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LPUNEST BTech 2022 Previous Year Paper

LPU National Entrance and Scholarship Test (LPUNEST)

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## Previous Year LPUNEST(B.TECH) Question Paper

## Section – English

This section contains **25 Multiple Choice Questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

1. Choose the correct article and fill in the blanks: How many stars are there in sky? A. No article B. The C. A D. Big 2. Choose the correct modal verb and fill in the blanks: Mary been to the supermarket; the cupboards are all full. A. Can B. Have to C. Have D. Must Have 3. Use the correct form of adjective in the sentence below. All members of the family were at home for the holidays. What could make for Diwali than that? A. a happy B. a happier C. a more happier D. a happiest 4. Identify the adjectival clause in the sentence below. The trousers which were gifted to me by my father were guite expensive A. The trousers which were gifted B. The trousers which were gifted to me by my father C. Which were gifted to me D. Which were gifted to me by my father 5. Select the correct conjunction from the choices given to join the sentence. She cannot walk properly. The doctor removes her plaster. A. as B. until C. when D. although 6. Choose the sentence with 'Better' used as Noun A. My suit is better than yours. B. We can always learn something from our betters. C. Out countrymen can better their lot. D. You have done better by refusing to help him. 7. "Myself" is a: A. Relative Pronouns **B.** Demonstrative Pronouns C. Reflexive Pronouns D. Indefinite Pronouns 8. The car was parked in front of the store. Choose the prepositions that would be unsuitable to the one underlined. A. Across B. Next to C. On D. At the back 9. It is dead now. Identify the interjection which is not appropriate for use. A. Alas! B. What a pity! C. Oh! D. Yay! 10. Choose the correct verb to complete the following sentence: Either two nickels or one dime \_\_\_\_\_ in the parking meter. B. Works C. are working A. Work D. were working 11. Which of these sentences does not contain an adverb? A. The child ran happily towards his mother.



B. Brendan gently woke the sleeping ba	by.		
C. Sall walked to the shops.			
D. I visited my mum yesterday.			
12. Fill in the blanks.			
The circumference of a circle 3.14	159265 times its dia	ameter no matter how	
small or large it is.			
A. Measures	B. Measured		
C. Will be measuring	D. Had been meas	ured	
13. Fill in the blanks.			
While mom the VCD I hired, I	my assig	gnment	
A. Watch/ would finish	B. Was going to wa	atch/ finishes	
C. Was watching/ finished	D. Will watch/ am f	inishing	
14. Choose the correct option:			
They have completed 24 years of toge	etherness today and	by next year on the	
same day, they their 25th anniv	ersary.		
A. Will have celebrated	B. Will be celebrati	ng	
C. Are celebrating	D. Have been celel	brating	
15. Find out the synonyms of 'Defray'?			
A. Exit B. Spend	C. Malicious	D. Alight	
16. Which of the following options is an ante	onym for 'Destitute'?	)	
A. Exhausted B. Impoverished	C. Affluent	D. Poor	
17. 'One who runs away from justice' provid	de one word for the e	expression.	
A. Extravagant B. Eccentric	C. Fugitive	D. Connoisseur	
18. Choose the correct meaning of the und	erlined phrase.		
We are afraid that you may be led astra	<u>y</u> in Arvind's bad cor	mpany.	
A. Misguided B. Lose the job	C. Killed	D. Get into trouble	
19. Which word is used for "Path of travel"?	)		
A. Course B. Coarse	C. Corse	D. Caerse	
20. Choose the appropriate homonym:			
If one wants to reach God, he/she has to	o worldly	things.	
A. Fergo B. Feorego	C. Forgeo	D. Forgo	
21. Read the sentence and Choose the Ind	ependent clause –	Ū	
While you were at recess, we were eating	ng cake and ice crea	am.	
A. While you were at recess, we were e	ating cake and ice c	ream.	
B. we were eating cake and	0		
C. we were eating cake and ice cream			
D. while you were at recess			
22. What is true of the following example w	ith regards to subord	dinate clause?	
The cat whom we are watching just cau	ght a mouse!		
A. It contains a prepositional phrase.			
B. It contains an adjectival clause.			
C. It contains an adverbial clause.			
D. It contains a noun clause.			



