

FINAL TERM EXAMINATION
2019-2020
BIOLOGY
CLASS- XI

Time: 3 hrs

MM: 70

General instructions:

- (a) This question paper consists of four sections A,B,C& D. Section A contains 5 questions of 1 mark each, Section B is of 7 questions of 2 marks each, Section C is of 12 questions of 3 marks each & Section D of 3 questions of 5 marks each.
(b) All questions are compulsory.
(c) Write down the serial number of question before attempting it.
(d) Attempt the question in serial order.
(e) Give diagram where ever needed.

Section-A

Q1. Axial skeleton comprises of

- (a) 10 bones (b) 80 bones (c) 50 bones (d) 2 bones.

1

Q2. Define a cardiac cycle and cardiac output.

Q3. What are porins?

1

Q4. Name two synthetic auxins

1

Q5. Define plasticity ? Give an example of a plant that shows this phenomenon.

1

Or

Name the enzyme that digests fat. Give the end product of fat digestion.

Section-B

Q6. Which hormonal deficiency is responsible for the following:

- (a) diabetes mellitus (b) cretinism ? give one symptom for each deficiency.

2

Q7. What are neurotransmitters? Give an example.

Q8. Water droplets are observed near the tip of grass blades in the early morning.

- (a) What is such loss of water in liquid phase called?

2

- (b) Why does this phenomenon occur?

2

Q9. What is pericarp? Name its three regions in a fleshy fruit

2

Q10. What are porins? What role do they play in diffusion?

2

Q11. In which part of the alimentary canal major absorption of digested food takes place? What are the absorbed forms of different kinds of food materials?

2

- Q12. Provide the scientific terms for the following: 2
- The flat and expanded portion of a leaf.
 - The roots which come above the surface of soil to absorb air.
 - The sepals which are united.
 - The roots which arise from any parts of the plant other than the radicle.

Section-C

Q13. Give the values of each of the following: 3

- Po_2 of (i) alveolar air, (ii) oxygenated blood and (iii) a metabolically active tissue.
- Pco_2 of (i) alveolar air, (ii) deoxygenated blood and (iii) a metabolically active tissue.

Q14. Draw a labeled diagram of the human duodenum and the duct system of the associated digestive glands pouring their secretions into it. 3

OR

Draw neat diagram of different types of Chromosomes.

Q15. What are mesosomes in a prokaryotic cell? Mention the functions that it performs? 3

Q16. Draw a diagram of the ultrastructure of a cilium. 3

Q17.(a) Give the volume of air for the following: IRV and ERV.

- What is vital capacity? What is its significance?

OR

- What are Occupational Respiratory Disorders? Describe them.

- What happens in Emphysema? What is the major cause of this disorder.

Q18. What is phyllotaxy? Describe the type of phyllotaxy seen in Alstonia and calotropis. 3

Q19. Which plant growth regulator would you use if you are asked to:

- induce rooting in a twig
- quickly ripen a fruit
- delay leaf senescence
- induce growth in axillary buds
- "bolt" a rosette plant
- induce immediate stomata closure in leaves?

Q20. Draw the basic structure of a chemical synapse between neurons and label the Pre-synaptic membrane

- Synaptic vesicle
- Neurotransmitters
- Receptors
- Post-synaptic membrane
- Synaptic cleft

Q21 (a) Write any four functions of boron in plants

- Name two free-living bacteria that are nitrogen fixers.

Q22. What is meant by photoperiodism and vernalisation. Describe their significance. 3

Q23. (a) Differentiate between red muscle fibres and white muscle fibres.

- what causes muscle fatigue?

- Q24. In a stone grinding industry, the workers are provided with protective Masks, to protect the workers from disorders that can be caused by the Pollutants in their work place:
What are such disorders commonly called?
(a) What type of disorders such pollutants cause/ Why?
(b) Apart from protective masks, how can the authorities help the workers in maintaining proper health?

3

Section-D

Q25. Who proposed the fluid mosaic model of plasma membrane. Explain with the help of a labeled diagram. 5
OR

- (a) Explain how butter in your food gets digested and absorbed in your body?
(b) Name the bones of the pectoral girdle.
(c) Give an example of fibrous joint.
(d) What is the role of Ca^{2+} (calcium ions) in muscle contraction?

