



# DELHI PUBLIC SCHOOL GAYA

ASSIGNMENT SESSION 2018–19

CLASS – XII

*Instruction: – Kindly do your assignment work in assignment copies of the subjects.*

## ENGLISH CORE

- Draft Advertisements for the following (2 each):
  - Household item for sale
  - To-let
  - Required/Vacancy
  - Matrimony
  - Services (Showroom/Gym/Coaching etc.)
- Write articles on the following topics:
  - Language as a means of suppression [ref. : The Last Lesson]
  - The greatest challenge is to overcome fear. [ref. : Deep Water]
- Water is precious and each one of us must stop wastage. Prepare a poster in not more than 50 words urging people to employ various methods of rainwater harvesting in their colonies.
- The recent rain caused great havoc in the city. Many buildings collapsed and several trees got uprooted blocking traffic at several places. Write a report to be published in a national daily.
- Recently you went to your native village to visit your grandparents. You saw that some of the children in the age group 5-14 (the age at which they should have been at school) remained at home, were working in the fields or were simply loitering in the streets. Write a letter in 120-150 words to the editor of a national daily analysing the problem and offering solutions to it.
- Bring out the elements of satire, irony and humour from the chapter 'The Tiger King'.
- Why is it important to keep one's language alive? What are the reasons behind extinction of many languages?
- Explain the following statements:
  - "Will they make them sing in German too?"
  - "The steel canister seemed heavier than the garbage bag."
  - "Few airplanes fly over Ferozabad."
- How is the plight of underprivileged children brought out in the chapter 'Lost Spring'?
- What was Dr. Sadao's dilemma? Do you agree that his final solution was the best under the circumstances?

## MATHEMATICS

- Differentiate  $\sin(x^2)$  w.r.t.  $e^{\sin x}$
- $y = x^y$  then find  $\frac{dy}{dx}$ .
- If  $y = x^x + x^3 + 3^x + 3^3$ , find  $\frac{dy}{dx}$

4. If  $x = a \cos^3 \theta$ ,  $y = a \sin^3 \theta$ , find  $\frac{d^2y}{dx^2}$
5. For what value of constant K, the following functions are continuous at the indicated points.

$$(i) f(x) = \begin{cases} \frac{e^x - 1}{\log(1+2x)} & x \neq 0 \\ \frac{K}{x=0} & x = 0 \end{cases}$$

$$(ii) f(x) = \begin{cases} \frac{1 - \cos 4x}{x^2} & x < 0 \\ K & x = 0 \\ \frac{\sqrt{x}}{\sqrt{16 + \sqrt{x}} - 4} & x > 0 \end{cases} \quad \text{at } x = 0$$

6. For what values  $a$  and  $b$

$$f(x) = \begin{cases} \frac{x+2}{|x+2|} + a & \text{if } x < -2 \\ a + b & \text{if } x = -2 \\ \frac{x+2}{|x+2|} + 2b & \text{if } x > -2 \end{cases} \quad \text{Is continuous at } x = -2$$

7. Find the values of  $a$ ,  $b$  and  $c$  for which the function

$$f(x) = \begin{cases} \frac{\sin[(a+1)x] + \sin x}{x} & x < 0 \\ C & x = 0 \\ \frac{\sqrt{x+bx^2} - \sqrt{x}}{bx^{3/2}} & x > 0 \end{cases} \quad \text{Is continuous at } x = 0$$

8. Let  $f(x) = \begin{cases} \frac{1 - \sin^3 x}{3 \cos^2 x} & ; x < \frac{\pi}{2} \\ a & ; x = \frac{\pi}{2} \\ \frac{b(1 - \sin)}{(\pi - 2x)^2} & ; x > \frac{\pi}{2} \end{cases}$  If  $x = \frac{\pi}{2}$ , find  $a$  and  $b$ .

9. If  $f(x) = \begin{cases} x^3 + 3x + a & x \leq 1 \\ bx + 2 & x > 1 \end{cases}$  Is everywhere differentiable, find the value of  $a$  and  $b$ .

10. Differentiate  $\tan^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right)$  w.r.t.  $\cos^{-1}(2x\sqrt{1-x^2})$  where  $x \neq 0$ .

