1. A block moving horizontally on a smooth surface with a speed of 20m/s bursts into two equal parts continuing in the same direction. If one of the parts moves at 30m/s, the speed of the second part move and the fractional change in the kinetic energy are :

(A) $10, \frac{1}{4}$ (B) $20, \frac{1}{4}$

(C) $20, \frac{1}{2}$ (D) $10, \frac{1}{2}$

2. A spherical ball of mass m and radius r rolls without slipping on a rough concave surface of large radius R. It makes small oscillations about the lowest point. The time period is :

(A) $2\pi\sqrt{\frac{5(R-r)}{7g}}$ (B) $2\pi\sqrt{\frac{7(R-r)}{5g}}$

(C) $2\pi\sqrt{\frac{3(R-r)}{5g}}$ (D) $2\pi\sqrt{\frac{2(R-r)}{5g}}$

3. The equation of a standing wave, produced on a string fixed at both ends, is $y = (0.4cm)\sin[(0.314cm^{-1})x]\cos[(600\pi s^{-1})t]$. The smallest length of the string could be :

(A) 30 *cm* (B) 20 *cm*

(C) 40 *cm* (D) 10 *cm*

4. White light is incident normally on a glass plate of thickness $0.50\times10^{-6}\,m$ and index of refraction 1.50. Which wavelengths in the visible region (400 nm -700 nm) are strongly reflected by the plate ?

(A) 429 *nm and* 600 *nm* (B) 449 *nm and* 600 *nm*

(C) 429 *nm and* 500 *nm* (D) 469 *nm and* 700 *nm*

5. A diatomic gas ($\gamma = 1.4$) does 200 J of work when it is expanded isobarically. The heat given to the gas in the process is :

(A) 500 J (B) 600 J

(C) 700 J (D) 800 J

6. A wire of length *l* carries a current I along the $x-axis$. A magnetic field exists which is given as $\vec{B} = B_0(\hat{i}+\hat{j}+\hat{k})T$. The magnetic force acting on the wire is :

(A) $\sqrt{3}\,ilB_0$ (B) $\sqrt{2}\,ilB_0$

(C) $\sqrt{5}\,ilB_0$ (D) ilB_0

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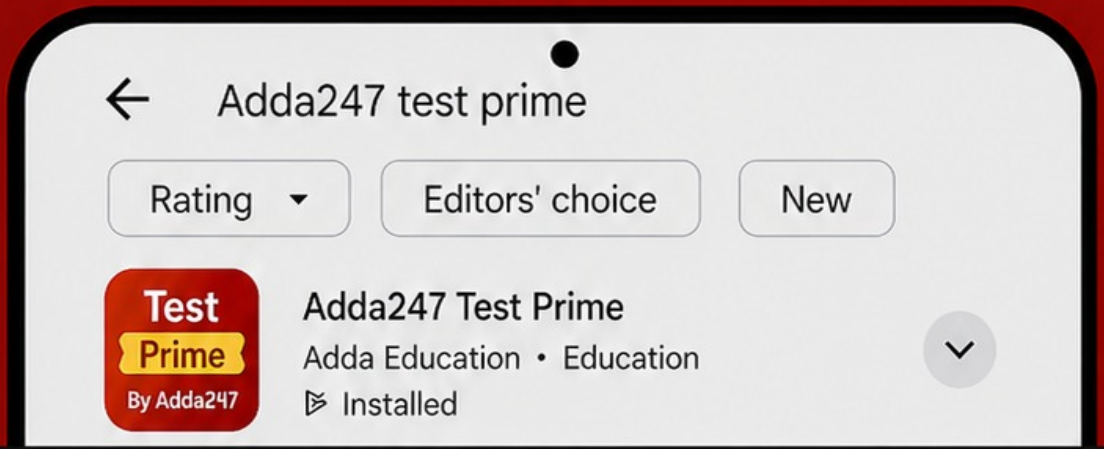

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7. Ultraviolet light of wavelength 280 nm is used in an experiment on photoelectric effect with lithium ($\phi = 2.5eV$) cathode. The stopping potential is :

(A) $0.9eV$ (B) $2.9eV$

(C) $1.9eV$ (D) $3.9eV$

8. How many different wavelengths may be observed in the spectrum from a hydrogen sample if the atoms are excited to states with principal quantum number n ?