Q 26. (a) What is a synapse? How does the nerve impulse cross the chemical synapse?
(b) Distinguish between Aerobic and Anaerobic respiration.
(c) Respiratory Quotient (RQ) for carbohydrates is one (1) why?

5

OR

Describe the process of digestion of carbohydrates in human alimentary canal.

Q 27. (a) What is meant by double circulation? What is its significance?
(b) What is the importance of plasma proteins?
Or

Explain the conduction of a nerve impulse along a nerve fibre.

FINALTERM EXAMINATION
(2019-2020)
SUBJECT: CHEMISTRY
CLASS -XI

Time: 3 Hours

Maximum Marks: 70

General instructions:

- (i) All questions are compulsory.
- (ii) The question paper consist of 30 Questions divided in to four sections A, B, C & D.
- (iii) All questions of section A are MCQ type each question carry 1 mark.
- (iv) All questions of section B are short questions, each question carries 2 marks.
- (v) All questions of section C are short answer type, each question carries 3 marks.
- (vi) All questions of section D are Long answer type, each question carries 5 marks.

Section A

Q.1. Discovery of the nucleus of an atom was due to the experiment carried out by

- a) Bohr
- b) Mosley
- c) Rutherford
- d) Thomson

Q.2. Just the position of hydrogen in the periodic table on the basis of its electronic configuration.

Q.3. In the modern periodic table the period indicates the value of

- a) Atomic number
- b) Atomic mass
- c) Principle quantum no
- d) Ionic charge

Q.4. What are electrophiles and nucleophiles.

Q.5. Discuss the metallic character and the ionization enthalpy of S-block elements?

Q.6. The elements in which electrons are progressively filled in 4f –orbitals are called

- a) Transition elements
- b) Alkali metals
- c) Lanthanides
- d) Halogens

Q.7. Discuss critical temperature and critical volume.

Q.8. The hybridization of orbitals of N atom in NO_3^- , NO_2^+ and NH_4^+ are respectively

- a. sp^2 , sp^3 , sp
- b. sp , sp^2 , sp^3
- c. sp^2 , sp , sp^3
- d. sp , sp^3 , sp^2

Q.9. An atom of an element contains 29 electrons and 35 neutrons, deduce

- a) the number of protons and
- b) the electronic configuration of the element

Q.10. Define bond length and bond energy

Section B

Q.1. Explain why there is phenomenal decrease in ionization enthalpy from carbon to silicon?

Q.2. Why is sodium less reactive than potassium.

Q.3. What is Electrometric effect, also define +E and –E effect in detail.

OR

What is difference between Electron affinity and Electronegativity?

Q.4. Write the formulas for the following compounds:

- | | |
|------------------------|-----------------------|
| a) Mercury(II)chloride | b) Nickel(II)sulphate |
| c) Tin(IV)oxide | d) Iron(III)sulphate |

Q.5. Calculate the molecular mass of the following

- | | |
|------------------------|-----------------------|
| a) Ethane (C_2H_6) | b) Ammonia (NH_3) |
| c) Methane (CH_4) | d) Water (H_2O) |

Q.6. What you understand by limiting reagent.

Q.7. Differentiate between Aromatic, Anti-aromatic and Homoaromatic compounds

Q.8. Discuss hyperconjugation in detail and what are the conditions for hyper conjugation

Q.9. What is Inductive effect, also define +I and –I effect in detail.

Q.10. Discuss Heisenberg's uncertainty principle

Section C

Q.1. a) Write down the genera; electronic configuration of group 17 elements

- b) Which is largest in size, Cu^{2+} , Cu^+ and Cu and why
- c) Why anions are bigger in size than their parent atom.

Q.2. What is the basic difference in approach between the Mendeleev's periodic law and Modern periodic law?

Q.3. What do you understand by

- a) Inert pair effect
- b) Allotropy
- c) Catenation

OR

Explain molarity, normality and molality in detail

Q.4. Define electronegativity in detail, and how the electronegativity varies along a period and down a group.

OR

- a) Arrange Fe, Fe²⁺ and Fe³⁺ in increasing order of radii
- b) Define hydrogen bonding
- c) Write general electronic configuration of d-block elements

Q.5. What are Significant figures. Discuss with examples.

Section D

Q.1. Discuss carbanions in detail, also discuss the stability of various carbanions.

