DIWALI WORKSHEET: 2023-24
STD – XII SCIENCE

MATHEMATICS (041)

Q1. Let N be the set of all natural numbers and R be the relation on $N \times N$ defined by $(a,b)\ R\ (c,d) \Leftrightarrow ad = bc$ for all $(a,b)\ R\ (c,d) \in N \times N$ Show that R is an equivalence relation on $N \times N$. Also find the equivalence class of $(2,6)$ i.e $[(2,6)]$.

Q2. Show that the function $f: R \to R$ defined by $(x) = \frac{x}{1+x^2}$, for all $x \in R$ is neither one -one nor onto. Also, if $g: R \to R$ is defined as $g(x) = 2x - 1$, find $fog(x)$.

Q3. Show that the function f in $A = R - \left\{\frac{2}{3}\right\}$ defined as $f(x) = \frac{4x+3}{6x-4}$ is onto.

Q4. Find the domain of $\sin^{-1}(x^2 - 4)$.

Q5. Write the solution of $\tan^{-1}\left[2\sin[2\cos^{-1}(\frac{\sqrt{3}}{2})]\right]$.

Q6. Find the value of the following: $cot\left(\frac{\pi}{2} - 2\cot^{-1}\sqrt{3}\right)$.

Q7. If $A = \begin{bmatrix} 3 & -4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$, then find A^{-1} and hence solve the following system of equations.
$3x - 4y + 2z = -1, 2x + 3y + 5z = 7$ and $x + z = 2$.

Q8. Prove that the product of matrices $\begin{bmatrix} \cos^2\theta & \cos\theta\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{bmatrix}$ and $\begin{bmatrix} \cos^2\varphi & \cos\varphi\sin\varphi \\ \cos\varphi\sin\varphi & \sin^2\varphi \end{bmatrix}$ is a null matrix, when θ and φ differ by an odd multiple by $\frac{\pi}{2}$.

Q9. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then find α satisfying $0 < \alpha < \frac{\pi}{2}$ when $A + A^T = \sqrt{2}\, I_2$, where A^T is transpose of A.

Q10. Find the maximum value of $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+sin\theta & 1 \\ 1 & 1 & 1+cos\theta \end{vmatrix}$.

Q11. If A is a square matrix of order 3 with $|A| = 9$, then find the value of $|2adjA|$.

Q12. If $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$, find A^{-1}. Using A^{-1}, solve the system of linear equations.
$x - 2y = 10, 2x - y - z = 8, -2y + z = 7$.

Q13. For what value of a is the function f defined by $f(x) = \begin{cases} a\sin\frac{\pi}{2}(x+1), & x \le 0 \\ \frac{\tan x - \sin x}{x^3}, & x > 0 \end{cases}$ is continuous at $x = 0$?

Q14. If $= cost + log\ tan\frac{t}{2}$, $y = sin\, t$, then find the value of $\frac{d^2y}{dt^2}$ and $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{4}$.

Q15. Discuss the continuity and differentiability of the function $f(x) = |x| + |x-1|$ in the interval $(-1, 2)$.

Q16. The radius r of a right circular cone is decreasing at the rate of 3 cm/minute and the height h is increasing at the rate of 2 cm/minute. When $r = 9\ cm$ and $h = 5\ cm$, find the rate of change of its volume.

Q17. Find the intervals in which the function $f(x) = \frac{3}{2}x^4 - 4x^3 - 45x^2 + 51\ is$ (a) strictly increasing (b) strictly decreasing.

Q18. Find all the points of local maxima and local minima of $f\ (x) = -x + 2\ sin\ x\ on\ [0, 2].\ \pi$ Also, find local maximum and minimum values.

Q19. Show that a right circular cylinder which is open at the top, and has a given surface area will have the greatest volume if its height is equal to the radius of the base.

Q20. Find: $\int \frac{2x}{(x^2+1)(x^2+2)^2}\,dx$.

Q21. Find: $\int_0^{\frac{\pi}{4}} \frac{dx}{\cos^2 x+4\sin^2 x}$.

Q22. Find: $\int_0^{\frac{\pi}{4}} |xsin\pi x|\,dx$.

Q23. Calculate the area of the region bounded by the curve $y = logx$, the straight line $x = 2$ and the $x - axis$.

Q24. Find the area of the region bounded by the curve $ay^2 = x^3$, the $y - axis$ and the lines $y = a$ and $y = 2a$.

