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LPUNEST BTech 2024 Previous Year Paper

LPU National Entrance and Scholarship Test (LPUNEST)

Previous Year Question Paper of LPUNEST (B.Tech)

Question paper contains five subjects i.e. Physics (30 Questions), Maths (30 Questions), Chemistry (30 Questions), Biology (30 Questions) and English (30 Questions). English, Physics & Chemistry are mandatory subjects and student has to opt one subject out of Mathematics and Biology.

Section – ENGLISH

This section contains **30 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

1. Select the answer choice that identifies the noun in the sentence.
Sue's parents tried living in the north, but they could not adapt to the cold.
a) north b) but c) not d) adapt

2. What is the missing pronoun?
The children are coming out of school in a minute. I need to go and pick _____ up.
a) it b) her c) them d) they

3. Choose the correct order of adjectives to fill the blank.
She is a _____ supermodel.
a) Beautiful slim Brazilian
b) Brazilian beautiful slim
c) Slim Brazilian beautiful
d) Brazilian slim beautiful

4. Which kind of adverb is the word in capitals?
"Mothers look GENTLY at their babies."
a) Adverb of Manner
b) Adverb of Time/Frequency
c) Adverb of Place
d) Adverb of Degree

5. Choose the right option to fill the gap.
When Pooja arrives, I _____ in my apartment.
a) Will be sleeping
b) Won't be sleeping
c) Be sleeping
d) Both Will be sleeping and Won't be sleeping

6. Choose the right option to fill the gap.
Nahal _____ his PhD on trauma studies by December this year.
a) will completing
b) will have been completing
c) will have completed
d) will have been completed

7. Choose the right option to fill the gap.
Jean Martin Charcot _____ for us soon.
a) Will work
b) Shall work
c) Would have worked
d) Both Will work and Shall work

8. Choose the correct one.
a) I think he would not come with us to the meeting
b) I think he might not come with us to the meeting
c) I think he shall not come with us to the meeting
d) I think he might not came with us to the meeting

9. Choose the correct use of modal verb.

a) I will make dinner tonight
b) I will be making dinner tonight
c) Both I will make dinner tonight and I will be making dinner tonight
d) None of these

10. The sentence below contains an error. Identify which part has the error and choose from the options.

I am finding it difficult to choose among my pair of red trousers and my pair of green ones.

a) I did found it difficult
b) To choose between my pair of red trousers
c) And my pair of green one
d) No error

11. Identify which part of the sentence has the error.

Following intense debate (1)/, the faculty has approved the measure to increase (2)/ class size by 15% over the next four years.(3)/ No error (4)

a) 1 b) 2 c) 3 d) 4

12. Pick the right meaning for the following phrase.

To die in harness

a) Die early
b) Die after doing work
c) To die while in duty
d) Die peacefully

13. Identify the correct meaning of the idiom.

That ship has sailed.

a) Work better or leave
b) It's too late
c) Work quickly
d) Go through something difficult

14. Choose one word for the following.

A mild or indirect expression substituted for an offensive or harsh one

a) Wriggle b) Sacrilege c) Euphemism d) Linguist

15. In the following question, a related pair of words or phrases is followed by five pairs of words or phrases. Choose the pair that best expresses a relationship similar to that in the original pair.

earth is to ball as pancake is to?

a) soccer b) flag c) disc d) flat

16. Choose the correct form of the verb to fill the gap so as to make a meaningful sentence.

I think I _____ a new cellphone. This one does not function properly any more.

a) needs b) needed c) need d) am needing

17. Choose the correct form of the verb to fill the gap so as to make a meaningful sentence.

At a school dance:
Mohul: " …… yourself?"
Zoya: "Yes, I'm having a fun time!"

a) You enjoying b) Enjoy you c) Do you enjoy d) Are you enjoying

18. Choose the correct form of the verb to fill the gap so as to make a meaningful sentence.

During the two years Rishi _____ ten different jobs.

a) has has b) has had c) have had d) have has

19. Fill in the blank with correct word.

They went to the shopping center _____ shops were closed.
a) because b) or c) but d) so

20. Choose the most suitable interjection to complete the sentence.
_____ I spilled my coffee on my dress.
a) Oops! b) Aww! c) Phew! d) Ah!

21. Fill in the blank with correct word.
Nisha is pleased _____ her result.
a) about b) at c) with d) all of these

22. Fill in the right verb form.
The horse was _____ by the young boy.
a) ride b) rode c) ridden d) riding

23. Change the voice of following sentence.
They speak French at this shop.
a) French is spoken at this shop b) French was spoken at this shop
c) French has spoken at this shop d) French were spoken at this shop

24. Which of these words is most nearly the opposite of the word provided?
Pit
a) group b) peak c) select d) marry

25. Which of these words is closest in meaning to the word provided?
Banish
a) exile b) hate c) fade d) clean

26. Choose the right option to fill the gap.
Mrs Adams was _____ dinner at 6 o'clock yesterday morning.
a) has b) had c) have d) having

27. Choose the right option to fill the gaps.
It was a very difficult movie, but I _____ it because I _____ the book.
a) Had understood, read b) Read, had understood
c) Had read, understood d) Understood, had read

28. Choose the right option to fill the gap.
The film wasn't very good. I _____ it very much.
a) enjoyed b) wasn't enjoy c) didn't enjoyed d) didn't enjoy