Or

Assign oxidation number to the underlined elements in each of the following species:

- a) NaH₂PO₄
- b) NaHSO₄
- c) H₄P₂O₇
- d) K₂MnO₄
- e) CaQ₂
- f) NaBH₄
- g) H₂S₂O₇
- h) KAl(SO₄)₂.12H₂O

Q.2. Explain ionization energy, atomic radius and electronegativity in detail. How do ionization energy, atomic radius and electronegativity vary

- i) down the group
- ii) along the period from left to right

Q.3. What are quantum numbers, explain them in detail.

Or

Explain

- a) Atomic Mass
- b) Molecular Mass
- c) Orbital
- d) Wavelength
- e) electron affinity

Q.4. Discuss the general characteristics and gradation in properties of alkaline earth Metals.

Q.5. Explain Schrodinger's wave equation in detail.

OR

Define Ionization potential in detail and factors affecting the ionization potential

SECTION D – LITERATURE
(30Marks)

Q9. Read the extracts given below and answer the questions, choosing the best option from those given below: **(any one extract)**

(Mention the extract no. being attempted) (1 × 3=3)

“When did my childhood go?
Was it when I found my mind was really mine,
To use whichever way I choose,
Producing thoughts that were not those of other people
But my own and mine alone
Was that the day!”

- a) What does the poet want to know?
- b) Explain “my mind was really mine”.
- c) What has the poet decided?

OR

“I am the poem of the earth, said the voice of the rain,
Eternal I rise impalpable out of the land and the bottomless sea”.

- a) Who is the speaker in the above lines? Who is “I” speaking to?
 - b) Why does the rain call itself “impalpable”?
 - c) Find out words form the extract which mean the same as:
 - 1. Ever-lasting
 - 2. Which cannot be seen
- Q10.** Answer these questions in about 40-50 words each (3 × 5= 15)
- 1. What impression of Shahid do you gather from the piece?
 - 2. Mention the two ways in which the author’s grandmother spent her days after he grew up.
 - 3. Explain the concept of shanshui.
 - 4. How did Einstein’s medical prove useless.
 - 5. Why did Crocker-Harris not disclose the results like the other teachers?

Q11. Answer any **ONE** of the following in about 100- 120 words. **(6)**

How did Rajendra Deshpande apply his theory of Catastrophic experience regarding the Battle of Panipat?

OR

What difficulties did the author encounter and overcome when he set out to reach Mount Kailash?

Q12. Answer the following questions in about 100-120 words. (6)

i. What dilemma did Dr. Andrew felt soon after the birth of Mrs. Morgan's child?

OR

ii. Compare Elsa and Einstein view of education.

FINAL TERM EXAMINATION
(2019-2020)
MATHEMATICS
CLASS -XI

Time: 3 Hours

Maximum Marks: 90

General Instruction:

- (i) All questions are compulsory.
- (ii) The question paper consists of 29 questions divided into four sections A, B,C and D. Section A comprises of 10 questions of one mark each, Section B comprises of 8 questions of two marks each, Section C comprises of 6 questions of four marks each and Section D comprises of 5 questions of six marks each.
- (iii) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- (iv) There is no overall choice. However, internal choice has been provided and You have to attempt only one of the alternatives in all such questions.
- (v) Use of calculators is not permitted. You may ask for logarithmic tables, if required.

SECTION : A

Question numbers 1 to 10 carry 1 mark each.

Q1. Find The value of $\sin \frac{31\pi}{3}$?

Q2. Find the multiplicative inverse of $\sqrt{5} + 3i$?

Q3. Find the derivative of $f(x) = x \sin x$.

Q4. If $P(A) = 0.54$, $P(B) = 0.69$ & $P(A \cap B) = 0.35$ find $P(A \cup B)$?

Q5. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of exactly 3 girls .

Q6. Find the middle terms in the expansion of $(\frac{x}{3} + 9y)^{10}$.

Q7. Find the slope of line joining the points $(2,1)$ and $(4,5)$.

Q8. Find the eccentricity of conic section: $\frac{x^2}{100} - \frac{y^2}{400} = 1$

Q9. Find the domain of the function $f(x) = \sqrt{2x + 1}$

Q10. Write the formula to find the co-ordinate of centroid of triangle whose vertices are (x_1, y_1, z_1) , (x_2, y_2, z_2) and (x_3, y_3, z_3) .