Q25. Sketch the region $\{(x, y): y = \sqrt{4 - x^2}\}$ and *x* axis. Find the area of the region using integration.

PHYSICAL EDUCATION (048)

CHAPTER – 8: BIOMECHANICS AND SPORTS

1 mark questions:

Q1. According to which law, a body at rest will remain at rest unless acted on by an external force.

Q2. According to which law, a change in the acceleration of an object is directly proportional to the force producing it and inversely proportional to its mass?

Q3. According to which law, for every action, there is always an equal and opposite reaction?

Q4. How many types of friction are there?

Q5. How many types of dynamic friction are there?

Q6. What it is called, when one body tends to move over the surface of another, but the actual motion has not yet started?

Q7. What it is called, when one body is actually moving over the surface of another body?

Q8. Ice-skating is an example of which friction.

Q9. Which type of friction it is called, when any object roll on any surface?

Q10. When all the forces acting on the body are counter balanced by equal and opposite force is called?

Q11. How many types of equilibrium are there?

Q12. An imaginary point around which the body or object is balanced is called.

Q13. What it is called, when a projectile follows the path?

Q14. What it is called when an object thrown into the space either horizon or an acute angle under the action of gravity?

Q15. How many types of levers are there?

Q16. In which type of lever, a fulcrum remains in between force and resistance.

Q17. In which type of lever, a load remains in between force and fulcrum.

Q18. In which type of lever, a force remains in between fulcrum and resistance.

2 marks questions:

Q1. Define Newton's Laws.

Q2. Define friction.

Q3. Define static friction.

Q4. Define dynamic friction.

3 marks questions:

Q5. Explain, how Newton's laws are applicable in the field of sports with suitable examples.

Q6. Explain different types of Equilibrium shortly.

Q7. Describe three principles of stability.

Q8. Define Centre of Gravity and how it is helpful in sports?

5 marks questions:

Q9. Explain that factors which are affecting projectile trajectory.

Q10. Mention any three advantages and three disadvantages of friction.

Q11. Explain types of lever.

Q12. How lever is useful in sports, explain with suitable examples.

CHAPTER – 9: PSYCHOLOGY AND SPORTS

1 mark questions:

Q1. In which type of personality, the individual is very competitive.

Q2. In which type of personality, the individual is easy going and patient.

Q3. In which type of personality, the individual is lethargic, passive, hopeless and pessimistic.

Q4. In which type of personality, the individual is usually suffer from high degree of distress.

Q5. In how many sociability characters, C. G. Jung has classified personality.

Q6. In which type of personality, characteristics like shyness, social withdrawal and tendency to talk less are seen.

Q7. In which type of personality, characteristics like tendency to be friendly, outgoing, talkative and social in nature are seen.

Q8. In which type of personality, characteristics of Introvert and Extrovert are seen together.

Q9. In which traits of personality, person is being imaginative, insightful and having a variety of interest?

Q10. In which traits of personality, person is remain organized, systematics, laborious and complete in all respects.

Q11. In which traits of personality, person is being energetic, talkative and assertive.

Q12. In which traits of personality, person is remain friendly, cooperative, kind and gentle.

Q13. In which traits of personality, person is remain moody and tense.

Q14. What it is called, when a person gives a value and respect to oneself?

Q15. What it is called, when a person is involved in activity through using his/her senses?

Q16. What it is called, when a person talks to oneself through his/her inner voice?

Q17. Which is the first step to turning the impossible into possible?

Q18. What do you mean by intrinsic?

Q19. What do you mean by extrinsic?

Q20. How many types of motivation are there?

2 marks questions:

Q1. Define ‘Personality’ and ‘Aggression’.

Q2. Define motivation.

3 marks questions:

Q3. Explain any three dimensions of personality.

Q4. Explain any three types of personality.

Q5. Explain the different types of aggression in sports.

Q6. Write a short note on self-esteem and mental imagery.

Q7. Write a short note on self-talk and goal setting.

5 marks questions:

Q8. How can you classify personality, according to C. G. Jung?

Q9. Describe any five traits of personality in your words.

Q10. Describe the types of motivation.

Q11. Explain any five techniques of motivation.

Q12. Explain any five reasons of exercise.

Q13. Explain any five benefits of exercise.

Q14. Explain any five strategies for enhancing adherence to exercise.