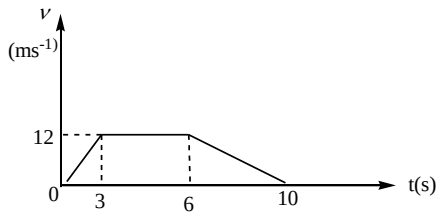
29. Select the answer choice that identifies the noun in the sentence.
Susan was exceedingly proud of her beautiful new home.
a) exceedingly b) home c) proud d) beautiful

30. Choose the right option to fill the gap.
By the time the boss comes in the factory, will _____ the new project?
a) Jane and Luke discuss
b) Jane and Luke be discussed
c) Jane and Luke be discussing
d) Both Jane and Luke discuss & Jane and Luke be discussing

Section – PHYSICS

This section contains **30 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

31. A lift is moving in upward direction. The total mass of the lift and the passengers is 1600kg. The variation of the velocity of the lift is as shown in the figure. The tension in the rope at t=8th second will be



a) 11200N b) 16000N c) 4800N b) 12000N

32. A mass m moves with a velocity v and collides in elastically with another identical mass. After collision, the first mass moves with velocity $\frac{v}{\sqrt{3}}$ in a direction perpendicular to the initial direction of motion. Find the speed of 2nd mass after collision.

a) $\frac{2}{\sqrt{3}}v$ b) $\frac{v}{\sqrt{3}}$ c) v d) $\sqrt{3}v$

33. In a system of particles 8kg mass is subjected to a force of 16N along positive y axis and another 8kg mass is subjected to a force of 8N along positive x axis. The angle made by the acceleration of centre of mass with x axis is

a) $\theta = 45^0$ b) $\theta = \tan^{-1}\left(\frac{2}{3}\right)$ c) $\theta = \tan^{-1}(2)$ d) $\theta = \tan^{-1}\left(\sqrt{3}\right)$

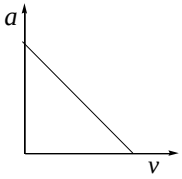
34. Four spheres of diameter 2a and mass M are placed with their centers on the four corners of a square of side 'b'. Then the moment of inertia of the system about an axis along one of the sides of the square is

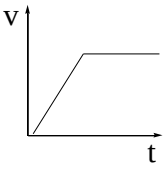
a) $\frac{4}{5}Ma^2 + 2Mb^2$ b) $\frac{8}{5}Ma^2 + 2Mb^2$ c) $\frac{8}{5}Ma^2$ d) $\frac{4}{5}Ma^2 + 4Mb^2$

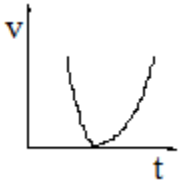
35. The time dependence of a physical quantity P is given by $P = P_o e^{-\alpha t^2}$, where α is a constant and t is a time then constant α is

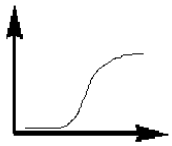
a) dimension less b) dimension of t^{-2} c) dimensions of P d) dimension of t^2

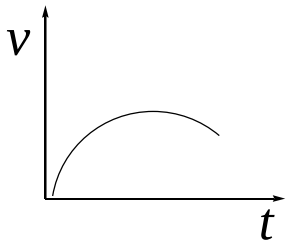
36. Acceleration verses velocity graph of a particle moving in a straight line as shown in graph. The corresponding velocity-time graph would be.



a) 

b) 

c) 

d) 

37. A man wishes to cross the river flowing with velocity u swims at angle θ with river flow if the man swims with speed v and if the width of the river is d then drift travelled by him.

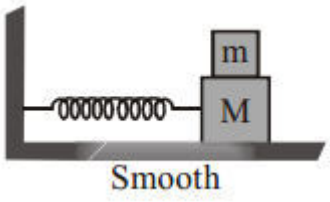
a) $[u+v\cos\theta]\frac{d}{v\sin\theta}$ b) $[u-v\cos\theta]\frac{d}{v\sin\theta}$

c) $[u-v\cos\theta]\frac{d}{v\cos\theta}$ d) $[u+v\cos\theta]\frac{d}{v\cos\theta}$

38. If the gravitational acceleration at surface of Earth is g, then increase in potential energy in lifting an object of mass m to a height equal to half of radius of earth from surface will be :-

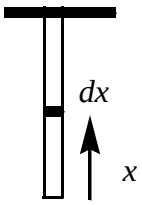
a) $\frac{mgR}{2}$ b) $\frac{2mgR}{3}$ c) $\frac{mgR}{4}$ d) $\frac{mgR}{3}$

39. In the arrangement, spring constant k has value $2Nm^{-1}$, mass M = 3 kg and mass m = 1 kg. Mass M is in contact with a smooth surface. The coefficient of friction between two blocks is 0.1 and amplitude of oscillation is 10 cm. The time period of SHM executed by the system is



a) $\pi\sqrt{6}$ b) $\pi\sqrt{2}$ c) $2\sqrt{2}\pi$ d) 2π

40. A wire of variable mass per unit length is $\mu=\mu_0 x$, hanging from the ceiling as shown in figure. The length of wire is l_0. A small transverse disturbance is produced at its lower end. Find the time after which the disturbance will reach to the other ends.