SECTION : B

Question numbers 11 to 18 carry 2 marks each.

Q11. Find the derivative of following function : $y = \frac{x}{\sin^n x}$

Q12. Let f and g are two real valued functions defined respectively by

$$f(x) = 2x+1, \quad g(x) = x^2 - 5, \quad \text{find } (f+g)x, (f-g)x.$$

Q13. Find Mean Deviation about Median of the following data: 4,7,8,6,5,3,1.

Q14. Find the equation of the line parallel to the $3x - 4y + 2 = 0$ and passing through the point $(-2, 3)$?

Q15. In how many ways can the letters of the word PERMUTATIONS be arranged if the -(i) Words start with P and end with S. (ii) There are always 4 letters between P and S.

Q16. Find the general solution for the equation $\sec^2 2x = 1 - \tan 2x$.

Q17. If $(1+i)^3 = u+iv$, Find u and v.

Q18. Find the equation of the circle passing through the point $(4, 1)$ and whose centre is $(6, 5)$.

SECTION : C

Question numbers 19 to 24 carry 4 marks each.

Q19. Prove that: $\cos^2 x + \cos^2(x + \frac{\pi}{3}) + \cos^2(x - \frac{\pi}{3}) = 3/2$.

Q20. Prove that the coefficient of x^n in the expansion of $(1+x)^{2n}$ is twice the coefficient of x^n in the expansion of $(1+x)^{2n-1}$.

Q21. Graphically solve the following system of linear equations, $3x+y \leq 66,000$, $x+y \leq 45,000$, $x \leq 20,000$, $y \leq 40,000$ and $x \geq 0, y \geq 0$

Q22. Find the equation of the set of points P such that its distances from the points A $(3, 4, -5)$ and B $(-2, 1, 4)$ are equal.

Q23. Let $A = \{1, 2, 3, \dots, 14\}$. Define a relation R from A to A by $R = \{(x, y) : 3x - y = 0$, where $x, y \in A\}$. Write down its domain, co-domain and range.

Q24. Three coins are tossed once. Find its Sample space and the probability of getting (i) exactly two tails (ii) exactly three tails?

SECTION : D

Question numbers 25 to 29 carry 6 marks each.

Q25. Calculate Mean, Variance and Standard deviation for the following distribution.

Classes	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	3	7	12	15	8	3	2

Q26. Find the image of the point $(3, 8)$ w.r.t the line $x + 3y = 7$ assuming, the line to be a plane mirror.

Q27. Two Students Anil and Ashima Appeared in an Examination. The Probability that Anil will qualify the examination is 0.5 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that (i) Both Anil and Ashima will not qualify the examination. (ii) At least one of them will not qualify the examination. (iii) Only one of them will qualify the examination.

Q28. Find the coordinate of the foci, the vertices and length of major axis and minor axis, the eccentricity and the length of the latus rectum of the ellipse: $\frac{x^2}{100} + \frac{y^2}{400} = 1$

Q29. Find the derivative of the following Function by using First Principle. (i) $f(x) = \sin(x)$ (ii) $f(x) = \tan(x)$.
OR

Find the derivative of Function $f(x) = \frac{2x+3}{x-2}$ by using First Principle.

**FINAL TERM EXAMINATION
(2019-2020)
SUBJECT – PHYSICAL EDUCATION
CLASS -XI**

Time 3: Hours

Maximum Marks70

General instructions:-

- Question paper contains 34 questions.
- All questions are compulsory.
- Question no 1 to 20 carry 1 mark each
- Question no 21 to 30 carry 3 marks each
- Question 31 to 34 carry 5 marks each

Q1. Which one of the following is not a component of wellness?

- | | |
|--------------------|-----------------------|
| a. Mental wellness | c. Maximum wellness |
| b. Moral wellness | d. Emotional wellness |

Q2. Who was the first president of Indian Olympic association?

- | | |
|----------------------|---------------------|
| a. Sir Dorab Ji Tata | c. Jawaharlal Nehru |
| b. Sardar Patel | d. Mahatma Gandhi |

Q3. The 2020 Olympic Games will be held in.

- | | |
|---------------|----------|
| a. Los Angles | c. India |
| b. Mexico | d. Tokyo |

Q4. Who is known as the father of modern Olympic?

