NEET UG (2024)

SHORT PRACTICE TEST - 02

DURATION: 60 Minutes | **M.MARKS : 192**

Topics Covered

Physics:	Unit and dimensions, Error
Chemistry:	Solution (Complete Chapter)
Botany:	Cell : The unit of life(Prokaryotic cell).
Zoology:	"Breathing and Exchange of gases (Full syllabus)"

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **60 minutes** duration.
3. The test booklet consists of **48** questions. The maximum marks are **192**.
4. All questions are compulsory.
5. There is only one correct response for each questions.
6. Each correct answer will give **4** marks while **1** Mark will be deducted for a wrong MCQ response.
7. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.
9. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

OMR Instructions:

1. Use blue/black dark ballpoint pens.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

PHYSICS

1. The method of dimensional analysis can be used to derive which of the following relations?

(1) $N_0e^{-\lambda t}$ (2) A sin ($\omega t + kx$)

(3) $\frac{1}{2}mv^2 + \frac{1}{2}Iw^2$ (4) None of the above

2. In a given system of units, 1 unit of mass = 2 kg, 1 unit of length = 5 m and 1 unit of time = 5 sec. Then in this system, 1 N represents:

(1) 5/2 units of force
(2) 2/5 units of force
(3) 2 units of force
(4) 1/2 units of force

3. Which of the following pairs of physical quantities have same dimensions?

(1) Force and power
(2) Torque and energy
(3) Torque and power
(4) Force and torque

4. A student writes following four different expressions for the displacement 'y' in a periodic motion:

(a) $y = a\sin\frac{2\pi t}{T}$

(b) $y = a\sin Vt$

(c) $y = \frac{a}{T}\sin\frac{t}{a}$

(d) $y = \frac{a}{\sqrt{2}}\left[\sin\frac{2\pi t}{T} + \cos\frac{2\pi t}{T}\right]$

Where 'a' is maximum displacement, V is the speed and T is the time period; then dimensionally:

(1) (a) and (b) are wrong
(2) (b) and (c) are wrong
(3) (c) and (d) are wrong
(4) (d) and (a) are wrong

5. Which of the following is a possible dimensionless quantity?

(1) Velocity gradient
(2) Pressure gradient
(3) Displacement gradient
(4) Force gradient

6. Force acting on a particle is given by $F = (A - x)/Bt$, where x is in metre, and t is in seconds. The dimension of B is

(1) MLT^{-2} (2) $M^{-1}T^{-3}$

^{-1}T (D) MT^{-1}

7. In a Vernier calipers, one main scale division is x cm and n division of the Vernier scale coincide with (n –1) division of the main scale. The least count (in cm) of the calipers is:

(1) $\left(\frac{n-1}{n}\right)x$ (2) $\left(\frac{nx}{n-1}\right)$

(3) $\frac{x}{n}$ (4) $\left(\frac{x}{n-1}\right)$

8. The density of a material in CGS system of units is 4 g/cm^3. In a system of units in which unit of length is 10 cm and unit of mass is 100 g, the value of density of material will be

(1) 400 (2) 0.04
(3) 0.4 (4) 40

9. Velocity of object is given as a function of time and position.

$$v = \alpha t + \beta x + \gamma$$

then dimension of α, β and γ are

(1) LT^{-2}, T^{-1}, LT^{-2}
(2) LT^{-2}, T^{-1}, LT^{-1}
(3) LT^{-1}, LT^{-2}, T^{-1}
(4) LT^{-1}, L, T

10. **Assertion:** y = 4 sin ($\omega t - kx$), | ($\omega t - kx$)| is dimensionless.

Reason: Because dimension of $\omega = [M^0L^0T^0]$.|

(1) Assertion is correct, reason is correct; reason is a correct explanation for assertion.
(2) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
(3) Assertion is correct, reason is incorrect
(4) Assertion is incorrect, reason is correct.