11. Differentiate  $(x \cos x)^x + (x \sin x)^{\frac{1}{x}}$  w.r.t.  $x$ .

12. If  $(x + y)^{m+n} = x^m \cdot y^n$  then prove that  $\frac{dy}{dx} = \frac{y}{x}$ .

13. If  $x = \tan\left(\frac{1}{a} \log y\right)$  then show that  $(1 + x^2) \frac{d^2y}{dx^2} + (2x - a) \frac{dy}{dx} = 0$

14. If  $y = x \log\left(\frac{x}{a+bx}\right)$  prove that  $x^3 \frac{d^2y}{dx^2} = \left(x \frac{dy}{dx} - y\right)^2$ .

15. Differentiate  $\sin^{-1}\left[\frac{2^{x+1} \cdot 3^x}{1+(36)^x}\right]$  w.r.t.  $x$ .

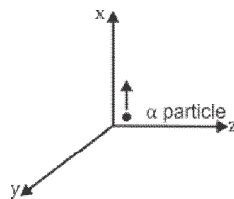
16. If  $\sqrt{1-x^6} + \sqrt{1-y^6} = a(x^3 - y^3)$ , prove that
- $$\frac{dy}{dx} = \frac{x^2}{y^2} \sqrt{\frac{1-y^6}{1-x^6}}, \text{ Where } -1 < x < 1 \text{ and } -1 < y < 1$$
17. If  $f(x) = \sqrt{x^2 + 1}$ ,  $g(x) = \frac{x+1}{x^2+1}$  and  $h(x) = 2x - 3$  find  $f'[h'(g'(x))]$ .
18. If  $x = a \cos^3 \theta$ ,  $y = a \sin^3 \theta$  then find  $\frac{d^2y}{dx^2}$
19. If  $y = \tan^{-1} \left[ \frac{\sqrt{1+\sin x} - \sqrt{1-\sin x}}{\sqrt{1+\sin x} + \sqrt{1-\sin x}} \right]$  where  $0 < x < \frac{\pi}{2}$  find  $\frac{dy}{dx}$
20. If  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then show that  $(1-x^2) \frac{d^2y}{dx^2} - x \frac{dy}{dx} - a^2 y = 0$
21. If  $y = [x + \sqrt{x^2 + 1}]^m$ , show that  $(x^2 + 1)y_2 + xy_1 - m^2y = 0$ .
22. Differentiate  $\sin^{-1} \left[ \frac{3x+4\sqrt{1-x^2}}{5} \right]$  w.r.t.  $x$ .
23. If  $x^y = e^{x-y}$ , prove the  $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$
24. Find the slope of the normal to the curve  $x = a \cos^3 \theta$  and  $y = a \sin^3 \theta$  at  $\theta = \frac{\pi}{4}$
25. Find the point on the curve  $y = x^3 - 2x + 3$  where the tangent is parallel to x-axis.
26. Find the co-ordinates of the point on the curve  $y^2 = 3 - 4x$ , where tangent is parallel to the line  $2x + y - 2 = 0$
27. The sides of an equilateral triangle are increasing at the rate of 2 cm/s. Find the rate at which the area increases, when side is 10 cm.
28. An inverted cone has a depth of 10 cm and a base of radius 5 cm. Water is poured into it at the rate of  $\frac{3}{2}$  c.c. per minute. Find the rate at which the level of water in the cone is rising when the depth is 4 cm.
29. A water tank has the shape of an inverted right circular cone with its axis vertical and vertex lower most. Its semi-vertical angle is  $\tan^{-1}(0.5)$ , water is poured into it at a constant rate of  $5m^3/h$ . Find the rate at which the level of the water is rising at the instant, when the depth of Water in the tank is 4m.
30. Determine whether the following functions is increasing or decreasing in the given interval  $f(x) = \cos \left( 2x + \frac{\pi}{4} \right)$ ,  $\frac{3\pi}{8} \leq x \leq \frac{5\pi}{8}$ .
31. Determine for which values of  $x$ , the function  $y = x^4 - \frac{4x^3}{3}$  is increasing and for which it is decreasing.
32. Find the interval of increasing and decreasing of the function  $f(x) = \sin x - \cos x$ ,  $0 < x < 2\pi$ .