- | | |
|----------------------|-----------------------|
| a. Prof. Jigaro Kino | c. Sir Dorab ji Tata |
| b. Jack Rogges | d. Perrie D Coubertin |

Q5. How many rings are there in Olympic flags?

- | | |
|----------|---------|
| a. Three | c. Two |
| b. Five | d. Four |

Q6. Special Olympic Bharat started in?

- | | |
|---------|---------|
| a. 2001 | c. 1948 |
| b. 1995 | d. 2005 |

Q7. Deaf Olympic started in?

- | | |
|---------|---------|
| a. 1960 | c. 1947 |
| b. 1924 | d. 2001 |

Q8. The Headquarter of Paralympic is situated in?

- a. Paris
- b. Germany
- c. New York
- d. Denmark

Q9. Inclusion is needed for?

- a. Hearing Impaired
- b. Blind people
- c. Loss of Limbs
- d. All of these

Q10. Which of the following is not an Asana?

- a. Kapalbhati
- b. Shashankasana
- c. Trikonasana
- d. Naukasana

Q11. Which of the following are adventure sports?

- a. Trekking
- b. Paragliding
- c. Surfing
- d. All the above

Q12. Find one word answer for the statement ‘Raise your head, stand erect, raise your arms’?

- a. Padmasana
- b. Tadasana
- c. Garudasana
- d. Shashankasana

Q13. Which is not a quality of a good Leader?

- a. Autocratic
- b. Both
- c. Dictator
- d. None of the above

Q14. Who has a pear shape body?

- a. Endomorphic. Mesomorph
- b. Ectomorph
- c. All the above

Q15. Body weight=50kg, Height=155cm, Find the BMI?

- a. 20.81
- b. 21.53
- c. 19.81
- d. 23.02

Q16. BMI of a person is 32.50 he is?

- a. Overweight
- b. Obesity grade-1
- c. Healthy
- d. Underweight

Q17. Ball and socket joint is situated at?

- a. Shoulder
- b. Wrist
- c. Neck
- d. Knee

Q18. A 19 year old boy fall in the category of?

- a. Late childhood
- b. Adolescence
- c. Infancy
- d. Naukasana

Q19.Which of the following is not a sign of growth?

- a. Increase in height
- b. Increase in talking
- c. Increase in weight
- d. Increased hair length

Q20. Which is a method of warming up?

- a. Sauna bath
- b. stretching
- c. Jogging
- d. All the above

Q21What are the objectives of Indian Olympic Association?

Q22. What steps should be taken to implement Inclusion education in India?

Q23. Explain the principles of Adapted Physical education?

Q24. Specify the qualities of good leader?

Q25. Explain the objectives of adventure sports?

Q26. What are the properties of muscles?

Q27. Explain the functions of skeletal system?

Q28. Define the phenomena of second wind. Explain the causes and symptoms?

Q29.What is the side effects of Prohibited substances?

Q30. Explain the benefits of warming up?

Q31. How can we present the health threats through life style change?

Q32. Explain the procedure of Yoga Nidra. What are the benefits of practicing Yoga Nidra?

Q33.What is the importance of test, measurement and evaluation?

Q34. What is the difference between growth and development?

**FINAL TERM EXAMINATION
(2019-2020)
SUBJECT – PHYSICS
CLASS -XI**

Time 3: Hours

Maximum Marks70

General instructions:

- (i) All questions are compulsory.
- (ii) The question paper consist of 37 Questions divided in to four sections A,B,C &D.
- (iii) All questions of section A are MCQ type and one word each question carry 1 mark.
- (iv) All questions of section B are short questions, each question carries 2 marks.
- (v) All questions of section C are short answer type, each question carries 3 marks.
- (vi) All questions of section D are Long answer type, each question carries 5 marks.