11. If dimension of critical velocity of liquid flowing through a tube are expressed as $v_c \propto [\eta^x\rho^y r^z]$ where η, ρ and r are the coefficient of viscosity of liquid, density of liquid and radius of the tube respectively, then the values of x, y and z are given by:

(1) 1, 1, 1 (2) 1, –1, –1
(3) –1, –1, 1 (4) –1, –1, –1

12. In the measurement of a physical quantity

X = $\frac{A^2B}{C^{1/3}D^3}$. The percentage errors introduced in the measurements of the quantities, A, B, C and D are 2%, 2%, 4% and 5% respectively. Then the minimum amount of percentage of error in the measurement of X is contributed by

(1) A (2) B
(3) C (4) D

CHEMISTRY

13. The boiling point of C_6H_6, CH_3OH, $C_6H_5NH_2$ and $C_6H_5NO_2$ are 80ºC, 65ºC, 184ºC and 212ºC respectively. Which will show lowest vapour pressure at room temperature?
(1) C_6H_6 (2) CH_3OH
(3) $C_6H_5NH_2$ (4) $C_6H_5NO_2$

14. Which of the following is not a colligative property?
(1) Vapour pressure
(2) Depression in freezing point
(3) Elevation in boiling point
(4) Osmotic pressure

15. For each of the following dilute solutions, van't Hoff factor is equal to 3, except:
(1) Na_2SO_4 (2) CaF_2
(3) K_3PO_4 (4) $(NH_4)_2 CO_3$

16. At 298 K, the vapour pressure of pure liquid A (molecular weight = 40) is 100 torr, while that of pure liquid B is 40 torr, (molecular weight = 80). The vapour pressure at 298 K of a solution containing 20 g of each A and B, is:
(1) 59.8 torr (2) 80 torr
(3) 48 torr (4) 68 torr

17. If α is the degree of dissociation of Na_2SO_4, the van't Hoff factor (i) used for calculating the molecular mass is:
(1) $1 - 2\alpha$ (2) $1 + 2\alpha$
(3) $1 - \alpha$ (4) $1 + \alpha$

18. The passing of solvent particles through a semipermeable membrane is called**:**
(1) Osmosis (2) Electrodialysis
(3) Electrophoresis (4) Electroplating

19. Van't Hoff factor more than unity indicates that the solute in solution has:
(1) Dissociated (2) Associated
(3) Both (1) and (2) (4) Cannot say anything

20. For an aqueous solution, freezing point is –0.186ºC. Elevation of the boiling point of the same solution is (K_f = 1.86ºC mol^{-1} kg and K_b = 0.512ºC mol^{-1} kg)
(1) 0.186ºC (2) 0.0512ºC
(3) 1.86ºC (4) 5.12ºC

21. A solution is prepared by adding 4 moles of substance A to 300 g of water. Calculate molality of the solution.
(1) 0.1333 m (2) 1.333 m
(3) 0.0133 m (4) 13.33 m

22. 2.3 g of C_2H_5OH (mol. Wt. 46) are dissolved in water to form 500 mL solution. The molarity of the solution is:
(1) 0.01 (2) 0.1
(3) 0.05 (4) 2.0

23. The solubility of a gas in water depends on:
(1) Nature of the gas
(2) Temperature
(3) Pressure of the gas
(4) All of these

24. 0.5 M solution of urea is isotonic with:
(1) 0.5 M NaCl solution
(2) 0.5 M sugar solution
(3) 0.5 M $BaCl_2$ solution
(4) None of these

BOTANY

25. Which of the following represents prokaryotic cells?

27. Structure is **not present** in bacteria:
(1) Glycocalyx
(2) Fimbriae
(3) Pili
(4) Cilia

28. The motile bacteria are able to move by:
(1) Pili (2) Fimbriae
(3) Flagella (4) Cilia

29. Plasmids of bacterial cell possess all the following characteristics, **except**.
(1) These are extrachromosomal DNA
(2) These are self replicating
(3) These help in the replication of nucleoid
(4) These are small, circular and confer unique phenotypic characters to some bacteria