23. Read the following paragraphs and carefully determine what the main idea is for each.

There are no effective boundaries when it comes to pollutants. Studies have shown that toxic insecticides that have been banned in many countries are riding the wind from countries where they remain legal. Compounds such as DDT and toxaphene have been found in remote places like the Yukon and other Arctic regions. This paragraph best supports the statement that

A. toxic insecticides such as DDT have not been banned throughout the world.

B. more pollutants find their way into polar climates than they do into warmer areas. C. studies have proven that many countries have ignored their own anti-pollution laws.

D. DDT and toxaphene are the two most toxic insecticides in the world.

24. Spot the error in the sentence below. If no error, then you may choose the required option as well: -

None of two girls / who were present / appeared to be inclined / to listen to sane advice.

- A. None of two girls B. Who were present
- C. Appeared to be inclined D. No error
- 25. Choose some relationship from given four choices as given in original pair. Teeth: Chew
  - A. Mind: Think B. Sweater: Heat C. Food: Taste D. Eyes: flicker

# Section – Chemistry

This section contains **25 Questions (20 Multiple Choice Questions and 5 Fill in the Blanks)**. Each **Multiple choice question** has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct. For **Fill in the Blank** type question, enter the correct numerical value upto TWO decimal places.

- 1. The empirical formula of a compound is  $CH_2O$ . If 0.0835 moles of the compound contain 1 gm of hydrogen, the molecular formula of the compound is
  - A.  $C_2H_4O_2$  B.  $C_3H_6O_3$  C.  $C_3H_6O_3$  D.  $C_3H_6O_3$
- 2. A solid has a structure in which W atoms are located at the corners of the unit cell, O atoms are located at the cube edge and Na atoms at the cube Centres. The formula of the compound is:

A. Na <sub>2</sub> WO <sub>3</sub>	B. NaWO <sub>3</sub>	C. Na <sub>2</sub> W <sub>2</sub> O <sub>4</sub>	D. Na <sub>2</sub> WO <sub>6</sub>	
3. The incorrect elec	tronic arrangement	is		
A. 2, 8, 13, 1	B. 2, 8, 12, 2	C. 2, 8, 8, 1	D. 2, 8, 8, 2	
4. A molecule AX <sub>2</sub> has two lone pairs over A. Its shape is				
A. Tetrahedral	B. Pvramidal	C. Angular	D. Linear	



5. If $PCl_5$ is heated in two separate vessels of volume 5 lit and 10 lit respectively	at
27°C . The extent of dissociation of $PCl_5$ will be	
A. More in 5 lit vessel B. More in 10 lit vessel	
C. More in 8 lit vessel D. Cannot be sai	
6. Milk is an example of	
7 Which of the following is the correct order of electron affinity?	
A. $I > Br > F > CI$ B. $F < CI < Br < I$ C. $F > CI > Br > I$ D. $I < Br < F < CI$	
8. Ellingham diagram represents	
A. change of $\Delta G$ with temperature B. change of $\Delta H$ with temperature	
C. change of $\Delta G$ with pressure D. change of $(\Delta G - T \Delta S)$ with temperature	ire
9. Which of the following equations denotes that $H_2O_2$ acts as a reducing agent?	
A. $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$	
B. NaNO <sub>2</sub> + H <sub>2</sub> O <sub>2</sub> → NaNO <sub>3</sub> + H <sub>2</sub> O	
C. $Ag_2O + H_2O_2 \rightarrow 2Ag + O_2 + H_2O$	
D. $2KI+H_2O_2+H_2SO_4 \rightarrow I_2+K_2SO_4+H_2O_2$	
10. Which of the following gives apple green colour to the Bunsen flame?	
A. Be B. Ca C. Sr D. Ba	
11. The correct order of decreasing acid strength of oxy acids of group 15 element	IS
A. $11003, 113004, 113A304, 113104 B. 113104, 113A304, 113004, 11103$	
$C. HNO_3, H_3PO_4, H_3ASO_4 H_3SDO_4 D_ HNO_3, H_3PO_4, H_3ASO_4 H_3SDO_4$	
12. The pair of Xenon compounds which have same number of lone pairs of electro	ns
A $XeQ$ , $XeF$ , B $XeF$ , $XeF$ , C $XeF$ , $XeQ$ , D $XeF$ , $XeF$ .	
13 Bohr Magneton value in S I. Units is	
A. $9.273 \times 10^{-24} \text{ erg T}^{-1}$ B. $9.273 \times 10^{-24} \text{ JT}^{-1}$	
C. $9.273 \times 10^{-17} \text{ JT}^{-1}$ D. $9.273 \times 10^{-10} \text{ cal } \text{T}^{-1}$	
14. $sp^3d^2$ hybridisation is present in	
A. $[CoF_6]^{-3}$ B. $[Ni(CO)_4]$ C. $[Co(NH_3)_6]^{+2}$ D. All	
15. Haemoglobin of the blood forms carboxy haemoglobin with	
A. CO <sub>2</sub> B. CO C. SO <sub>2</sub> D. NO <sub>2</sub>	
16. Heterolytic fission of an organic covalent bond gives only	
A. Free radicals B. Both cation and anion	
C. Only cation D. Only anion	
A having $6\pi$ electrons B having 3 double bonds	
C. having (4n+2) $\pi$ electrons D. having alternate double bonds	