a) $\sqrt{\frac{6l_0}{g}}$ b) $\sqrt{\frac{8l_0}{g}}$ c) $\sqrt{\frac{9l_0}{g}}$ d) $\sqrt{\frac{10l_0}{g}}$

41. A cubical ball is taken to a depth of 200m in a sea. The decrease in volume observed to be 0.1%. The bulk modulus of the ball is

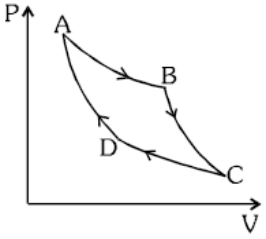
($g = 10\ ms^{-2}$)

a) 2×10^7 Pa b) 2×10^6 Pa c) 2×10^9 Pa d) 1.2×10^9 Pa

42. The temperature of a body falls from 62ºC to 50ºC in 10 minutes. If the temperature of the surroundings is 26ºC, the temperature in next 10 minutes will become

a) 42ºC b) 40ºC c) 56ºC d) 55ºC

43. In the indicator diagram fig. shown of Carnot cycle T_a, T_b, T_c, T_d represent temperature of gas at A, B, C, D respectively. Which of the following is correct relation



a) $T_a = T_b = T_c = T_d$ b) $T_a = T_c$, $T_b = T_d$

c) $T_a = T_d$, $T_c = T_b$ d) $T_a = T_b$, $T_c = T_d$

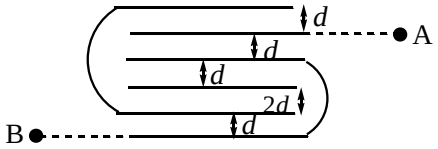
44. Modern vacuum pumps can evacuate a vessel down to a pressure of 4.0×10^{-15} atm. At room temperature (300K) taking R = 8.3 JK^{-1} $mole^{-1}$ and $N_{avagardro} = 6\times10^{23} mole^{-1}$, the mean distance between molecules of gas in an evacuated vessel will be of the order of :

a) 0.2μm b) 0.2mm c) 0.2cm d) 0.2nm

45. Three concentric conducting spherical shells carry charges $+4Q$ on the inner shell $-2Q$ on the middle shell and $+6Q$ on the outer shell. The charge on the inner surface of the outer shell is

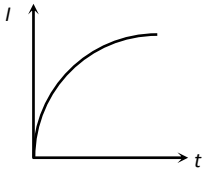
a) 0 b) $4Q$ c) $-Q$ d) $-2Q$

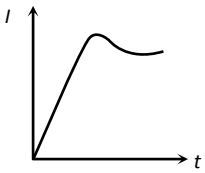
46. Find equivalent capacitance between points A and B. [Assume each conducting plate is having same dimensions and neglect the thickness of the plate, $\frac{\varepsilon_0 A}{d} = 7\mu F$, where A is area of plates]

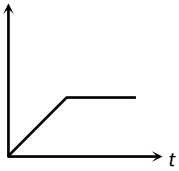


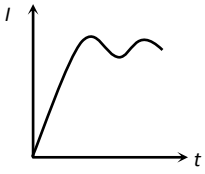
a) $7\mu F$ b) $11\mu F$ c) $12\mu F$ d) $15\mu F$

47. When an electric heater is switched on, the current flowing through it (i) is plotted against time (t). Taking into account the variation of resistance with temperature, which of the following best represents the resulting curve

a) 

b) 

c) 

d) 

48. A wire of mass 100g is carrying a current of 2A towards increasing x in the form of $y = x^2 (-2m \le x \le +2m)$. This wire is placed in a magnetic field $\vec{B} = -0.02\hat{k}$ tesla. The acceleration of the wire (in m/s^2) is

a) $-1.6\hat{j}$ b) $-3.2\hat{j}$ c) $1.6\hat{j}$ d) zero

49. The real angle of dip at a place , if a magnet is suspended at an angle of 30° to the magnetic meridian and the dip needle makes an angle of 45° with horizontal is

a) $\text{Tan}^{-1}\left(\frac{\sqrt{3}}{2}\right)$ b) $\text{Tan}^{-1}\left(\sqrt{3}\right)$ c) $\text{Tan}^{-1}\left(\sqrt{\frac{3}{2}}\right)$ d) $\text{Tan}^{-1}\left(\frac{2}{\sqrt{3}}\right)$

50. In a hypothetical Bohr's hydrogen atom the mass of the electrons is doubled. The energy E_0 and radius r_0 of the first orbit will be (a_0 is the Bohr radius for the first orbit):

a) $E_0 = -27.2eV, r_0 = a_0$ b) $E_0 = -13.6eV, r_0 = a_0/2$

c) $E_0 = -27.3eV, r_0 = a_0/2$ d) $E_0 = -13.6eV, r_0 = a_0$

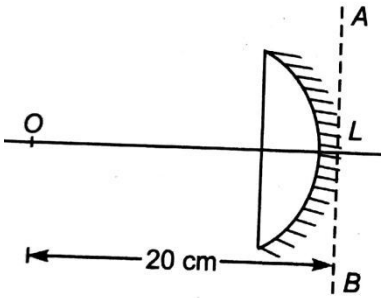
51. A radioactive isotope is being produced at a constant rate X. Half-life of the radioactive substance is Y. After some time the number of radioactive nuclei become constant. The value of this constant is:

a) $\frac{XY}{\ln(2)}$ b) XY c) $(XY)\ln(2)$ d) $\frac{X}{Y}$

52. Two identical particles move at right angles to each other, possessing debroglie wavelength λ_1 and λ_2. The Debroglie wavelength of each of the particles in their centre of mass frame will be

a) $\sqrt{\frac{\lambda_1^2+\lambda_2^2}{2}}$ b) $\frac{\lambda_1+\lambda_2}{2}$ c) $\frac{2\lambda_1\lambda_2}{\lambda_1+\lambda_2}$ d) $\frac{2\lambda_1\lambda_2}{\sqrt{\lambda_1^2+\lambda_2^2}}$