30. Inclusion bodies of blue-green, purple and green photosynthetic bacteria are:
(1) Gas vacuoles (2) Centrioles
(3) Microtubules (4) Contractile vacuoles

31. Chromatophore are extensions present in membrane of _____ and have _____.
(1) Cyanobacteria, enzyme
(2) Cyanobacteria, pigment
(3) *Mycoplasma*, pigment
(4) Plant cell, pigment

32. The cell envelope of bacteria is composed of:
(1) Outermost cell wall followed by glycocalyx and plasma membrane
(2) Plasma membrane and cell wall
(3) Outermost glycocalyx followed by cell wall and plasma membrane
(4) Plasma membrane

33. A complex of ribosomes attached to a single strand of mRNA is known as:
(1) Polyribosome (2) Polypeptide
(3) Nucleosome (4) All of these

34. **Assertion**: Inclusion bodies lie free in the cytoplasm
Reason: Inclusion bodies are not bound by any membrane system.
(1) Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
(2) Both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.
(3) Assertion is true statement but Reason is false
(4) Both Assertion and Reason are false statements.

35. Mark the **correctly** matched.
(1) Mesosome – Photosynthesis
(2) Fimbriae – Attachment
(3) Pili –Motility
(4) Chromatophore – Respiration

36. Consider the following statements.
(A) Cell wall of bacteria is made up of peptidoglycan
(B) Mesosome helps in DNA replication
(C) Mesosome and chromatophore extension of cell wall
Mark the **correct** statement(s).
(1) (A) and (B)
(2) (B) and (C)
(3) All three
(4) (A) and (C)

(ZOOLOGY)

37. 23% of carbon dioxide is transported
(1) Directly dissolved in plasma
(2) As Bicarbonate ions
(3) As carboxy haemoglobin
(4) As Carbamino haemoglobin

38. Residual volume is
(1) Lesser than Tidal volume
(2) Greater than IRV
(3) Greater than vital capacity
(4) Greater than Tidal volume

39. Which of the factor given below dissociate Hb–O_2 from each other
(1) Low pCO_2 (2) High H^+
(3) Low H^+ (4) Low temperature

40. Which is incorrect match
(1) Larynx : Sound box
(2) Pharynx : Common passage for food and air
(3) Alveoli : Exchange of gases
(4) pO_2 in Alveoli : 95 mm Hg

41. Which of the following statements is true about pleural membranes?
(1) Outer pleural membrane is in close contact with the lung surface
(2) Inner pleural membrane is in contact with the thoracic lining
(3) Pleural fluid is present between both the pleural layers.
(4) It increases the friction on the lung surface

42. Which is a Allergic respiratory disorder
(1) Asthma
(2) Silicosis
(3) Asbestosis
(4) Emphysema

43. Pneumotaxic centre is found in
(1) Medulla
(2) Pons
(3) Cerebellum
(4) Midbrain

44. Match the following columns.

	Column-I		**Column-II**
A	Earthworm	1.	Moist cuticle
B	Arthropods	2.	Gills
C	Fishes	3.	Lungs
D	Birds/Reptiles	4.	Trachea

	A	**B**	**C**	**D**
(1)	2	1	4	3
(2)	1	4	2	3
(3)	1	3	2	4
(4)	1	2	4	3

45. **Assertion:** During inspiration volume of thoracic cavity increases

Reasons: Diaphragm moves upwards and becomes dome shaped during inspiration

(1) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

(2) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

(3) Assertion (A) is true and Reason (R) is false.

(4) Assertion (A) and Reason (R) both are false.

46. Arrange the given steps of respiration mechanism in the order, they occur in the human body

I. Breathing or pulmonary ventilation

II. Diffusion across the alveolar membrane

III. Transport of gases by blood

IV. Utilisation of O_2 by cells

V. Diffusion of O_2 and CO_2 between blood and tissues

Choose the correct option

(1) I → II → III → IV → V

(2) I → II → III → V → IV

(3) I → III → II → V → IV

(4) I → III → II → IV → V

47. Which is incorrect in the following

(1) Tidal volume = 500 ml

(2) IRV = 1200 ml

(3) ERV = 1000 ml

(4) RV = 1200 ml

48. **Statement I:** It is beneficial to respire through mouth than through nasal openings

Statement II: Trachea divides into primary bronchi at 6^{th} Thoracic vertebra

(1) Both statements are correct

(2) Both statements are incorrect.