18. Which of the following order is true regarding the acidic nature of phenol?

- A. Phenol > o Cresol > o Nitrophenol
- B. Phenol > o Cresol < o Nitrophenol
- C. Phenol < o Cresol < o Nitrophenol
- D. Phenol < o Cresol > o Nitrophenol
- 19. On ozonolysis 2–methyl–2– butene gives
  - A. 2moles of  $CH_3$ –CHO B. 2moles of  $CH_3COCH_3$
  - C.  $CH_3CHO \& CH_3COCH_3$  D.  $CH_3CHO \& HCHO$
- 20. Aniline on heating with 'X' in the presence of KOH gives a product with very bad smell. Which of the following is 'X'?
  A. CH<sub>3</sub>Cl
  B. CHCl<sub>3</sub>
  C. CH<sub>2</sub>Cl<sub>2</sub>
  D. C<sub>2</sub>H<sub>5</sub>Cl
- 21. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)
  The maximum oxidation state of osmium is ?
- 22. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35) The van't Hoff factor for 0.1M Barium nitrate is 2.74. The percentage of dissociation of Barium nitrate is \_\_\_\_\_ %.
- 23. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)

 $E_{Zn^2/Zn}^0 = -0.76V$  The EMF of the cell  $Zn / Zn_{(IM)}^{2+} || HCl(pH = 2) | H_{2(1atm)}Pt$  is V.

- 24. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)
  75% of a first order reaction is completed in 32 minutes. 50% of the reaction would have been completed in \_\_\_\_\_ minutes.
- 25. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)
  0.2 g of an organic compound on complete combustion produces 0.44 g of CO<sub>2</sub>, then the percentage of carbon in it is \_\_\_\_\_.



# Section – Mathematics

This section contains **25 Questions (20 Multiple Choice Questions and 5 Fill in the Blanks)**. Each **Multiple choice question** has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct. For **Fill in the Blank** type question, enter the correct numerical value upto TWO decimal places.