53. A point object is placed at a distance of 20 cm from a thin plano-convex lens of focal length 15 cm (μ=1.5). The curved surface is silvered. The image will form at



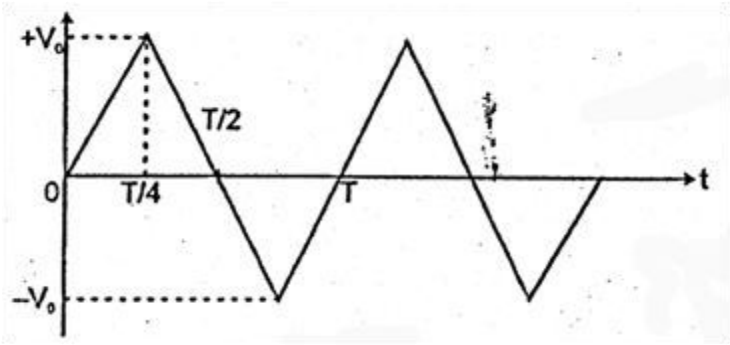
a) 60 cm left of AB b) 30 cm left of AB

c) 20/7 cm left on AB d) 60 cm right of AB

54. In Young's double slit experiment, the two slits acts as coherent sources of equal amplitude A and wavelength λ. In another experiment with the same set up the two slits are sources of equal amplitude A and wavelength λ but are incoherent. The ratio of the intensity of light at the mid-point of the screen in the first case to that in the second case is

a) 4:1 b) 1:1 c) 2:1 d) 1:4

55. The voltage time graph of a triangular wave having peak value V_0 is as shown in figure. The rms value of V in time interval from t=0 to $\frac{T}{4}$ is

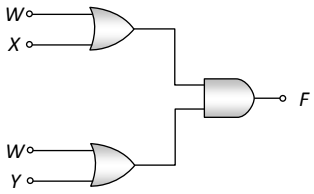


a) $\frac{V_0}{3}$ b) $\frac{V_0}{2}$ c) $\frac{V_0}{\sqrt{2}}$ d) $\frac{V_0}{\sqrt{3}}$

56. A potential difference of $2V$ is applied between the opposite faces of a *Ge* crystal plate of area 1 cm^2 and thickness 0.5 *mm*. If the concentration of electrons in *Ge* is $2 \times 10^{19}/m^3$ and mobilities of electrons and holes are $0.36\frac{m^2}{volt-\sec}$ and $0.14\frac{m^2}{volt-\sec}$ respectively, then the current flowing through the plate will be

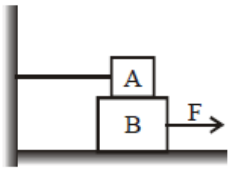
a) 0.25 *A* b) 0.45 *A* c) 0.56 *A* d) 0.64 *A*

57. The diagram of a logic circuit is given below. The output *F* of the circuit is represented by



a) $W.(X+Y)$ b) $W\cdot(X\cdot Y)$ c) $W+(X\cdot Y)$ d) $W+(X+Y)$

58. A block A of mass 100 kg rests on another block B of mass 200 kg and is tied to a wall as shown in the figure. The coefficient of friction between A and B is 0.2 and that between B and the ground is 0.3. The minimum force F required to move the block B is (g = 10 m/s^2)



a) 900 N b) 200 N c) 1100 N d) 700 N

59. A fully charged capacitor C with initial charge q_0 is connected to a coil of self-inductance L at t = 0.The time at which the energy is stored equally in the form of electric filed in capacitor and the magnetic field in the inductor

a) $\pi\sqrt{LC}$ b) $\frac{\pi}{4}\sqrt{LC}$ c) $2\pi\sqrt{LC}$ d) $\sqrt{LC}$

60. A signal of frequency 20 kHz and peak voltage of 5 Volt as used to modulate a carrier wave of frequency 1.2 MHz and peak voltage 25 Volts. Choose the correct statement.

a) Modulation index=5, side frequency bands are at 1400 kHz and 1000 kHz
b) Modulation index=5, side frequency bands are at 21.2 kHz and 18.8 kHz
c) Modulation index=0.8, side frequency bands are at 1180 kHz and 1200 kHz
d) Modulation index=0.2, side frequency bands are at 1220 kHz and 1180 kHz