33. Prove that the function  $y = \frac{4 \sin \theta}{2 + \cos \theta} - \theta$  is an increasing function of  $\theta$  in  $\left[0, \frac{\pi}{2}\right]$
34. Find the intervals in which the function is decreasing or increasing.  
 $f(x) = x^4 - 8x^3 + 22x^2 - 24x + 21$
35. Find the interval in which the function  
 $f(x) = 5x^{\frac{3}{2}} - 3x^{\frac{5}{2}}, x > 0$  is strictly decreasing.
36. Show that the function  $f(x) = \tan^{-1}(\sin x + \cos x)$ , is strictly increasing in the interval  $\left(0, \frac{\pi}{4}\right)$ .
37. Find the interval in which the function  $f(x) = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$  is increasing or decreasing.
38. Find the interval in which the function given by  
 $f(x) = \frac{3x^4}{10} - \frac{4x^3}{5} - 3x^2 + \frac{36x}{5} + 11$   
 (i) Strictly increasing  
 (ii) Strictly decreasing
39. Find the equation of the tangent to the curve  $y = x^2 - 2x + 7$  which is  
 (i) Parallel to the line  $2x - y + 9 = 0$   
 (ii) Perpendicular to the line  $5y - 15x = 13$
40. Find the point on the curve  $\sqrt{x} + \sqrt{y} = 4$  at which tangent is equally inclined to the axes.
41. Find the equation of the normal to the curve  $y = e^{2x} + x^2$  at  $x = 0$ . also find the distance from origin to the line.
42. Show that the line  $\frac{x}{a} + \frac{y}{b} = 1$  touches the curve  $y = be^{-x/a}$  at the point, where the curve intersects the  $x$ -axis.
43. At what point on the circle  $x^2 + y^2 - 2x - 4y + 1 = 0$  the tangent is parallel to  $x$ -axis.
44. Show that the equation of the normal at any point ' $\theta$ ' on the curve  $x = 3 \cos \theta - \cos^3 \theta, y = 3 \sin \theta - \sin^3 \theta$  is  $4(y \cos^3 \theta - x \sin^3 \theta) = 3 \sin 4\theta$ .
45. Use differentials to find the approximate value of  
 (i)  $(3.968)^{3/2}$  (ii)  $(26.57)^{1/3}$
46. Find the approximate value of  $f(2.01)$  where  $f(x) = x^3 - 4x + 7$
47. Find the maximum and minimum values of  $f(x) = \sin x + \frac{1}{2} \cos 2x$  in  $\left[0, \frac{\pi}{2}\right]$ .



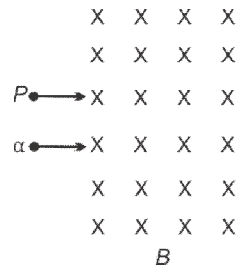
## PHYSICS

1. Write the expression, in a vector form, for the Lorentz magnetic force  $\vec{F}$  due to a charge moving with velocity  $\vec{v}$  in a magnetic field  $\vec{B}$ . What is the direction of the magnetic force?
2. Define one tesla using the expression for the magnetic force acting on a particle of charge 'q' moving with velocity  $\vec{V}$  in a magnetic field  $\vec{B}$ .
3. Use the expression :  $\vec{F} = q (\vec{v} \times \vec{B})$ , to define the S.I. unit of magnetic field.
4. A proton and an electron travelling along parallel paths enter a region of uniform magnetic field, acting perpendicular to their paths. Which of them will move in a circular path with higher frequency?
5. A particle of mass 'm' and charge 'q' moving with velocity 'v' enters the region of uniform magnetic field at right angle to the direction of its motion. How does its kinetic energy get affected?
6. A long straight wire carries a steady current / along the position y-axis in a coordinate system. A particle of charge + Q is moving with a velocity  $\vec{v}$  along the x-axis. In which direction will the particle experience a force?
7. Depict the trajectory of a charged particle moving with velocity  $\vec{v}$  as it enters in a uniform magnetic field perpendicular to the direction of its motion.
8. A narrow beam of protons and deuterons, each having the same momentum, enters a region of uniform magnetic field directed perpendicular to their direction of momentum. What would be the ratio of the circular paths described by them?
9. Two particles A and B of masses m and 2m have charges q and 2q respectively. Both these particles moving with velocities  $v_1$  and  $v_2$  respectively in the same direction enter the same magnetic field B acting normally to their direction of motion. If the two forces  $F_A$  and  $F_B$  acting on them are in the ratio of 1 : 2, find the ratio of their velocities.
10. A beam of  $\alpha$ -particles projected along + x-axis, experiences a force due to a magnetic field along the + y-axis. What is the direction of the magnetic field?