1. Universal set, $U = \{x / x^{5} - 6x^{4} + 11x^{3} + 11x^{3} - 6x^{4} + 11x^{4} + 11$	6x <sup>2</sup> = 0}		
$\Lambda$ $\{1, 3\}$	B (1 2 3)		
$\Lambda$ . $\{1, 5\}$	$D.\{1, 2, 3\}$	$D_{-1}$ ic	D. {0, 1, 2, 3}
A. reflexive only C. equivalence		B. symmetric but n D. None of the abc	ot transitive ove
3. $ \underbrace{\text{Lt}}_{x \to \infty} \left( \frac{x^2 + 5x + 3}{x^2 + x + 2} \right)^x $			
A. e <sup>4</sup>	B. e <sup>2</sup>	C. e <sup>3</sup>	D. e
4. If one root of the quadratic	equation ax2+bx+c=	0 is 3-4i then 31a+b	+c=
A. 0	B. 2a	C. 2b	D. 2c
5. If the 2 <sup>nd</sup> , 5 <sup>th</sup> and 9 <sup>th</sup> terms ratio of this G.P.is:	s of a non-constant .	A.P. are in G.P., the	en the common
A. 8/5	B. 4/3	C. 1	D. 7/4
6. If A( $\alpha$ ) = $\begin{pmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{pmatrix}$ then A	Α(α) Α(β) =		
Α. Α(α)+Α(β)	Β. Α(α)-Α(β)	C. A(α+β)	D. Α(α-β)
7. A square matrix (Nonsingular) satisfies $A^2 - A + 2I = 0$ then $A^{-1} =$			
A. $\frac{I-A}{2}$	B. I-A	C. $\frac{I+A}{2}$	D. I+A
8. The ratio in which $\overline{i} + 2\overline{j} + 2\overline{j}$	$3\overline{k}$ divides the join o	of $-2\overline{i} + 3\overline{j} + 5\overline{k}$ and	$7\overline{i}-\overline{k}$ is
A. 1 : 2	В. 2:3	C. 3 : 4	D. 1 : 4
<ul> <li>9. Consider the following staten</li> <li>P : Suman is brilliant</li> <li>Q : Suman is rich</li> <li>R : Suman is honest</li> </ul>	nents		
The negation of the stateme	ent "Suman is brilliant	and dishonest if and	only if Suman is
rich" can be expressed as:			<b>D</b> 0 D D
A. $\sim$ (PA $\sim$ R) $\leftrightarrow$ Q 10, 10 map and 6 wamap are	B. $\sim PA(Q \leftrightarrow \sim R)$	C. $\sim (Q \leftrightarrow (P \land \sim R))$	D. $\sim Q \leftrightarrow \sim PAR$
The number of wave they	can be seated in a 100	v so that no two wolf	ien sit logelher.
A 111101	B (111/6151)	C (10191/51)	D (111101/51)
11. $1^3 - 2^3 + 3^3 - 4^3 + \dots + 9$	$\beta^3 =$	0. (10.0.70.)	2.(



A 425 B. -425 C. 475 D. -475  
12. The ratio of the coefficient of x<sup>15</sup> to the term independent of x in the expansion  
of 
$$\left(x^2 + \frac{2}{x}\right)^{15}$$
 is  
A. 1: 32 B. 1: 4 C. 7: 16 D. 7: 64  
13. Let f be a polynomial function such that f(3x) = f(x).f'(x), for all xER. Then:  
A. f<sup>11</sup>(2) - f<sup>1</sup>(2) =0 B. f<sup>11</sup>(2) - f(2) =4  
C. f(2) - f<sup>1</sup>(2) =10 D. f(2) + f<sup>11</sup>(2) =28  
14. The minimum distance of a point on the curve y=x<sup>2</sup>-4 from the origin is  
A. ( $\sqrt{15}$ )/2 B.  $\sqrt{(19/2)}$  C.  $\sqrt{(15/2)}$  D. ( $\sqrt{19}$ )/2  
15.  $\int \frac{dx}{\cos x + \sqrt{3} \sin x}$  equals  
A.  $\log \tan\left(\frac{x}{2} + \frac{\pi}{12}\right) + c$  B.  $\log \tan\left(\frac{x}{2} - \frac{\pi}{12}\right) + c$   
C.  $\frac{1}{2} \log \tan\left(\frac{x}{2} + \frac{\pi}{12}\right) + c$  D.  $\frac{1}{2} \log \tan\left(\frac{x}{2} - \frac{\pi}{12}\right) + c$   
16.  $\int \frac{1}{(x+100)\sqrt{x+99}} dx = f(x) + c$  then f(x) =  
A.  $2(x+100)^{1/2}$  B.  $3(x+100)^{1/2}$   
C.  $2\tan^{-1}\sqrt{x+99}$  D.  $2\tan^{-1}\sqrt{x+100}$   
17.  $\int_{0}^{\pi} \frac{x Sinx}{1 + \cos^2 x} dx =$   
A.  $\pi^2/4$  B.  $\pi^2/2$  C.  $\pi^2/3$  D.  $\pi^2$   
18. If  $y = y(x)$  is the solution of the differential equation,  $x \frac{dy}{dx} + 2y = x^2$  satisfying  $y(1) = 1$ , then  $y\left(\frac{1}{2}\right)$  is equal to :  
A. 1/4 B. (7/64) C. (49/16) D. (13/16)  
19. If the mid points of the sides BC, CA and AB of a triangle ABC, are respectively (2, 1), (-1, -2) and (3, 3), then the equation of the side BC is  
A. x-2y=0 B. 5x-4y=6 C. 2x+3y=8 D. 3x-2y=6  
20. Two vertices of a triangle are (5, -1) and (-2, 3). If the origin is the orthocenter of this triangle, then the coordinates of the third vertex of that triangle are  
A. (4,7) B.  $\left(-2, -\frac{7}{2}\right)$  C. (-4,-7) D. (-2,3)  
21. Eact the following question, eact the correct numerical value upto TWO decimal places if the

