



ALL INDIA INSTITUTE OF SPEECH AND HEARING  
MANASAGANGOTTHRI  
MYSURU 570 006  
ENTRANCE EXAMINATION 2018  
PHYSICS – SET 2

Time: 50 minutes

Max. Marks 50

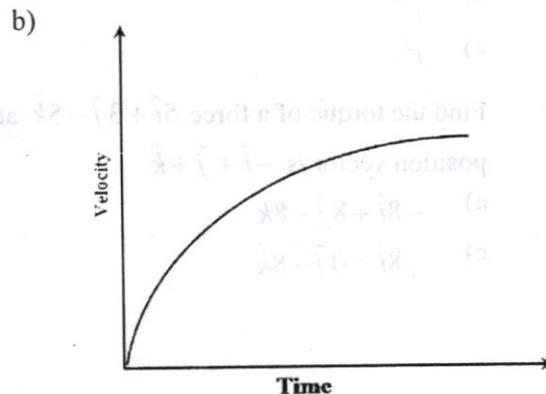
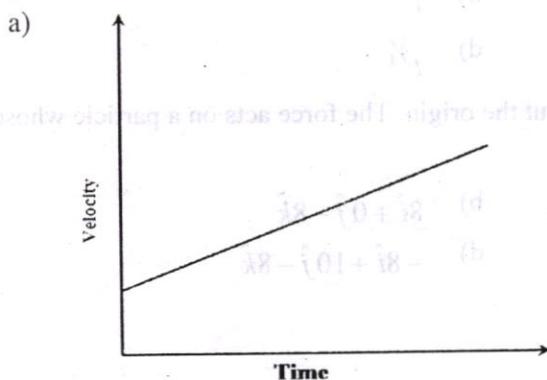
Instructions: Answer all the questions  
Each question carries one mark  
Use ball point pen with black ink  
Do not overwrite

Select the most appropriate answer from among the four alternatives given and indicate it by marking an 'X' in the box adjacent to the correct answer (in the answer sheet). For example, if c) is the correct answer for a given question, then indicate your answer as shown below:

a)       b)       c)       d)

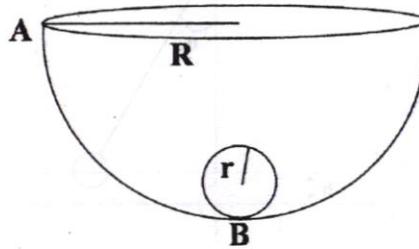
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- Identify the dimensional formula of Power  
a)  $[M^1L^1T^{-3}]$       b)  $[M^1L^1T^{-2}]$   
c)  $[M^1L^2T^{-2}]$       d)  $[M^1L^2T^{-3}]$
- A car is moving along a straight line towards north and travels a distance of 360m in 12s. It returns along the same path to the initial point and travels further to a point which is 120m southward of the starting point. The total return journey takes 16s. Find the average speed of the car.  
a)  $\frac{30}{7}$  m/s      b) 20 m/s  
c) 30 m/s      d)  $\frac{20}{7}$  m/s
- Identify the graph corresponding to an object moving in positive direction with negative acceleration.





9. A ball of radius  $r$  starts from rest from the point A and rolls inside a hemispherical vessel of radius  $R$  as shown in the figure. The angular velocity of the ball in the position B about the centre of this vessel is,



- a)  $2\sqrt{\frac{g}{5(R-r)}}$       b)  $\sqrt{\frac{10g}{7(R-r)}}$   
 c)  $\sqrt{\frac{5g}{2(R-r)}}$       d)  $\sqrt{\frac{2g}{5(R-r)}}$
10. The moment of inertia of the square of side  $a$  and mass  $M$  about any side is,  
 a)  $\frac{Ma^2}{3}$       b)  $\frac{Ma^2}{6}$   
 c)  $\frac{Ma^2}{12}$       d)  $\frac{3Ma^2}{4}$
11. Kepler's second law is also known as  
 a) Law of orbits      b) Law of areas  
 c) Law of periods      d) Law of gravitation
12. The potential energy of a system of four identical particles of masses, 1 kg each, placed at the vertices of a square of side  $\sqrt{2}$  m is approximately,  
 a)  $-4G$       b)  $-\frac{G}{2}$   
 c)  $-4\sqrt{2}G$       d)  $-2\sqrt{2}G$
13. The ratio of the radii of two planets A and B is 3:9 and the ratio of their densities is 3:2, respectively. What would be the ratio of the acceleration due to gravity at the surfaces of these planets ( $g_A : g_B$ )?  
 a) 2:1      b) 3:1  
 c) 1:3      d) 1:2
14. The mass of a simple pendulum is slowly increased so that its thread just breaks at the point of the maximum tension. After breaking the bob falls to a point B. Find the distance AB. ( $\theta_0$  is the amplitude)