SECTION-A

20 A pipe 35 cm long is open at both the ends. A source of 1.5 kHz resonantly excites third harmonic mode. If one end of the pipe is closed, which mode will then be resonantly excited with the same source? Take speed of sound 35cm/s

- (a) 3rd harmonic (b) 5th harmonic (c) 7th harmonic (d) no harmonic mode

SECTION-B

- 21** A particle is projected at an angle θ from the horizontal with kinetic energy K . What is the kinetic energy of the particle at the highest point ?
- 22** Explain why second law is the real law in nature.
- 23** State and prove the work energy theorem by variables force.
- 24** What are conservative and non- conservative forces? Prove that gravitational force is conservative force.
- 25** Define radius of gyration of a body about some axis of rotation .Derive an expression for it on what factors does it depend.
- 26** Define the term orbital speed. Establish a relation for orbital speed of a satellite orbiting very close to the surface of the Earth .Find the ratio of this orbital speed and escape speed.
- 27** A small ball is allowed to fall from rest vertically downward through a viscous liquid. Plot a graph showing the variation of its velocity with time.

SECTION-C

- 28** A projectile is fired horizontally with a velocity ‘ u ’. Show that its trajectory is a parabola. Also obtain expression for its (i) time of flight (ii) Velocity at any instant.
- 29** A hunter has a machine gun that can fire 50g bullets with a velocity of 150m/s. A 60g tiger springs at him with a velocity of 10m/s. How many bullets must the hunter fire in to the tiger in order to stop him?
- 30** Derive an expression for the elastic collision in one dimension.
- 31** A satellite orbits the Earth at a height of 500 km from its surface. Compute its (i) Kinetic energy (ii) Potential energy (iii) Total energy. Mass of the satellite = 300 kg , mass of the Earth = 6.0×10^{24} kg , radius of the Earth = 6.4×10^6 m, $G = 6.67 \times 10^{-11}$ Nm 2 kg $^{-2}$.
- 32** A liquid drop of diameter D breaks up in to 27 tiny drops. Find the resulting change in energy. Take the surface tension of the liquid as T .

OR

Derive an expression for the excess pressure inside a liquid bubble.

- 33** The equation of a plane progressive wave is given by the equation $Y=10\sin 2\pi (t-0.005x)$ where y and x are in cm and t in second . Calculate the amplitude, frequency, wavelength and velocity of the wave
- 34** Write Newton’s formula for speed of sound in air. What was the correction made by Laplace in this formula?

SECTION-D

- 35** (a) Derive an expression for the moment of inertia of a circular disc about an axis passing through its center and perpendicular to its plane.
(b) A solid cylinder rolls down an inclined plane. Its mass is 2 kg and radius 0.1 m .If the height of the inclined plane is 4 m, what is its rotational K.E. when it reaches the foot of the plane? **(3+2)**
- 36** (a) State and prove the Bernoullis Theorem.
(b) An aeronautical engineer observes that on the upper and the lower surfaces of the wings of an aeroplane, the speed of the air is 90m/s and 72m/s respectively. What is the lift on the wing, if its area is 3.2m^2 ? take the density of air to be 1.29kg/m^3 . **(3+2)**
- 37** (a) Show that in case of closed organ pipe of length L, the frequencies of vibrating air column are given by $\gamma(2n-1)\frac{V}{2L}$ where n is an integer.
(b) A sonometer wire of length 1.5m is made of steel. The tension in it produces an elastic strain of 1%. What are the fundamental frequencies of vibration of the wire , if density and elasticity of steel is $7.7 \times 10^3 \text{ kg/m}^3$ and $2.2 \times 10^{11} \text{ N/m}^2$ respectively. **(3+2)**

SUBJECT – PHYSICS
CLASS -XI

Time 1: Hours

Maximum Marks : 20

1. The velocity time curve of a body projected vertically upwards is

(a) parabolic	(b) ellipse	(c) hyperbola	(d) straight line
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- 2 A body is dropped from an aeroplane flying horizontally at 250 km/H at an altitude of 980 m. Time of fall is:

(a) 10s	(b) 12 s	(c) 14.15 s	(d) 17.33 s
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3. A bus starts from rest and acquires a speed of 72 km/H in 20 s. The acceleration of the bus is

(a) 10 m/s	(b) 5 m/s	(c) 2 m/s	(d) 1 m/s
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4. A shell of mass 200 gm is ejected from a gun of mass 4 kg by an explosion that generates 1.05 kJ of energy. The initial velocity of the shell is

(a) 100m/s	(b) 80 m/s	(c) 40m/s	(d) 120 ms
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5. A body is moving with a velocity of 72 km/h on a rough horizontal surface of coefficient of friction 0.5. If the acceleration due to gravity is 10 m/s, the minimum distance in which it can be stopped is