Section- MATEHMATICS

This section contains **30 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

61. A survey of 500 television viewers produced the following information, 285 watch foot ball, 195 watch hockey, 115 watch basket ball, 45 watch foot ball and basket ball, 70 watch foot ball and hockey, 50 watch hockey and basket ball, 50 do not watch any of the three games. The number of viewers, who watch exactly one of the three games is

a) 325 b) 310 c) 315 d) 372

62. The minimum number of elements that must be added to the relation $R=\{(1,2),(2,3)\}$ on the set $\{1,2,3\}$ so that it is an equivalence relation

a) 3 b) 5 c) 6 d) 7

63. $f:R-\{0\}\to R$ given by $f(x)=\frac{1}{x}-\frac{2}{e^{2x}-1}$ can be made continuous at $x=0$ by defining $f(0)$ as

a) 1 b) 2 c) -1 d) 0

64. If z represent a point on the circle $|z|=2$ then the locus of the point $z+\frac{1}{z}$ is

a) parabola b) circle c) ellipse d) hyperbola

65. The quadratic equation $8\sec^2 x-6\sec x+1=0$ has

a) No real root b) Two real roots c) Many roots d) Only one real root

66. If 8 G.M.'s are inserted between 2 and 3 then the product of the 8 G.M.'s is

a) 6 b) 36 c) 216 d) 1296

67. If x,y,z are in A.P with common difference 'd' and the rank of the matrix $\begin{bmatrix}4 & 5 & x\\ 5 & 6 & y\\ 6 & k & z\end{bmatrix}$ is 2 then the values of k, d are

a) $6,\frac{x}{2}$ b) 5, x c) any arbitrary, x d) 7, any arbitrary

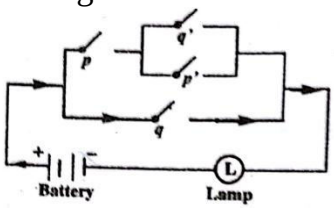
68. If $\Delta=\begin{vmatrix} f(x) & f\left(\frac{1}{x}\right)+f(x)\\ 1 & f\left(\frac{1}{x}\right)\end{vmatrix}=0$ where $f(x)$ is a polynomial and $f(2)=17$ then $f(5)=---$

a) 624 b) 626 c) 82 d) 79

69. The distance between the line $\bar{r}=2\bar{i}-2\bar{j}+3\bar{k}+\lambda(i-\bar{j}+4\bar{k})$ and the plane $\bar{r}.(\bar{i}+5\bar{j}+\bar{k})=5$ is

a) $\frac{10}{\sqrt{3}}$ b) $\frac{10}{2\sqrt{3}}$ c) $\frac{10}{3\sqrt{3}}$ d) $\frac{10}{3}$

70. The symbolic form of logic of the circuit given below is



a) $\left[(p\wedge q')\vee p'\right]\wedge q$ b) $\left[p\vee(q'\wedge p')\right]\vee q$

b) c) $\left[(p\wedge p')\vee q'\right]\wedge q$ d$\left[p\wedge(q'\vee p')\right]\vee q$

71. The number of 4 digited even numbers whose sum is 34

a) 5 b) 12 c) 3 d) 7

72. The number of ordered triplets of +ve integers which satisfied the inequalities $20 \le x+y+z \le 50$ is

a) ${}^{50}C_3$ b) ${}^{19}C_3$ c) ${}^{50}C_3 - {}^{19}C_3$ d) ${}^{69}C_3$

73. If $\sum_{r=1}^{n} a_r = \frac{n(n+1)(n+2)}{6} \forall\ n \ge 1$, then $\underset{n\to\infty}{Lt} \sum_{r=1}^{n} \frac{1}{a_r} =$

a) 1 b) $\frac{3}{2}$ c) 2 d) 3

74. Value of $\sum_{k=1}^{\infty}\sum_{r=0}^{k} \frac{1}{3^k}({}^{k}C_r)$

a) 1 b) 0 c) $\frac{2}{3}$ d) 2

75. If $y=(1-x)(1+x^2)(1+x^4)...(1+x^{2n})$, then $\frac{dy}{dx}$ at x = 0 is equal to

a) -1 b) $\frac{1}{(1+x)^2}$ c) $\frac{x}{(1+x^2)}$ d) $\frac{x}{(1-x)^2}$

76. Consider p(x) to be a polynomial of degree 5 having extremum at $x=-1,1$ and $\lim_{x\to 0}\left(\frac{P(x)}{x^3}-2\right)=4$. Then the value of [P(1)] is (where [.] represents greatest integer function)

a) 1 b) 2 c) 3 d) 4

77. $\int \frac{\sin^2 x.\cos^2 x}{\left(\sin^5 x+\cos^3 x.\sin^2 x+\sin^3 x.\cos^2 x+\cos^5 x\right)^2}dx =$

a) $\frac{1}{3(1+\tan^3 x)}+c$ b) $\frac{1}{3(1+\tan^3 x)}+c$ c) $\frac{1}{1+\cot^3 x}+c$ d) $\frac{-1}{1+\cot^3 x}+c$

78. $\int (\sin 101x)\sin^{99} x\,dx = \frac{\sin(100x)\sin^{100} x}{k+5}+c$ then $\frac{k}{19} =$

a) -2 b) -4 c) 4 d) 5

79. If $g(x)=\cos x^2$, $f(x)=\sqrt{x}$ and $\alpha,\beta(\alpha<\beta)$ are the roots of $18x^2-9\pi x+\pi^2=0$ then the area bounded by the curve $y=(gof)(x)$ and the lines $x=\alpha$, $x=\beta$ and $y=0$ is

a) $\frac{\sqrt{3}}{2}$ b) $\frac{\sqrt{3}+1}{2}$ c) $\frac{\sqrt{3}-1}{2}$ d) $\frac{1}{2}$