For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)



If z, iz and z+iz are the vertices of a triangle and if |z| = 4, then the area (in sq. units) of that triangle, is

- 22. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)There are 10 points in a plane out of which 6 are collinear. The number of straight lines formed by joining all these points is
- 23. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35) Minimum number of times a fair coin must be tossed so that the probability of getting at least one head is more than 99% is \_\_\_\_\_.
- 24. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35) An envelope is known to have come from either 'LONDON' OR 'CLIFTON'. On the postal card only two successive letters ON are visible. The probability that the envelope comes from LONDON is 12/\_\_\_\_.
- 25. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)

The eccentricity of the ellipse  $\frac{x^2}{25} + \frac{y^2}{16} = 1$  is 3/\_\_\_\_.

### Section – Physics

This section contains **25** Questions (**20** Multiple Choice Questions and **5** Fill in the Blanks). Each Multiple choice question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct. For Fill in the Blank type question, enter the correct numerical value upto TWO decimal places.

1. A block of mass m is kept on a platform which starts from rest with constant acceleration g/2 upward, as shown in figure. Work done by normal reaction on block in time t is:



2. A rod of length 50 cm is pivoted at one end. It is raised such that if makes an angle of 30° from the horizontal as shown and released from rest. Its angular speed when it passes through the horizontal (in rad s<sup>-1</sup>) will be

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- A. √30
  B. (√20)/3
  C. (√30)/2
  D. (√40)/2
  3. A long cylindrical rod is welded to a thin circular disc of diameter 0.5 m at a point on its circumference. The rod is in the same plane as that of the disc and forms a tangent to the disc. The radius of gyration of the disc about the rod (in m) is A. 1/4
  B. (√5)/8
  C. 1/2
  D. 2√2
- 4. Expression for time in terms of G (universal gravitational constant), h (Planck constant) and c (speed of light) is proportional to:

A. 
$$\sqrt{\frac{hc^5}{G}}$$
 B.  $\sqrt{\frac{Gh}{c^3}}$  C.  $\sqrt{\frac{c^3}{Gh}}$  D.  $\sqrt{\frac{Gh}{c^5}}$ 

5. In a car race on straight road, car A takes a time 't' less than car B at the finish and passes finishing point with a speed 'v' more that of car B. Both the cars start from rest and travel with constant acceleration a<sub>1</sub> and a<sub>2</sub> respectively. Then 'v' is equal

A. 
$$\frac{2a_1a_2}{a_1 + a_2}t$$
 B.  $\sqrt{2a_1a_2}t$  C.  $\frac{a_1 + a_2}{2}t$  D.  $\sqrt{a_1a_2}t$ 

- 6. A shell is fired from a fixed artillery gun with an initial speed u such that it hits the target on the ground at a distance R from it. If t<sub>1</sub> and t<sub>2</sub> are the values of the time taken by it to hit the target in two possible ways, the product t<sub>1</sub>t<sub>2</sub> is:
- A. R/g
  B. 2R/g
  C. R/2g
  D. R/4g
  7. Moon is revolving in a circular orbit of radius 60R (R = radius of earth). Assume that the radius of the moon is R/4. If the moon is stopped for an instant and then released, it will fall towards the earth. Ignoring the atmospheric friction, the velocity of moon just before it strikes the earth is (Take g = acceleration due to gravity at the surface of earth)