c)  $\frac{25}{3}\Omega$

d)  $\frac{50}{3}\Omega$

31. To radiate signals of wavelength  $\lambda$  with high efficiency, the antenna should have a size at least

a)  $\lambda$

b)  $\frac{\lambda}{2}$

c)  $\frac{\lambda}{3}$

d)  $\frac{\lambda}{4}$

32. The npn transistors are preferred to pnp transistors because of,

a) npn transistors are cheaper

b) npn transistors are easily available

c) Mobility of electrons is more than that of holes

d) Mobility of holes is more than that of electrons

33. The truth table of AND gate is given. Identify  $(\alpha, \beta)$ .

A	B	Y
1	$\alpha$	1
0	1	$\beta$

a) (1,0)

b) (0,1)

c) (0,0)

d) (1,1)

34. Tritium has a half-life of 12.5 years undergoing  $\beta$ -decay. What percentage of the original sample of Tritium will remain undecayed after 25 years?

a) 50 %

b) 25 %

c) 75 %

d) 12.5 %

35. Which of the series of spectra of the Hydrogen atom falls in the visible region?

a) Lyman

b) Balmer

c) Paschen

d) Brackett

36. An electron, an  $\alpha$ -particle, and a proton have same kinetic energies. Which particle has the least De- Broglie wavelength?

a) Electron

b) Proton

c)  $\alpha$ - particle

d)  $\alpha$ - particle and proton

37. Wave theory could not explain,

a) Diffraction

b) Interference

c) Photoelectric effect

d) Polarization

38. If  $L$  is the length of the compound microscope,  $f_o, f_e$  are the focal lengths of the objective and eye-piece, respectively and  $D$  is the least distance of distinct vision. What would be the magnification?

a)  $\frac{Lf_o}{Df_e}$

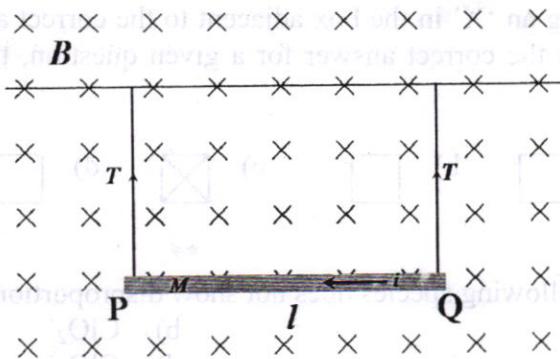
b)  $\frac{LD}{f_o f_e}$

c)  $\frac{f_o f_e}{LD}$

d)  $\frac{Df_o}{Lf_e}$



47. In any AC circuit with only inductor,
- The current leads the voltage by  $\pi/4$
  - The current lags the voltage by  $\pi/4$
  - The current leads the voltage by  $\pi/2$
  - The current lags the voltage by  $\pi/2$
48. If current sensitivity is increased in a moving coil galvanometer
- Voltage sensitivity must be increased
  - Voltage sensitivity may remain same or increase
  - Voltage sensitivity must be decreased
  - There is no relation between current sensitivity and voltage sensitivity
49. Which of the following is NOT a diamagnetic material?
- Bismuth
  - Copper
  - Lead
  - Gadolinium
50. A rod of length  $l$  and mass  $M$  is suspended using two strings in a magnetic field  $B$  as shown in the figure. A current  $i$  ampere flows in the rod from Q to P. If the rod is in mechanical equilibrium, what would be the tension ( $T$ ) in the string?