80. If $y=f(x)$ passing through (1,2) satisfies the differential equation $y(1+xy)dx-xdy=0$ then

a) $f(x)=\frac{2x}{2-x^2}$ b) $f(x)=\frac{x+1}{x^2+1}$ c) $f(x)=\frac{x-1}{4-x^2}$ d) $f(x)=\frac{4x}{1-2x^2}$

81. A line cuts x-axis at A (7, 0) and y-axis at B(0, –5). A variable line PQ is drawn perpendicular to AB cutting x, y-axis at P and Q. If AQ, BP intersect in R, then locus of R is

a) $x^2+y^2+7x-5y=0$ b) $x^2+y^2-7x+5y=0$

c) $x^2+y^2-3x+4y=0$ d) $x^2+y^2+6x+7y=0$

82. A straight line through the origin O meets the parallel lines 4x+2y=9 and 2x+y+6=0 at points P and Q respectively. The point O divides the segment PQ in the ratio

a) 1:2 b) 3:4 c) 2:1 d) 4:3

83. The number of integral values of λ for which $x^2+y^2+\lambda x+(1-\lambda)y+5=0$ is the equation of a circle whose radius cannot exceed 5, is

a) 14 b) 15 c) 16 d) 18

84. The number of values of c such that the straight line $y=4x+c$ touches the curve $x^2/4+y^2=1$ is

a) 0 b) 1 c) 2 d) infinite

85. The plane x – 2y + 3z = 17 divides the line joining the points (–2, 4, 7) and (3, –5, 8) in the ratio

a) 3 : 5 b) 3 : 10 c) 3 : 7 d) none of these

86. The ratio of the distances from the points (1, –1, 3) and (3, 3, 3) to the plane 5x + 2y – 7z + 9 = 0

a) 2 : 1 b) 1 : 3 c) 1 : 1 d) 3 : 2

87. If the mean deviation of number 1, 1+d, 1+2d, …..1+100d from their mean is 255, then the d is equal to

a) 20.0 b) 10.1 c) 20.2 d) 10.0

88. If n integers taken at random are multiplied together, then the probability that the last digit of the product is 1, 3, 7 or 9 is

a) $\frac{2^n}{5^n}$ b) $\frac{8^n-2^n}{5^n}$ c) $\frac{4^n-2^n}{5^n}$ d) None of these

89. If $\tan\beta=2\sin\alpha.\sin\gamma.\operatorname{cosec}(\alpha+\gamma)$, then $\cot\alpha, \cot\beta, \cot\gamma$ are in

a) A.P. b) G.P. c) H.P. d) none of these

90. If $\cos^{-1}\alpha+\cos^{-1}\beta+\cos^{-1}\gamma=3\pi$ then the value of $\alpha\beta+\beta\gamma+\gamma\alpha=$

a) 1 b) 2 c) 0 d) 3

Section- CHEMISTRY

This section contains **30 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

91. A mixture of CO and CO_2 has vapour density 20 at STP, 100 g of this mixture contains _____ mole of CO

a) 0.4 b) 0.2 c) 0.625 d) 0.375

92. If ideal gas expands at constant temperature

a) kinetic energy of molecules increases
b) number of gas molecules increases
c) kinetic energy of the molecules remains same
d) pressure of the gas increases

93. Number of photons emitted by 10 watt bulb in 10 seconds, if wavelength of the light is 1000 Å, is

a) 1.01×10^{11} b) 2.02×10^{13} c) 3.03×10^{15} d) 4.04×10^{19}

94. The hybridization of atomic orbitals of N in NO_2^+, NO_3^- and NH_4^+ are respectively

a) sp ,sp^2,sp^3 b) sp,sp^3,sp^2 c) sp^2,sp,sp^3 d) sp^2,sp^3,sp

95. Bond dissociation energy of XY, X_2 and Y_2 (all diatomic molecules) are in the ratio 1:1: 0.5 and ΔH_f of XY is –200 kJ mol^{-1}. The bond dissociation energy of X_2 will be:

a) 800 kJ mol^{-1} b) 200 kJ mol^{-1} c) 300 kJ mol^{-1} d) 400 kJ mol^{-1}

96. Van't Hoff factors of aqueous solutions of X,Y,Z are 1.8, 0.8 and 2.5, Hence, their

a) boiling point: Z < X < Y b) freezing point: Z < X < Y
c) osmotic pressure: X = Y = Z d) vapour pressure Y < x < Z

97. K_{sp} of $Mg(OH)_2$ is 1×10^{-12} . 0.01 M $MgCl_2$ will be precipitating at the limiting P^H

a) 8 b) 9 c) 10 d) 12

98. On the basis of information available for the reaction: $\frac{4}{3}Al + O_2 \rightarrow \frac{2}{3}Al_2O_3; \Delta G = -827 kJ/mol$ of O_2, the minimum emf required to carry out an electrolysis of Al_2O_3 is : (Given 1F = 96500 C)

a) 2.14 V b) 4.28 V c) 6.42 V d) 8.56 V

99. Consider a successive reaction (al first order)

$A \xrightarrow{k_1} B \xrightarrow{k_2} C \xrightarrow{k_3} D$

The incorrect statements is

a) Concentration of A decreases exponentially with time
b) Concentration of both B and C first increases, reaches maxima, then decreases

c) If $k_1 < k_2$ and $k_2 < k_3$ $[B]_{max}$ will be greater than $[C]_{max}$.

d) If $k_1 > k_2$ and $k_2 < k_3$ $[B]_{max}$ will be greater than $[C]_{max}$.