A. 
$$\sqrt{\frac{59}{30}gR}$$
 B.  $\sqrt{\frac{118}{61}gR}$  C.  $\sqrt{\frac{7gR}{10}}$  D.  $\sqrt{\frac{47}{30}gR}$ 

8. A particle executing SHM along a straight line has zero velocity at points A and B whose distances from 'O' on the same direction OAB are 'a' and 'b' respectively. If the velocity at the midpoint between A and B is 'v', then its time period is

A. 
$$\frac{\pi(b+a)}{v}$$
 B.  $\pi\left(\frac{b-a}{v}\right)$  C.  $\left(\frac{b+a}{2v}\right)$  D.  $\left(\frac{b-a}{2v}\right)$ 

9. The frequency of a tuning fork P is 'a' % less than a standard fork A. The frequency of another fork Q is 'b' % greater than that of A. When P and Q are sounded



together 'x' beats are produced in one second. Frequency of the standard fork is (in Hz)

- A.  $\frac{100x}{a+b}$  B.  $\frac{100x}{a-b}$  C.  $\frac{100x}{b-a}$  D.  $\frac{200x}{b-a}$
- 10. A tank full of water has a small hole at the bottom. If one-fourth of the tank is emptied in  $t_1$  seconds and the remaining three-fourths of the tank is emptied in  $t_2$  seconds. Then the ratio  $t_1/t_2$  is
  - A.  $\sqrt{3}$  B.  $\sqrt{2}$  C 1/ $\sqrt{2}$  D.  $\frac{2}{\sqrt{3}}$  -1
- 11. A metallic wire of density d floats horizontal in water. The maximum radius of the wire so that the wire may not sink, will be (surface tension of water = T)

A. 
$$\sqrt{\frac{2T}{pdg}}$$
 B.  $\sqrt{\frac{2pT}{dg}}$  C.  $\sqrt{\frac{2pTg}{d}}$  D.  $\sqrt{2pTgd}$ 

12. One mole of a monoatomic ideal gas undergoes the process A→B in the given P-V. Diagram Specific heat capacity in the process is



D. (2R/3)

13. An ideal gas enclosed in a cylinder at pressure of 2 atm and temperature. 300K. The mean time between two successive collisions is 6x10<sup>-8</sup> s. If the pressure is doubled and temperature is increased to 500K the mean time between two successive collisions will be close to:

A.  $3x10^{-6}$  s B.  $4x10^{-8}$  s C.  $2x10^{-7}$  s D.  $5x10^{-8}$  s 14. Two point charges  $q_1(\sqrt{10}\mu C)$  and  $q_2(-25\mu C)$  are placed on the x-axis at x=1m

and x = 4m respectively. The electric field (in V/m) at a point y = 3m on y-axis is,

$$\begin{bmatrix} \text{take} - \frac{1}{4\pi g \varepsilon_0} - 9 \times 10^9 Nm^2 C^{-2} \end{bmatrix}$$
  
A.  $(-81\hat{i} + 81\hat{j}) \times 10^2$   
B.  $(81\hat{i} + 81\hat{j}) \times 10^2$   
C.  $(-63\hat{i} + 27\hat{j}) \times 10^2$   
D.  $(63\hat{i} + 27\hat{j}) \times 10^2$ 

A. (13R/3)

15. A parallel plate capacitor is made of two square plates of side 'a', separated by a distance d (d << a). The lower triangular portion is filled with a dielectric of dielectric constant K, as shown in the figure., Capacitance of this capacitor is:





16. A proton accelerated by a pd V=500 KV moves through a transverse magnetic field B=0.51 T as shown in figure. Then the angle  $\theta$  through which the proton deviates from the initial direction of its motion is (approximately)



C 45°

D. 60°

17. A magnetic dipole in a constant magnetic field has

- A. zero potential energy when the torque is maximum
- B. minimum potential energy when the torque is maximum