(3) Only statement I is correct.

(4) Only statement II is correct.

Answer Key

PHYSICS		CHEMISTRY		BOTANY		ZOOLOGY	
1.	(4)	13.	(4)	25.	(4)	37.	(4)
2.	(1)	14.	(1)	26.	(1)	38.	(4)
3.	(2)	15.	(3)	27.	(4)	39.	(2)
4.	(2)	16.	(2)	28.	(3)	40.	(4)
5.	(3)	17.	(2)	29.	(3)	41.	(3)
6.	(3)	18.	(1)	30.	(1)	42.	(1)
7.	(3)	19.	(1)	31.	(2)	43.	(2)
8.	(4)	20.	(2)	32.	(3)	44.	(2)
9.	(2)	21.	(4)	33.	(1)	45.	(3)
10.	(3)	22.	(2)	34.	(1)	46.	(2)
11.	(2)	23.	(4)	35.	(2)	47.	(2)
12.	(3)	24.	(2)	36.	(1)	48.	(2)

(PHYSICS)

1. **(4)**

Limitation of dimensional analysis

2. **(1)**

$$1N = \frac{[M][L]}{[T^2]} = \frac{(1/2 \text{ unit of mass})(1/2 \text{ unit of length})}{\left(\frac{1}{5}\text{unit of time}\right)^2}$$

$$= \frac{5}{2} \text{ unit of force.}$$

3. **(2)**

(1) $F = ma = MLT^{-2}$

$$P = \frac{w}{t} = \frac{F \times S}{t} = \frac{MLT^{-2} \times L}{T} = ML^2T^{-3}$$

(2) $\tau = F \times \text{length} = MLT^{-2} \times L$

$= ML^2T^{-2}$

$E = W = F \times S = MLT^{-2} \times L$

4. **(2)**

Since LHS is displacement, so RHS should have dimensions L. Also the argument of a trigonometric function should be dimensionless. In (b), argument is not dimensionless in (c), a / T does not have the dimensions of displacement.

5. **(3)**

$$\frac{Q}{L} = \frac{\text{Quantity}}{\text{length}} \text{ (Quantity gradient)}$$

displacement $\frac{S}{l} = \frac{L}{L}$

6. **(3)**

$$[M\,L\,T^{-2}] = \frac{[L]}{B[T]}$$

$$B = \frac{[L]}{MLT^{-1}}$$

$B = [M^{-1}\,T^1]$

$[A] = [L]$

7. **(3)**

1 MSD = x cm

n *VSD* = $(n-1)$ MSD

$$1VSD = \frac{(n-1)MSD}{n}$$

L.C. = 1 MSD – 1 VSD

$$L.C = 1MSD - \frac{(n-1)}{n}MSD$$

$$= \left[\frac{n-n+1}{n}\right]MSD$$

$$= \frac{1MSD}{n} = \frac{x}{n}$$

8. **(4)**

$$n_1u_1 = n_2u_2$$

$$\Rightarrow \quad \frac{4\text{g}}{\text{cm}^3} = n_2 \times \frac{100\text{ g}}{10^3\text{ cm}^3}$$

$$\Rightarrow \quad \boxed{n_2 = 40}$$

9. **(2)**

$v = \alpha t + \beta x + \gamma$

$\left[LT^{-1}\right] = [\alpha][T]$

$[\alpha] = \left[LT^{-2}\right]$

$[\gamma] = \left[LT^{-1}\right]$

$LT^{-\gamma} = \beta[L]$

$T^{-1} = \beta$

10. **(3)**

Given $y = A \sin(wt - kx)$

As we know θ is dimensionless

$\therefore$ $wt - kx$ is dimensionless.