- $\frac{Mg - Bil}{2}$
- $\frac{Mg + Bil}{2}$
- $\frac{Bil - Mg}{2}$
- $Mg + Bil$





19. The number of bond pair and lone pair of electrons around the central atom in SF<sub>4</sub> are  
 a) 5,0  
 b) 4,2  
 c) 4,1  
 d) 4,0
20. According to MOT, the correct increasing order of relative stability of O<sub>2</sub>, O<sub>2</sub><sup>+</sup>, O<sub>2</sub><sup>-</sup>, O<sub>2</sub><sup>2-</sup> species is  
 a) O<sub>2</sub><sup>2-</sup> < O<sub>2</sub><sup>+</sup> < O<sub>2</sub> < O<sub>2</sub><sup>-</sup>  
 b) O<sub>2</sub><sup>2-</sup> < O<sub>2</sub><sup>-</sup> < O<sub>2</sub> < O<sub>2</sub><sup>+</sup>  
 c) O<sub>2</sub><sup>-</sup> < O<sub>2</sub><sup>2-</sup> < O<sub>2</sub> < O<sub>2</sub><sup>+</sup>  
 d) O<sub>2</sub><sup>2-</sup> < O<sub>2</sub><sup>-</sup> < O<sub>2</sub><sup>+</sup> < O<sub>2</sub>
21. When the temperature of a solution is increased, its surface tension  
 a) decreases  
 b) increases  
 c) remains same  
 d) first increases and then decreases
22. The temperature at which a real gas obeys ideal gas law over an appreciable range of pressure is called  
 a) critical temperature  
 b) Boyle temperature  
 c) inversion temperature  
 d) absolute temperature
23. The p<sub>OH</sub> value for the strongest base is  
 a) 0  
 b) 1  
 c) 7  
 d) 14
24. The conjugate base of HCO<sub>3</sub><sup>-</sup> is  
 a) H<sub>2</sub>CO<sub>3</sub>  
 b) CO<sub>3</sub><sup>2-</sup>  
 c) CO<sub>2</sub>  
 d) both H<sub>2</sub>CO<sub>3</sub> and CO<sub>3</sub><sup>2-</sup>
25. For the reaction 2HI(g) → H<sub>2</sub>(g) + I<sub>2</sub>(g), the relationship between ΔH and ΔU is  
 a) ΔH = ΔU  
 b) ΔH > ΔU  
 c) ΔU > ΔH  
 d) ΔH = ΔU + 2RT
26. When the magnetic moments of the domains in the substance are aligned in parallel and anti-parallel directions in unequal numbers, the substance shows  
 a) ferromagnetism  
 b) antiferromagnetism  
 c) ferrimagnetism  
 d) diamagnetism
27. The structure of the lattice having AAA... type pattern is  
 a) primitive cubic  
 b) hcp  
 c) ccp  
 d) fcc
28. The reverse osmosis takes place when the pressure applied on the solution side must be  
 a) equal to osmotic pressure  
 b) equal to atmospheric pressure  
 c) less than osmotic pressure  
 d) larger than osmotic pressure
29. The solubility of gases in liquid decreases with increase of temperature because for dissolution of a gas in liquid  
 a) Δ<sub>sol</sub>H = 0  
 b) Δ<sub>sol</sub>H > 0  
 c) Δ<sub>sol</sub>H < 0  
 d) Δ<sub>sol</sub>H = K<sub>H</sub>







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a)     b)     c)     d)

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- Lichens represent symbiotic relationship between
  - algae and fungi
  - moss and fungi
  - virus and bacteria
  - algae and bacteria
- Methanogens are present in the gut region of ruminants such as
  - cow and buffalo
  - mongoose and otter
  - monkey and ape
  - cat and dog
- According to Allen's rule, the mammals from colder climates have
  - shorter ears and longer limbs
  - longer ears and shorter limbs
  - longer ears and longer limbs
  - shorter ears and shorter limbs
- Phycocerythrin, chlorophyll *a* and chlorophyll *d* are present in
  - Chlorophyceae
  - Xanthophyceae
  - Phacophyceae
  - Rhodophyceae
- Agar- agar is obtained from
  - virus
  - bacteria
  - fungi
  - algae
- Tissues are absent in the body of
  - Platyhelminthes
  - Annelids
  - Sponges
  - Arthropods
- Gambusia is a
  - pest of fish
  - parasite of fish
  - pest of mosquitoes
  - predator of mosquito larvae