(a) 10 m	(b) 20m	(c) 30 m	(d) 40 m
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- 6 A body of mass 5 kg is moving in a circle of radius 1 m with an angular velocity of 2 rad/s. The centripetal force acting on the body is

(a) 10N	(b) 20 N	(c) 30 N	(d) 40 N
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7. A spring of stiffness 'k' is cut into two parts 'A' and 'B' of length $l_A : l_B = 2:3$, then the stiffness of spring 'A' is given

5k/2	(b) 3k/5	(c) 2k/5	(d) k
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8. A car of mass m starts from rest and accelerates so that the instantaneous power delivered to the car has a constant magnitude P_0 . The instantaneous velocity of this car is proportional to

(a) $T^2 P_0$	(b) $T^{1/2}$	(c) $T^{1/2}$	(d) $T/m^{1/2}$
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- 9 W_1, W_2 and W_3 represent the work done in moving a particle from A to B along three different paths 1, 2 and 3 respectively in the gravitational field of point mass m, find the correct relation between W_1, W_2 and W_3

(a) $W_1 > W_2 > W_3$	(b) $W_1 = W_2 = W_3$
(c) $W_1 < W_2 < W_3$	(d) $W_2 > W_1 > W_3$

- 10 A solid sphere is rotating in free space. If the radius of the sphere is increased, keeping its mass same, which one of the following will remain constant?

(a) Angular velocity	(b) Angular momentum	(c) Moment of inertia	(d) Rotational kinetic energy
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- 11 A ring, a disc and a sphere, all of the radius and mass, roll down an inclined plane from the same height h. Out Of these

(a) the ring will reach the bottom first
(b) both ring and the disc will reach the bottom before the sphere
(c) the disc will reach the bottom first
(d) only the sphere will reach the bottom first.

12 A pulley of radius 2 m is rotated about its axis by a force $F = (20t - 5t^2)$ newton, where t is measured in seconds applied tangentially. If the moment of inertia of the pulley about its axis of rotation is 10 kg/m^2 , the number of rotations made by the pulley before its direction of motion is reversed is

- (a) more than 3 but less than 6 (b) more than 6 but less than 9
(c) more than 9 (d) less than 3

13 Two particles of equal mass ' m ' go around a circle of radius ' R ' under the action of their mutual gravitational attraction. The speed of each particle with respect to their centre of mass is

- (a) Gm/R (b) $Gm/4R$ (c) $Gm/3R$ (d) $Gm/2R$

14 Two points 'A' and 'B' having masses in the ratio 4:3 are separated by a distance of 1 m. When another point mass 'C' of mass 'M' is placed in between 'A' and 'B', the force between 'A' and 'C' is $1/3$ of the force between 'B' and 'C' at distance is

- (a) $2m/3$ (b) $1m/3$ (c) $1m/4$ (d) $2m/5$

15. The ratio of radii of earth to another planet is $2/3$ and the ratio of their mean densities is $4/5$. If an astronaut can jump to a maximum height of 1.5 m on the earth, with the same effort, the maximum height he can jump on the planet is

- (a) 1 m (b) 0.8 m (c) 0.5 m (d) 1.25

16 A liquid filled in a container exerts a force which is always directed

- (a) vertically downwards at the bottom (b) perpendicular on all surfaces in contact
(c) vertically upwards on its free surface (d) radially outward

17 Hydraulic lift is based upon

- (a) Archimedean principle (b) Hooke's law (c) Stoke's law (d) Pascal's law

18. Each of the two strings of lengths 51.6 cm and 49.1 cm are tensioned separately by 20 N force. Mass per unit length of both the strings is same and equal to 1 g/m. When both the strings vibrate simultaneously, the number of beats is

- (a) 3 (b) 6 (c) 7 (d) 8

19. A source of sound gives 5 beats per second, when sounded with another source of frequency 100 Hz. The second harmonic of the source together with a source of frequency 205 Hz gives 5 beats/s. What is the frequency of the source

- (a) 105 Hz (b) 205 Hz (c) 95 Hz (d) 100 Hz

20. A boat at anchor is rocked by waves, where crests are 100 m apart and velocity is 25 m/s. The boat bounces up in

- (a) 2500 s (b) 75s (c) 4s (d) 0.25 s

