Construct the 'less than' and 'more than' ogive from the data given below :

Marks	10-20	20-30	30-40	40-50	50-60	60-70
No of students	8	12	20	6	4	10

Find the median.

🍀 *Best of Luck !!!*



KATHMANDU

## DON BOSCO COLLEGE (10+2)

2nd Terminal Examination -2058

Stream : Science  
Class : XII  
Subject : English

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

1. Read the following passage and answer the questions that follow: 5X3=15

The development of the Space Shuttle has dramatically reduced the cost of sending loads into space. The shuttle takes off from earth like a rocket, and lands again like an aircraft. It can transport not only its own crew, but also passengers, and has a huge cargo-hold, which is capable of carrying large satellites or a space laboratory.

Before the space shuttle was created, it was necessary to plan trips into space several years in advance. However, for the rest of the century it should be possible to make space flights every week or so. Any scientist or engineer needing to travel into orbit will simply take the next shuttle flight, stay as long as necessary, and then return at his or her convenience. It is difficult to imagine the immense opportunities created by the shuttle. One of the great advantages of having a reusable space vehicle is that it can take one load after another into orbit. Very large space stations could not be launched in their complete form directly from earth, but they could be built piece by piece in space in the past.

Questions:

- How is the space shuttle different from earlier space vehicle?
- What are the three advantages of the space shuttle?
- Why couldn't a complete space station be launched earlier directly from the earth?
- The Development of the Space shuttle has dramatically reduced the cost of sending loads into space. How is it possible?
- Give the central idea of the passage in one sentence.

2. Answer any one question. 10

- Sketch the character of Alyohin. (*About Love*)
- What is the historical significance of Martin Luther King's speech? (*I Have a Dream*)

3. Answer any five questions. 5X3=15

- Give reasons why men are unaware of God's greatness. (*God's Grandeur*)
- What is the reason for which Will Sentry always followed Benjamin Franklyn?  
(*A Story*)
- Give a short account of the life of the people of Karnali. (*Hurried Trip to Avoid a Bad Star*)
- According to Traugot what changes are transforming the American adoption scene? (*A Child Is Born*)
- Justify the title of W.B. Yeats' *Lamentation of the Old Pensioner*.
- Is the ship real or imaginary? Give reasons. (*The Last Voyage of the Ghost Ship*)

4. Join the following pairs of sentences each with a relative clause. 5

- Diamond is a very hard substance. It is used for cutting.

- b) A road leads to the farm. It isn't suitable for cars.
- c) A girl was injured in the accident. She is now in hospital.
- d) A man answered the phone. He told me you were happy.
- e) At last they managed to repair the telephone. It was out of order for quite long.

5. Complete the sentences below using the word(s) in brackets. 5

- a) I wrote to my mother by airmail, but in fact... (two weeks).
- b) I intended to have an early night, but as it happened... (midnight).
- c) It was supposed to be a short meeting, but as it happened... (three hours).
- d) His parents expected him to marry young... (48).
- e) She thought she would go back home before long... (several years).

6. Rewrite the following sentences using, **No sooner**... 2

- a) She picked up the case and immediately the handle broke.
- b) She lit her stove and it immediately ran out of gas.

7. Use **than / as ... as** in the following sentences and rewrite them. 3

- a) The people were friendly. But I'd hoped they would be friendlier.
- b) I'd been told London was dirty. But it wasn't, really.
- c) The shops were expensive. I'd hoped they would be cheaper.

8. Change the following sentences as shown in the example. 5

**Example:**

Someone is singing in the bath. It's getting on Hari's nerves. 5

Answer: If there's one thing that gets on my nerves, it's people who sing in the bath.

- a) Susan doesn't pay back her debts. She makes me angry
- b) Tom has bad breath. I can't stand him.
- c) Anna doesn't keep her promises. She upsets me.
- d) Pamela doesn't reply to letters. I really dislike her.
- e) Alan smokes all the time. I hate it.

9. Report the following remarks using a suitable verb from below. Begin with the words given. 5

**Accuse, assure, admit, warn, deny, refuse, threaten, try to persuade, explain**

- a) 'You are under no obligation to buy the drill if you don't like it.  
The salesman ...
- b) 'I don't want the drill because it doesn't work.'  
Mr. Lock ...
- c) 'If you don't pay up, we'll take legal action.'  
The Managing Director ...
- d) 'I didn't break the drill.'  
Mr. Lock ...
- e) 'You're interfering in a private matter.'  
The Sales Manager ...

10. Imagine you are in a situation below. 3+2=5

A. Write a wish for each of the following situations:

- i) It is your birthday.
- ii) You're tired.
- iii) You're stuck halfway up a mountain in fog.

B. Express regrets for the following situations:

- i) You forgot to write home to your parents.
- ii) You left your motor bike at the college.

11. Rewrite the following sentences using must, can't or may/might. 5

- a) I'm sure they've arrived.
- b) I'm sure she is not having dinner.
- c) Perhaps, he heard you.
- d) I'm convinced he hasn't forgotten my name.
- e) Maybe, he was delayed.

12. Write a paragraph about the advantages and disadvantages of studying in a foreign country. 5

13. Write a letter to the editor of a newspaper saying how you feel about the growing use of computers in our daily lives. 10

14. Look at this letter to a local newspaper and answer the questions: 10

Dear Sir,

If the traffic congestion gets any worse, there is likely to be a permanent traffic jam in the town centre during working hours, which will make it impossible for shops and businesses to operate efficiently.

The proposed scheme for banning cars from the centre is, however, unlikely to solve this problem. This ban will only cause more congestion in the suburbs, and in any case there are many people who genuinely need to take their cars to work.

A much better solution would be to double the numbers of train services into the centre, and to halve the fares. This would encourage people to stay off the roads, and avoid the bad feeling that the present scheme seems likely to cause among the business community.

Yours faithfully,  
Sarada Shrestha,  
Baghbazar.

1. Why does the writer think:

- a) something should be done about traffic congestion?
- b) the business houses will suffer?
- c) she proposed scheme will not work?
- d) her own solution is better?

2. Justify the use of 'will' in paragraphs 1 and 2.