20. Photorespiration results in formation of
- sugars but not ATP
  - ATP but not sugars
  - both ATP and sugars
  - neither ATP nor sugar
21. The first 4-carbon compound taking part in Krebs' cycle is
- Oxaloacetic acid
  - Fumaric acid
  - Succinic acid
  - Malic acid
22. Treatment of seeds at low temperature for promoting germination is known as
- vernalisation
  - cryopreservation
  - photoperiodism
  - thermoregulation
23. The wave like contraction of the smooth muscles of digestive tract is called
- deglutition
  - peristalsis
  - fibrillation
  - mastication
24. Maximum amount of carbon dioxide produced by our body cells is transported to the lungs as
- carboxy haemoglobin
  - carbonate
  - bicarbonates
  - dissolved in the plasma
25. Which of the following is involved in the coagulation of blood?
- Albumin
  - Globulin
  - Fibrinogen
  - Serum amylase
26. Which are the ear ossicles present in human beings?
- Incus and stapes
  - Stapes and malleus
  - Incus and malleus
  - Malleus, incus and stapes
27. Progesterone is secreted by
- Copora allata
  - Corpus albicans
  - Corpus luteum
  - Corpus callosum
28. The term 'clone' cannot be applied to offsprings formed by sexual reproduction, because
- offsprings do not possess exact copies of parental DNA
  - DNA of only one parent is copied and passed on to the offspring
  - offsprings are formed at different times
  - DNA of parent and offsprings are completely different
29. Filiform apparatus is a characteristic feature of
- egg
  - synergids
  - zygote
  - suspensor
30. Which one of the following hormones is responsible for uterine contraction during parturition?
- Relaxin
  - Vasopressin
  - Oxytocin
  - Prolactin
31. Gynaecomastia is a symptom of
- Klinefelter's syndrome
  - Turner's syndrome
  - Down's syndrome
  - AIDS







7. If  $f: A \rightarrow B$  and  $g: B \rightarrow C$  are onto then  $g \circ f$  is always
- onto
  - into
  - one-one
  - many-one
8.  $f$  is a function from  $R$  to  $R$  defined as  $f(x) = 4x + 3$ . Then which among the following function  $g$ , gives  $g \circ f = \text{Identity function}$
- $g(x) = \frac{x+4}{3}$
  - $g(x) = \frac{x-4}{3}$
  - $g(x) = \frac{x+3}{4}$
  - $g(x) = \frac{x-3}{4}$
9. Everyone in Germany speaks German. Which is not its negation:
- Not everyone in Germany speaks German
  - No one in Germany speaks German
  - At least one person in Germany does not speak German
  - It is false that everyone in Germany speaks German
10. The inverse of the matrix  $A = \begin{bmatrix} -1 & 2 \\ -3 & 4 \end{bmatrix}$  is:
- $\frac{1}{2} \begin{bmatrix} -4 & 2 \\ -3 & 1 \end{bmatrix}$
  - $\frac{1}{10} \begin{bmatrix} 4 & -2 \\ 3 & -1 \end{bmatrix}$
  - $\frac{1}{-2} \begin{bmatrix} 4 & -3 \\ 2 & -1 \end{bmatrix}$
  - $\frac{1}{2} \begin{bmatrix} 4 & -2 \\ -3 & -1 \end{bmatrix}$
11. Choose the correct answer:
- every scalar matrix is an identity matrix
  - every identity matrix is a scalar matrix
  - every diagonal matrix is an identity matrix
  - every square matrix with each element being 1 is an identity matrix
12. If  $a, b, c$ , are positive and not all equal, then the value of the determinant of  $\begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$  is:
- non-negative
  - non-positive
  - negative
  - positive
13. If  $\hat{a}$  and  $\hat{b}$  are unit vectors inclined at an angle  $\theta$  then  $|\hat{a} - \hat{b}|$  is equal to
- $2 \tan \frac{\theta}{2}$
  - $2 \sin \frac{\theta}{2}$
  - $2 \cos \frac{\theta}{2}$
  - $2 \cot \frac{\theta}{2}$
14. If  $|\vec{a}| = 13$ ,  $|\vec{b}| = 5$  and  $\vec{a} \cdot \vec{b} = 60$  then  $|\vec{a} \times \vec{b}|$  is
- 25
  - 50
  - 60
  - 75
15. If the sum of two unit vectors is a unit vector then the magnitude of their difference is
- 1
  - $\sqrt{3}$
  - $\sqrt{2}$
  - 2