B 30°

- C. maximum potential energy when the torque is maximum
- D. zero potential energy when the torque is minimum
- 18. If  $\lambda_1$  and  $\lambda_2$  are the wavelength of the photons emitted when electrons in n<sup>th</sup> orbit of hydrogen atom fall to first excited state and ground state respectively, then the value of n is
  - A.  $\sqrt{\frac{2(\lambda_2 \lambda_1)}{2\lambda_2 \lambda_1}}$ B.  $\frac{2\lambda_2 \lambda_1}{2(\lambda_2 \lambda_1)}$ C.  $\sqrt{\frac{4\lambda_2 \lambda_1}{4(\lambda_2 \lambda_1)}}$ D.  $\sqrt{\frac{4(\lambda_2 \lambda_1)}{4\lambda_2 \lambda_1}}$

19. The energy released per fission of  $_{92}U^{235}$  is 200 Mev. The fission rate of  $_{92}U^{235}$  required to produce 2 watt power is

- A. 1.25 x  $10^{26}$  per second
- C. 1.25 x 10<sup>13</sup> per second

A 15°

- B. 2.56 x 10<sup>26</sup> per second
- D. 6.25 x 10<sup>10</sup> per second
- 20. In the following common emitter circuit,  $\beta$  = 100 and V<sub>CE</sub> = 7V. If V<sub>BE</sub> is negligible, then the base current is





A. 0.015 mA
B. 0.045 mA
C. 0.025 mA
D. 0.035 mA
21. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)
A 1 kW carrier is modulated to a depth of 80%. The total power in the modulated wave is

- 22. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35) A mass of 10kg is suspended vertically by a rope form the roof. When a horizontal force is applied on the rope at some point, the rope deviated at an angle of 45° at the point. If the suspended mass is at equilibrium, the magnitude of the force applied is \_\_\_\_\_N (g=10ms<sup>-2</sup>)
- 23. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35) On interchanging the resistances, the balance point of meter bridge shifts to the left by 10 cm. The resistance of their series combination is 1k W. How much was the resistance on the left slot before interchanging the resistances? \_\_\_\_\_W
- 24. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35) The image of an object placed in front of a concave mirror of focal length 12 cm is formed at a point which is 10 cm more distant from the mirror than the object. The magnification of the image is \_\_\_\_\_.
- 25. For the following question, enter the correct numerical value upto TWO decimal places. If the numerical value has more than two decimal places, round-off the value to TWO decimal places. (For example: Numeric value 5 will be written as 5.00 and 2.346 will be written as 2.35)
  A body moves along a circular path of radius 10m and the coefficient of friction is 0.5. What should be its angular velocity in rad/s i it is not to slip from the surface?
  V (g=9.8m/s<sup>2</sup>)



#### Section – Biology

This section contains 25 Multiple Choice Questions. Each question has four choices (A), (B), (C) and (D) out of which ONLY ONE is correct.

- 1. During the propagation of a nerve impulse, the action potential results from the movement of
  - A. Sodium ions from ECF to ICF
  - C. Potassium ions from ECF to ICF
- 2. Acromegaly is the result of
  - A. Hypersecretion of GH in children
  - B. Hypersecretion of GH in adults
  - C. Hypersecretion of GH
  - D. Deficiency of vitamin D
- 3. Electrons from the excited chlorophyll molecules of PS-II are first accepted by
  - A. Pheophytin
  - C. Cytochrome f D. Cytochrome b
- 4. During which stage in the complete oxidation of glucose are the greatest number of ATP molecules formed from ADP?

B. Ferredoxin

- A. Kreb's cvcle
- **B.** Glycolysis
- C. Electron transport chain
- D. Conversion of pyruvic acid to acetyl CoA
- 5. Which of these bioactive compounds is used as an immunosuppressive agent in organ-transplant patients?
- A. Acetic acid B. Ethanol C. Cyclosporine A D. Pectinase 6. Which is not an example of transmembrane transport between different subcellular compartments?
  - A. Transport from the stroma into thylakoid space
  - B. Transport from the cytoplasm into the lumen of the endoplasmic reticulum
  - C. Transport from the endoplasmic reticulum into the Golgi complex
  - D. Transport from mitochondrial intermembrane space into the mitochondrial matrix
- 7. The two amino acids having R groups with a negative net charge at pH 7.0 are
  - A. Aspartate and glutamate B. Arginine and histidine
  - C. Cysteine and methionine D. Proline and valine
- 8. The major electron transport chain complexes of mitochondria that are involved in the generation of Reactive oxygen species (ROS)
  - A. complex I and complex IV
- B. complex I and complex III
- C. complex II and complex IV
- D. None of these 9. Name the state where never dividing cells of neurons and skeletal muscle present? C. G2 A. G0 B. G1 D. M
- 10. One of the following is the correct sequence to make a transgenic animal.
  - A. Transomics transfection micro infection electro portion retroviral vectors