$[wt - kx] = [M^0L^0T^0]$

$[w]\,[t] = [K]\,[x] = [M^0\,L^0\,T^0]$

$[w] = [M^0\,L^0\,T^{-1}]$.

11. **(2)**

$$F = -\eta.A.\left(\frac{dv}{dx}\right)$$

$$\Rightarrow \quad \eta = \frac{F}{A\left(\frac{dv}{dx}\right)} = \frac{kg\,\frac{m}{s^2}}{m^2\left(\frac{m/s}{m}\right)} = \frac{kg}{m.s}$$

Also, $\rho = \frac{Mass}{Volume} : \frac{kg}{m^3}$

r = radius (m)

$v_c = C.\eta^x.\rho^y.r^z$

$$\underset{(m/s)}{Velocity} : \left(\frac{kg}{m.s}\right)^x.\left(\frac{kg}{m^3}\right)^y.(m)^z$$

$$\Rightarrow \quad m^1s^{-1} = kg^{x+y}.m^{-x-3y+z}.s^-$$

On comparing both sides:

$x + y = 0$

$\Rightarrow \quad \boxed{x = -y}$

$-x - 3y + z = 1; \boxed{x = 1}$

$\Rightarrow \quad -x + 3x + z = 1$

$\therefore \quad y = -1$

$\Rightarrow \quad 2x + z = 1 \qquad z = 1 - 2x$

$\boxed{z = -1}$

12. (3)

$$x = \frac{A^2B}{C^{1/3}D^3}$$

$$\frac{\Delta x}{x} = 2\frac{\Delta A}{A} + \frac{\Delta B}{B} + \frac{1}{3}\frac{\Delta C}{C} + \frac{3\Delta D}{D}$$

$\left(\frac{\Delta C}{C}\right)$ min amount

(CHEMISTRY)

13. (4)

$$\text{Vapour pressure} \propto \frac{1}{\text{Boiling Point}}$$

(NCERT – Page 12 – 13)

14. (1)

Vapour pressure is not a colligative property because it does not depend upon number of solute particles. It depends upon nature of the liquid and temperature.

(NCERT – Page 15)

15. (3)

Salt	(i)
Na_2SO_4	3
CaF_2	3
K_3PO_4	4
$(NH_4)_2CO_3$	3

(NCERT – Page 23 – 25)

16. (2)

$$\chi_A = \frac{n_A}{n_A + n_B} = \frac{\frac{20}{40}}{\frac{20}{40} + \frac{20}{80}}$$

$$= \frac{\frac{1}{2}}{\frac{1}{2} + \frac{1}{4}} = \frac{\frac{1}{2}}{\frac{3}{4}} = \frac{1}{2} \times \frac{4}{3} = \frac{2}{3}$$

$$\text{Hence } \chi_B = 1 - \chi_A = 1 - \frac{2}{3} = \frac{1}{3}$$

$$P_S = P_A^o \chi_A + P_B^o \chi_B$$

$$= 100 \times \frac{2}{3} + 40 \times \frac{1}{3}$$

$$= \frac{200}{3} + \frac{40}{3}$$

$$= \frac{240}{3}$$

$= 80$ torr

(NCERT – Page 9 – 11)

17. (2)

$Na_2SO_4 \rightleftharpoons 2Na^+ + SO_4^{2-}$

van't Hoff factor, $i = [1 + (y - 1)\alpha]$

where y is the number of ions from one mole solute, (in this case y = 3), and α is the degree of dissociation.

$i = (1 + 2\alpha)$

(NCERT – Page 23 – 25)

18. (1)

The passing of solvent particles through a semipermeable membrane (SPM) is called as osmosis.

(NCERT – Page 20 – 21)

19. (1)

Van't Hoff factor greater than 1 means observed value is greater than calculated value which is so when the solute dissociates.