100. Assertion (A): Colloidal solution is electrically neutral.
Reason (R): Due to similar nature of the charge carried by the particles, they repel each other and do not combine to form bigger particles
a) Both (A) and (R) are true and (R) is the correct explanation of (A)
b) Both (A) and (R) are true and (R) is not the correct explanation of (A)
c) (A) is true but (R) is false
d) Both (A) and (R) are false

101. Which is the most basic oxide?
a) SnO_2 b) K_2O c) CuO d) FeO

102. Which of the following acts as 'activator' in the froth floatation process?
a) KCN b) NaCN c) Sodium ethyl Xanthate d) Copper sulphate

103. $CO + 2H_2 \xrightarrow[catalyst]{300^o/300\,atm} CH_3OH$, the catalyst is
a) Fe b) Cr_2O_3/ZnO c) V_2O_5 d) Al_2O_3

104. Which of the following statement(s) is (are) incorrect for alkali metals?
a) Li^+ ion is exceptionally small and thus show covalent character in some compounds
b) Sodium oxide is amphoteric in nature
c) Lithium is the strongest reducing agent
d) All alkali metals and alkaline earth metals give blue coloration in liquid ammonia

105. The structures of quartz, mica, asbestos have the common basic unit of
a) $(SiO_4)^{4-}$ b) $(SiO_3)^{2-}$ c) $(SiO_3)^2$ d) SiO_2

106. For advertisement the coloured discharged tubes contain
a) He b) Ne c) Ar d) Kr

107. Given below, catalyst and corresponding process/reaction are matched. The mismatch is
a) $[RhCl(pph_3)_2]$: Hydrogenation b) $TiCl_4 + Al(C_2H_5)_3$: Polymerization
c) V_2O_5 : Haber-Bosch process d) Nickel : Hydrogenation

108. The EAN of $Co(CO)_4$ is 35. It attains stability by
a) Oxidation of $[Co(CO)_4]$ b) Reduction of $[Co(CO)_4]$
c) Dimerization of $[Co(CO)_4]$ d) Both b and c

109. Carcinogenic pollutant in the following is
a) Polychlorinated biphenyls b) Sodium chlorate
c) Tetrachloroethene d) Both a and c

110. 29.5 mg of an organic compound containing nitrogen was digested according to Kjeldahl's method and the evolved ammonia was absorbed in 20 mL of 0.1 M HCl solution. The excess of acid required 15 mL of 0.1 M $NaOH$ solution for complete neutralization. The percentage of nitrogen in the compound is

a) 29.5 b) 59.0 c) 23.7 d) 47.4

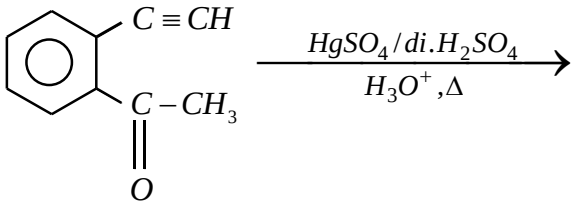
111. Hyper conjugation involves overlap of the following orbitals:

a) $\sigma-\sigma$ b) $\sigma-p$ c) $p-p$ d) $\pi-\pi$

112. What volume of methane at NTP is formed from 8.2 gm of sodium acetate by fusion with soda lime

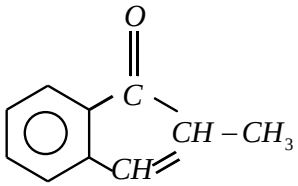
a) 10 litre b) 11.2 litre c) 5.6 litre` d) 2.24 litre

113.



Product is

a)



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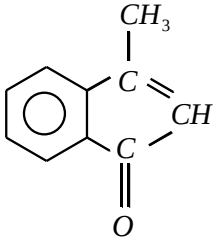

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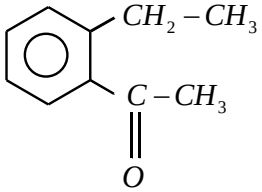
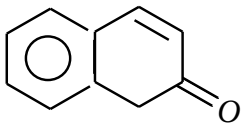


d)



114. How many monochloro derivatives are possible when 3-methylpentane is subjected to free radical chlorination? (including stereo isomers)

a) 7 b) 5 c) 6 d) 4

115. $(CH_3)_2NH \xrightarrow{KMnO_4} A$, $(CH_3)_2NH \xrightarrow{H_2SO_5} B$. Here A and B are

a) Tetramethylhydrazine and dimethyl hydroxyl amine

b) Dimethylphenol amine and Tetramethyl hydrazine
c) Tetramethylhydrazine and Tetramethyl hydrazine
d) Dimethyl hydroxyl amine and Dimethyl hydroxyl amine

116. Gutta-percha, a naturally occurring highly crystalline non-elastic rubber, consists of
a) 1, 4-polyisoprenes in which all the double bonds have E-configurations
b) 1, 4-polyisoprenes in which all the double bonds have Z-configurations
c) A mixture of Z-1, 4-polyisoprenes and E-1, 4-polyisoprenes
d) 1, 4-polyisoprenes in which some double bonds have Z-configurations and some other have E-configurations