- B. Sodium ions from ICF to ECF
- D.Potassium ions from ICF to ECF



B. Micro injection - transfection - electro portion - retroviral vectors - transomics

C. Transfection – micro injection – transomics – electro portion – retroviral vectors

- D. None of these
- 11. In which organ of digestive tract hydrolysis of starch into maltose take place?
  - A. Stomach B. Liver C. Mouth D. Duodenum
- 12. The alveoli of the lungs do not contain "air" because
  - A. We normally do not ventilate our lungs at a high enough rate.
  - B. The lungs have too many alveoli to ventilate.
  - C. There is "dead space" in the trachea and bronchi.
  - D. The trachea and bronchi are too small in volume.
- 13. Which of the following statement about plasmid is correct?
  - I) It can replicate by itself
  - II) Hybrid plasmid is introduced into bacteria by transformation
  - III) Other than bacteria, plasmid can also be found in bacteriophage
  - A. I only B. I and II only C. II and III only D. I, II and III
- 14. Which one of the following is the correct matching of the events occurring during menstrual cycle?
  - A. Menstruation: breakdown of myometrium and ovum not fertilized
  - B. Ovulation: LH and FSH attain peak level and sharp fall in the secretion of progesterone
  - C. Proliferative phase: Rapid regeneration of myometrium and maturation of Graafian follicle
  - D. Development of corpus luteum: Secretory phase and increased secretion of progesterone
- 15. Out of the total sunlight energy reaching the atmosphere, the fraction utilized in photosynthesis is approximately:

A. 0.002% B. 0.0	)2% C. 0	.2% D. 2	2.0%
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- 16. Depolarization of the T-tubule membrane activates the sarcoplasmic reticulum via the:
  - A. Ryanodine receptor
  - B. Dihydropyridine receptors
  - C. Increased Na<sup>+</sup> and K<sup>+</sup> conductance in end-plate membrane
  - D. IP<sub>3</sub> receptor
- 17. Consider the following statement:

a. The banded appearance of the Sarcomere is due to difference in the size and density of thick and thin filaments

b. The A band is the area containing thick filaments

c. A band includes the M line, the H band and the zone of overlap (thick and thin filaments)

d. A band and I band are anisotropic and isotropic, respectively

The incorrect statements are:

A. a, b and c B. b and c C. b, c and D. None



- 18. A sedentary sea anemone gets attached to the shell lining of hermit crab. The association is
  - **B.** Symbiosis A. Ectoparasitism D. Amensalism
  - C. Commensalism

19. The zone at the edge of a lake or ocean which is alternatively exposed to air and immersed in water is called

- A. pelagic zone
- C. lentic zone

- B. benthic zone D. littoral zone
- 20. Elicitors are molecules that
  - A. Induce cell division
  - B. Stimulate production secondary metabolites
  - C. Stimulate hairy root formation that accumulate secondary metabolites
  - D. None of these
- 21. Rheumatoid arthritis is different from some other forms of arthritis as it
  - A. Generally, occurs above the waist
  - B. Is more painful than other forms
  - C. Is symmetrical, affecting the right and the left sides of the body
  - D. Occurs below the waist
- 22. IUCN (The International Union for Conservation of Nature and Natural Resources) headquarters is at
  - A. Morges, Switzerland

B. Paris, France

- D. New York, USA
- 23. Which of the following organisms found in human waste that cause water pollution?
  - A. Coliform bacteria

C. Vienna. Austria

C. Protozoa

- **B.** Viruses
- D. Parasitic worms

- 24. What is tautonym?
  - A. These are the repeated sequence
  - B. It is a name of fish
  - C. Identical name of genus and species
  - D. It is a name of the genus
- 25. T.O. Diener discovered \_\_\_\_\_.
  - A. Bacteriophage
  - C. Free infectious DNA

- B. Infectious protein
- D. Free infectious RNA