(NCERT – Page 23 – 25)

20. (2)

$\Delta T_b = mK_b$

$\Delta T_f = mK_f$

$$\frac{\Delta T_b}{\Delta T_f} = \frac{K_b}{K_f} = \frac{0.512}{1.86}$$

$$\Delta T_b = \frac{0.512}{1.86} \times 0.186 = 0.0512^oC$$

(NCERT – Page 16 – 19)

21. (4)

$$\text{Molality of solution} = = \frac{n_{solute}}{W_{kg}\ \text{solvent}}$$

$$= \frac{4}{300/1000}$$

$$= \frac{4}{1} \times \frac{1000}{300}$$

$$= \frac{40}{3}$$
$$= 13.33 \text{ m}$$

(NCERT – Page 2 – 5)

22. (2)

$$\text{Molarity} = \frac{n_{\text{solute}}}{V_L \text{ solution}}$$
$$= \frac{2.3/46}{500/1000}$$
$$= \frac{2.3}{46} \times \frac{1000}{500} = 0.1 \text{ M}$$

(NCERT – Page 2 – 5)

23. (4)

(1) Easily liquified gases are more soluble.
(2) Solubility is inversely proportional to temperature.
(3) At constant temperature, the solubility of gas in a liquid is directly proportional to pressure of gas.

(NCERT – Page 6 – 9)

24. (2)

For isotonic solutions $\pi_1 = \pi_2$
Hence,
$\pi_{\text{Urea}} = \pi_{\text{Sugar}}$
$iC_1RT = iC_2RT$
$1 \times 0.5 = 1 \times 0.5$
(NCERT – Page 21 – 22)

(BOTANY)

25. (4)

The prokaryotic cells are represented by bacteria, blue-green algae, *mycoplasma* and PPLO (Pleuro Pneumonia Like Organisms).
Class 11 NCERT pg. No. 127.

26. (1)

Plasmid is extrachromosomal DNA present in bacteria.
Class 11 NCERT pg. no. 128.

27. (4)

Cilia present in eukaryotes.
Class 11 NCERT pg. no. 137, 129.

28. (3)

The motile bacteria are able to move by flagella.
Class 11 NCERT pg. no. 129.

29. (3)

* In addition to the genomic DNA (the single chromosome/circular DNA), many bacteria have small circular DNA outside the genomic DNA. These smaller DNA are called plasmids.
* The plasmid DNA confers certain unique phenotypic characters to such bacteria. One such character is resistance to antibiotics.
Class 11 NCERT pg. no. 128.

30. (1)

Inclusion bodies of blue-green, purple and green photosynthetic bacteria are gas vacuoles.
Class 11 NCERT pg. no. 129.

31. (2)

In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments.
Class 11 NCERT pg. no. 129.

32. (3)

The cell envelope consists of a tightly bound three layered structure i.e., the outermost glycocalyx followed by the cell wall and then the plasma membrane.
Class 11 NCERT pg. no. 128.

33. (1)

Ribosomes are the site of protein synthesis. Several ribosomes may attach to a single mRNA and form a chain called polyribosomes or polysome. The ribosomes of a polysome translate the mRNA into proteins.
Class 11 NCERT pg. no. 129.

34. (1)

Both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
Class 11 NCERT pg. no. 129.

35. (2)

* Mesosome – Respiration.
* Fimbriae – Attachment.
* Pili – Bacterial conjugation.
* Chromatophore – Photosynthesis.

Class 11 NCERT pg. no. 129.

36. (1)

Mesosome and chromatophore extension of plasma membrane.

(ZOOLOGY)

37. **(4)**
NCERT: page 271

38. **(4)**
NCERT: page 274

39. **(2)**
NCERT: page 274

40. **(4)**
NCERT: page 269 and 272

41. **(3)**
NCERT: page 269
Pleural fluid is present between both the pleural layers.

42. **(1)**
NCERT: page 275

43. **(2)**
NCERT: page 275

44. **(2)**
NCERT: page 267 & 268
Fact based

45. **(3)**
NCERT: page 270 and 271

46. **(2)**
NCERT: page 270
Fact based

47. **(2)**
NCERT: page 271

48. **(2)**
NCERT: page 269