11. A particle of charge 'q' and mass 'm' is moving with velocity  $\vec{v}$ . It is subjected to a uniform magnetic field  $\vec{B}$  directed perpendicular to its velocity. Show that it describes a circular path. Write the expression for its radius.
12. A proton and a deuteron, each moving with velocity  $\vec{v}$  enter simultaneously in the region of magnetic field  $\vec{B}$  acting normal to the direction of velocity. Trace their trajectories establishing the relationship between the two.
13. Write the expression for Lorentz magnetic force on a particle of charge 'q' moving with velocity  $\vec{v}$  in a magnetic field  $\vec{B}$ . Show that no work is done by this force on the charged particle.

14. An  $\alpha$ -particle and a proton moving with the same speed enter the same magnetic field region at right angles to the direction of the field. Show the trajectories followed by the circular paths which the two particles may describe.



15. Find the condition under which the charged particles moving with different speeds in the presence of electric and magnetic field vectors can be used to select charged particles of a particular speed.
16. Write the condition under which an electron will move undeflected in the presence of crossed electric and magnetic fields.

**Two Marks Questions**

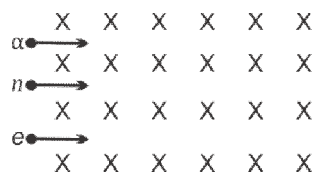
[2 × 1 = 2]

17. State the underlying principle of a cyclotron. Write briefly how this machine is used to accelerate charged particles to high energies.

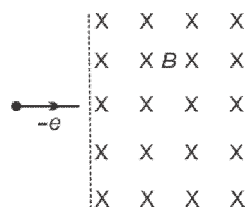
**Three Marks Questions**

[3 × 3 = 9]

18. (a) Write the expression for the magnetic force acting on a charged particle moving with velocity  $v$  in the presence of magnetic field  $B$ .
- (b) A neutron, an electron and an alpha particle moving with equal velocities, enter a uniform magnetic field going into the plane of the paper as shown. Trace their paths in the field and justify your answer.



19. A uniform magnetic field  $\vec{B}$  is set up along the positive x-axis. A particle of charge 'q' and mass 'm' moving with a velocity  $\vec{v}$  enters the field at the origin in X-Y plane such and perpendicular to the magnetic field  $\vec{B}$ . Trace, giving reason, the trajectory followed by the particle. Find out the expression for the distance moved by the particle along the magnetic field in one rotation.
20. An electron moving horizontally with a velocity of  $4 \times 10^4 \text{ m/s}$  enters a region of uniform magnetic field of  $10^{-5} \text{ T}$  acting vertically upward as shown in the figure. Draw its trajectory and find out the time it takes to come out of the region of magnetic field.



**Five Marks Questions**

[5 × 2 = 10]

21. A proton and a deuteron having equal momenta enter in a region of a uniform magnetic field at right angle to the direction of the field. Depict their trajectories in the field.
22. Deduce the expression for the frequency of revolution of a charged particle in a magnetic field and show that this is independent of the velocity or energy of the particle.

## **BIOLOGY**

Complete the “Investigatory Project” on any are of the topics given below:

1. Drug Addiction.
2. On recent diseases - Ebola.
3. How cigarette smoking affect your health.
4. Blood cancer
5. Antibiotics- good or bad for us?
6. Immune system in humans.
7. Acne in adolescence – causes & cure.
8. Malnutrition in tribals.
9. Study the effect of Bio-insecticides and Bio-pesticides on plant.
10. Population explosion and control.
11. Viral Diseases.
12. Effects of Diet on Blood glucose.
13. Microbes in daily life.

## **INFORMATICS PRACTICES**

1. Students need to make a project on e-learning/e-business/e-governance by using Java Netbeans and MySQL and the entire work must be filed together along with introduction, acknowledgment, coding, printout and bibliography. (the project needs to be made in a group of two or three pupils).

## **PHYSICAL EDUCATION**

1. Modified AAHPER administration for all items in detail.
2. Labelled diagram of field and equipment of any one game of your choice ant of the following list with their rules, terminologies and skills. – Athletics, Basketball, Football, Hand ball Kho-Kho, Volley ball.
3. Procedure for Asanas, benefits and contraindication of any two Asanas for life style disease.
4. A short note on physical education and sports for differently abled.
5. Write a note on Kinesiology, Biomechanics and sports.

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