117. Statement-I: Glucose is in pyranose form and has free anomeric hydroxyl group
Statement –II: In sucrose, glucose is in pyranose form and fructose is in furanose form
a) Both I and II are true b) I is true, but II is false
c) I is false, But II is true d) both I and II are false

118. The drug used for the treatment of throat infection is
a) quinine b) piperazine
c) sulpha drug like sulphanilamide d) isonicotin hydrazide

119. Which of the following statement is not correct?
a) Only $\alpha-$amino acids are obtained on hydrolysis of proteins
b) The amino acids which are synthesized in the body are known as non-essential amino acids
c) There are 20 essential amino acids
d) L-amino acids are represented by writing the $-NH_2$ group on the left side

120. In a reaction involving ring substitution of C_6H_5Y, the major product is meta-isomer. The group Y can be
a) $-NH_2$ b) – COOH c) $-CH_3$ d) -Cl

Section-BIOLOGY

This section contains **30 Multiple Choice Questions**. Each question has four choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

121. When two or more authors publish a new species or propose a new name, their names are linked using the epithet?
a) In b) Ex c) emend d) et

122. Members of which kingdom have cell walls and are all heterotrophic?
a) Plantae b) Fungi c) Animalia d) Protista

123. Squamous epithelium occurs in inner lining of
a) Kidney b) Pancreatic duct c) Lung Alveoli d) Heart

124. Which of the following statements is true?
a) Eukaryotic cells have membrane-bound organelles
b) Prokaryotic cells have a nucleus
c) Eukaryotic cells have genetic information
d) Prokaryotic cells are surrounded by a cell membrane

125. DNA structure was discovered by Watson and Crick in
a) 1953 b) 1962 c) 1952 d) 1951

126. Name the phenomena that begins when sugar solution is separated from water by a semipermeable membrane?
a) Osmosis b) Diffusion c) Imbibition d) Translocation

127. This is a rich source for Vitamin C
a) Rice b) Milk c) Egg d) Lemon

128. Synthesis of ADP + Pi → ATP in grana is
a) Phosphorylation b) Photophosphorylation
c) Oxidative Phosphorylation d) Photolysis

129. Citric acid cycle takes place in
a) Cytosol b) Peroxisomes c) mitochondria d) None of these

130. Coiling of garden pea tendrils around any support is an example of
a) Thermotaxis b) Thigmotaxis c) Thigmotropism d) Thigmonasty

131. The instrument used for measuring blood pressure is known as
a) ECG b) Stethoscope c) Sphygmomanometer d) EEG

132. Amount of blood passes through kidney per minute is
a) 110-200 ml b) 150-200 ml c) 100-120 ml d) 50-100 ml

133. Hinge joints
a) Are synovial joints b) Permit movements in one direction
c) Are found in knee d) All of these

134. When a neuron is in resting state i.e. not conducting any impulse, the axonal membrane is
a) Comparatively more permeable to K^+ ions and nearly impermeable to Na^+ ions
b) Comparatively more permeable to Na^+ ions and nearly impermeable to K^+ ions
c) Equally permeable to both Na^+ and K^+ ions
d) Impermeable to both Na^+ and K^+ ions

135. Parthenocarpy leads to
a) Seed fruit b) Seedless fruit c) No fruit d) Seed formation

136. Tyson's glands occur in male on
a) urethra b) scrotum c) prepuce d) epididymis

137. Chromatin is composed of _____

a) Nucleic acid and protein
b) Only Nucleic acid
c) Only protein
d) None of these

138. B-lymphocytes are
a) Formed in bone marrow
b) Preprocessed in bone marrow
c) Preprocessed in liver
d) Both Formed in bone marrow and Preprocessed in bone marrow

139. Choose the complex fertilizer
a) Potassium sulphate
b) Calcium ammonium nitrate
c) Triple super phosphate
d) Urea ammonium phosphate

140. Hop flowers are used for
a) Gluconic acid production
b) Citric acid production
c) Vinegar production
d) Beer production

141. The two DNA strands are held together by bonds of
a) Nitrogen
b) Oxygen
c) Hydrogen
d) Carbon

142. Green Fluorescent Protein was first observed in
a) Jellyfish
b) Primate
c) Cuttlefish
d) Shark

143. The carrying capacity of a population is determined by its
a) Natality
b) Population growth rate
c) Limiting resources
d) Mortality

144. The richness of species in an ecosystem is termed as
a) Genetic diversity
b) Species diversity
c) Community diversity
d) All of these

145. Red data book provides data on
a) red flowered plants
b) red coloured fishes
c) endangered plants and animals
d) red eyed birds

146. The Taj Mahal is being affected by
a) Noise pollution
b) Air pollution
c) Water pollution
d) None of these

147. Blood flow in lungs is circulated by
a) Cardiac circulation
b) Gastric circulation
c) Pulmonary circulation
d) trachea

148. Which of these is true for gastric juices?
a) Kill bacteria
b) Digest food
c) Include hydrochloric acid
d) All of these

149. Which of the following country have richest biodiversity?
a) India
b) South Africa
c) Brazil
d) Russia

150. Disease caused by eating fish inhabiting mercury contaminated water is

a) Hiroshima episode
b) Mina-mata disease
c) Bright's disease
d) Osteosclerosis