(A) $\frac{n(n+1)}{2}$ (B) $\frac{n^2(n+1)}{2}$

(C) $\frac{(n-1)(n+1)}{2}$ (D) $\frac{n(n-1)}{2}$

9. A transistor is used in a common- emitter mode in an amplifier circuit. When a signal of 20 mV is added to the base emitter voltage, the base current changes by 20 μA and the collector current changes by 2mA. The load resistance is 5 k ohm. The voltage gain is :

(A) 100 (B) 300

(C) 500 (D) 200

10. A radioactive nucleus can decay by two different processes. The half-life for the 1st process is t_1 and that for the second process is t_2. The effective half-life (t) of the nucleus is :

(A) $\frac{1}{t} = \frac{1}{t_1} + \frac{1}{t_2}$ (B) $t = t_1 + t_2$

(C) $t = t_1 t_2$ (D) $t = \frac{t_1}{t_2}$

11. The basicity of phosphorous acid is :

(A) 1 (B) 2

(C) 3 (D) 4

12. Which of the following does not have a unit ?

(A) Ionization Energy (B) Electron Affinity

(C) Bond length (D) Electronegativity

13. The maximum number of 4f electrons that can have the spin quantum number value of +1/2 are :

(A) 3 (B) 5

(C) 7 (D) 9

14. The ionisation potential of isotopes of an element are :
(A) Same
(B) Different
(C) Depends on atomic masses
(D) Depends on number of neutrons

15. The correct order of second ionisation energy of C, N, O, F is :
(A) C > N > O > F
(B) O > N > F > C
(C) O > F > N > C
(D) F > O > N > C

16. The second most abundant element in the Earth's crust is :
(A) Si
(B) O
(C) Al
(D) C

17. When magnesium ribbon is burnt in air, the ash formed is :
(A) Black
(B) White
(C) Yellow
(D) Pink

18. When carbon dioxide is passed through lime water :
(A) Lime water turns milky
(B) Calcium hydroxide is formed
(C) A white precipitate of CaO is formed
(D) Colour of lime water disappears

19. When silver is exposed to air a black coating is formed due to :
(A) $AgNO_3$
(B) Ag_2CO_3
(C) Ag_2O
(D) AgS

20. Copper displaces which of the following metals from its salt solution :
(A) $ZnSO_4$
(B) $FeSO_4$
(C) $AgNO_3$
(D) $NiSO_4$

21. In which plant group is the haploid (gamete-producing) stage the main and dominant stage, while the diploid stage depends on it ?
(A) Gymnosperms
(B) Pteridophytes
(C) Bryophytes
(D) Angiosperms

22. Which organelle is primarily responsible for gravity perception in roots of higher plants ?
(A) Mitochondria
(B) Amyloplasts
(C) Chloroplasts
(D) Peroxisomes

23. N-linked glycosylation primarily occurs in the :
(A) Rough endoplasmic reticulum
(B) Peroxisome
(C) Glyoxisome
(D) Mitochondria

24. Which of the following features distinguishes angiosperms from gymnosperms ?
(A) Presence of vascular tissue
(B) Presence of seeds
(C) Presence of archegonia
(D) Presence of double fertilization

25. The first appearance of true lignified vascular tissue is associated with :
(A) Algae
(B) Bryophytes
(C) Pteridophytes
(D) Angiosperms

26. The malate-oxaloacetate shuttle primarily functions to :
(A) Transport ATP across mitochondrial membrane
(B) Transfer reducing equivalents (NADH) into mitochondria
(C) Export CO_2
(D) Regulate glycolysis

27. The functional megaspore in most angiosperms develops from :
(A) The chalazal-most megaspore
(B) The micropylar-most megaspore
(C) Any random megaspore
(D) Fusion of two megaspores

28. The Shannon-Wiener diversity index increases with :
(A) Decrease in evenness
(B) Increase in dominance
(C) Increase in species richness and evenness
(D) Decrease in population size

29. Ecological efficiency between trophic levels is primarily limited by :
(A) Gross primary productivity
(B) Respiration and heat loss
(C) Nitrogen fixation
(D) Species richness

30. Industrial melanism is best described as :
(A) The increase in light-colored insects due to increased sunlight.
(B) The development of resistance to industrial chemicals in plants.
(C) The increase in dark-colored individuals in polluted areas due to natural selection.
(D) The sudden mutation of all species living near factories.

31. Ichthyophis belongs to which class ?
(A) Pisces
(B) Amphibia
(C) Reptilia
(D) Mammalia

32. The excretory system of *Fasciola hepatica* operates mainly through :
(A) Protonephridia with flame cells
(B) Metanephridia with nephrostomes
(C) Malpighian tubules
(D) Coxal glands

33. Inhibition of dynein motor proteins would primarily affect :
(A) Forward movement of materials inside the cell
(B) Protein synthesis in ribosomes
(C) Formation of actin filaments
(D) Backward movement of vesicles along microtubules

34. Addition of Rotenone to actively respiring mitochondria would most likely result in :
(A) An increased $NAD^+/NADH$ ratio
(B) An increased $NADH/NAD^+$ ratio
(C) Increased ATP synthesis with enhanced cytochrome c oxidation
(D) Decreased $FADH_2$ oxidation rate

35. The strongest evidence linking Hemichordata with Echinodermata is :
(A) Similarity between Tornaria larva and Bipinnaria larva
(B) Similarity between Tornaria larva to Trochophore
(C) Similarity between Veliger larva and Trochophore
(D) Similarity between Nauplius larva and Tornaria

36. Which pathway most directly transmits nutrient status from the intestine to the brain ?
(A) Spinal somatic nerves
(B) Vagus nerve afferents
(C) Sympathetic adrenal pathway
(D) Enteric motor neurons

37. If a molecule of CO_2 released into the blood in the left toe is exhaled through the nose, it must pass through all of the following structures except :

(A) Pulmonary vein
(B) Right atrium
(C) Alveolus
(D) Right ventricle

38. If adenylate cyclase is pharmacologically inhibited, which event would be reduced first ?

(A) Akt phosphorylation
(B) cAMP production
(C) CREB activation
(D) Phospho-diesterase production

39. Sustainable development refers to :

(A) Economic growth achieved primarily through the use of renewable resources
(B) Economic growth based on controlled exploitation of non-renewable resources
(C) Development that meets the needs of the present without compromising the ability of future generations to meet their own needs
(D) Regulated use of fossil fuels to ensure long-term industrial development

40. Eutrophication of freshwater bodies is mainly due to excess input of :

(A) Carbon and sulfur
(B) Nitrogen and phosphorus
(C) Oxygen and nitrogen
(D) Carbon and oxygen

41. Let A = {1,2,3}. The total number of distinct equivalence relations that can be defined on set A is :

(A) 2
(B) 3
(C) 5
(D) 8

42. If α and β are the roots of the equation $x^2 - 5x + 6 = 0$, what is the value of $\alpha^2 + \beta^2$:

(A) 13
(B) 25
(C) 12
(D) 31

43. The angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of the tower, is 30°. The height of the tower is :

(A) $10\sqrt{3}m$
(B) $30\sqrt{3}m$
(C) 15 m
(D) 20 m

44. What is the value of $\log_2(32)+\log_3\left(\frac{1}{9}\right)$:

(A) 7 (B) 3

(C) 5 (D) 2

45. Let R be a relation on the set of all real numbers $\mathbb{R}$ defined by aRb if and only if $1+ab>0$. The relation R is:

(A) Reflexive and symmetric but not transitive.

(B) Reflexive and transitive but not symmetric.

(C) An equivalence relation.

(D) Symmetric and transitive but not reflexive.

46. If the roots of the equation $x^2-bx+c=0$ are two consecutive integers, then the value of b^2-4c is:

(A) 0 (B) 1

(C) 2 (D) 4

47. A man observes the angle of elevation of a tower as 30°. He walks 100m towards the tower and finds the angle of elevation to be 60°. The height of the tower is:

(A) $50\sqrt{3}m$ (B) $100\sqrt{3}m$

(C) 50 m (D) $25\sqrt{3}m$

48. In a circle, a chord of length 8 cm is at a distance of 3 cm from the center. If another chord of length 6 cm is drawn in the same circle, its distance from the center will be:

(A) 3 cm (B) 4 cm

(C) 5 cm (D) 6 cm

49. If the roots of $ax^2+bx+c=0$ are in the ratio m:n, then which of the following is true:

(A) $mna^2=(m+n)c^2$ (B) $mnb^2=(m+n)^2ac$

(C) $(a+b+c)=m+n$ (D) $b^2=4ac\left(\frac{m}{n}\right)$

50. If $x^{\log_x(x+3)} = 7$, then value of x is :

(A) 3
(B) 4
(C) 7
(D) 10

51. A circle is inscribed in an equilateral triangle of side 12 cm. The area of the circle is :

(A) $12\pi\ cm^2$
(B) $6\pi\ cm^2$
(C) $3\pi\ cm^2$
(D) $144\pi\ cm^2$

52. Let $f(x) = \frac{ax}{x+1}, x \neq -1$. If $(f \circ f)(x) = x$ for all x in the domain, then the value of a is :

(A) $\sqrt{2}$
(B) -1
(C) 1
(D) 2

53. A balloon is observed from two points **A** and **B** on the ground, 1000m apart. **A** is exactly south of the balloon and **B** is exactly west of it. If the angles of elevation from **A** and **B** are 45° and 30° respectively, find the height of the balloon.

(A) $500\sqrt{2}m$
(B) $500\ m$
(C) $1000\sqrt{2}m$
(D) $250\sqrt{2}m$

54. Two circles of radii 9 cm and 4 cm touch each other externally. The length of their direct common tangent is :

(A) 13 cm
(B) 5 cm
(C) 12 cm
(D) $\sqrt{97}m$

55. The value of a diamond varies directly as the square of its weight. A diamond weighing 10g is worth Rs. 1,000. If it breaks into two pieces in the ratio 2:3, what is the loss in value ?

(A) Rs. 480
(B) Rs. 520
(C) Rs. 400
(D) Rs. 600

500 : 500
300 : 600

56. Solve for x : $\log_2(\log_3(\log_4 x)) = 0$:

(A) 4 (B) 12

(C) 64 (D) 81

57. If $f(x)+2f(1-x)=x^2+2$ for all real x, then the value of $f(x)$ is :

(A) $\frac{1}{3}(x-2)^2$ (B) $x^2-2x+\frac{2}{3}$

(C) $\frac{1}{3}(x^2-4x+4)$ (D) $\frac{1}{3}(x^2-4x+6)$

58. If $\sin\theta\frac{3}{5}$ then what is the value of $\cot\theta$ is :

(A) $\frac{3}{4}$ (B) $\frac{4}{5}$

(C) $\frac{4}{3}$ (D) $\frac{5}{3}$

59. A and B can complete a job in 8 days. B and C can do it in 12 days. A, B and C together can do it in 6 days. How many days would it take A and C together to complete the job ?

(A) 10 days (B) 8 days

(C) 12 days (D) 9 days

60. The area bounded by the curve $y = \sin x$ between $x = 0$, $x = 2\pi$ is :

(A) 2 (B) 4

(C) -2 (D) -4

Direction: Read the following passage carefully and answer the questions (Q. No. 61 to 64) choosing the correct alternatives:

Scientific progress has profoundly transformed human civilization. From the development of modern medicine to advances in space exploration and digital technology, science has expanded the boundaries of human knowledge and capability. However, scientific advancement is not merely a collection of discoveries; it is a systematic process that relies on observation, experimentation, and critical analysis. Through repeated experimentation and peer review, theories are either strengthened or modified. This continuous process of questioning and testing enables science to evolve over time. Despite its many achievements, science also

presents certain ethical and social challenges. Innovations such as genetic engineering, artificial intelligence, and nuclear technology have the potential to benefit humanity, but they also raise complex moral questions. For instance, genetic modification may help eliminate hereditary diseases, yet it may also lead to debates about the limits of human intervention in natural processes. Consequently, scientists and policymakers must work together to ensure that technological progress is guided by ethical considerations and social responsibility. Public understanding of scientific issues is equally important, as informed citizens are better equipped to participate in discussions about the responsible use of scientific knowledge. Ultimately, the future of science depends not only on discovery but also on the wisdom with which such knowledge is applied.

61. What does scientific method involve ?
(A) Guessing without evidence
(B) Observation, experimentation, and analysis
(C) Only theoretical discussion
(D) Ignoring previous knowledge

62. Which of the following is mentioned as an ethical concern related to science ?
(A) Lack of technological development
(B) Shortage of scientific institutions
(C) Decline in scientific funding
(D) Genetic engineering and its implications

63. Why is public understanding of science important ?
(A) To replace scientists in research
(B) To promote entertainment industries
(C) To enable informed participation in scientific discussions
(D) To eliminate government control

64. What does the future of science depend on ?
(A) Only rapid technological innovation
(B) Government control over research
(C) Responsible and wise use of knowledge
(D) Limiting scientific discoveries

Direction: Answer the questions (Q. No. 65 to 70) choosing the correct alternatives.

65. Which is a synonym of 'impediment' ?
(A) advantage
(B) barrier
(C) encouragement
(D) benefit

66. Which is an antonym of 'mandatory' ?
(A) compulsory
(B) obligatory
(C) necessary
(D) optional

67. One who believes in fate is :
(A) Fatalist
(B) Narcissist
(C) Feminist
(D) Somnambulist

68. The lift of the building has _____ again. Which is the correct phrasal verb to fill in the blank ?
(A) broken up
(B) broken in
(C) broken into
(D) broken down

69. There is an exception _____ every rule. Identify the correct preposition.
(A) at
(B) in
(C) to
(D) for

70. You can rely on me _____ happens. Identify the correct linking device.
(A) however
(B) whatever
(C) wherever
(D) whenever

71. Which of the following plants has special structures known as tendrils that helps it to climb?
(A) Grapevine
(B) Pumpkin
(C) Sweet potato
(D) Watermelon

72. Match the different blocks of elements as per the modern periodic table in **Group A** with the names of elements in **Group B** and select the correct option from the following table ?

Group A		**Group B**
(a)	d-block	(i) Americium
(b)	f-block	(ii) Iodine
(c)	p-block	(iii) Oganesson
(d)	s-block	(iv) Strontium
		(v) Zircon

Answers	**(a)**	**(b)**	**(c)**	**(d)**
(A)	iv	iii	ii	i
(B)	v	i	ii	iv
(C)	v	i	ii	iii
(D)	iii	ii	v	iv

73. Match the Indian states given in Group A with the corresponding capitals in Group B and select the correct option.

Group A	Group B
(a) Meghalaya	(i) Aizawl
(b) Mizoram	(ii) Gangtok
(c) Nagaland	(iii) Imphal
(d) Sikkim	(iv) Kohima
	(v) Shillong

Options	(a)	(b)	(c)	(d)
(A)	v	i	iii	ii
(B)	iii	i	iv	v
(C)	v	iii	iv	ii
(D)	v	i	iv	ii

74. Which expression is used in the Indian Constitution to denote the National Emergency ?

(A) Annunciation of emergency
(B) Declaration of emergency
(C) Proclamation of emergency
(D) Promulgation of emergency

75. In an official meeting of the Government of India, the following dignitaries participated. What is their order (top to bottom) as per the table of precedence ?

(A) The Deputy Chairman, NITI Aayog;
(B) The Chief Justice of India;
(C) The Governor of Odisha; and
(D) Shri Ramnath Kovind, Ex-President of India

(A) (c); (d); (b); (a)
(B) (d); (b); (c); (a)
(C) (d); (c); (a); (b)
(D) (d); (c); (b); (a)

76. Which of the following is not a feature of the Indian federal system ?

(A) Division of power
(B) Independent judiciary
(C) Single citizenship
(D) Unitary government

77. Who among the following was the Chairman of the University Education Commission (1948–49) ?
(A) Dr. D. S. Kothari
(B) Dr. M. Adiseshiah
(C) Dr. S. Radhakrishnan
(D) Dr. L. Mudaliar

78. The Secondary Education Commission (1952–53) is also known as :
(A) Sadler Commission
(B) Hunter Commission
(C) Kothari Commission
(D) Mudaliar Commission

79. NEP-2020 recommended which of the following curricular structure ?
(A) 5 + 3 + 3 + 4
(B) 5 + 4 + 3 + 3
(C) 4 + 5 + 3 + 3
(D) 3 + 4 + 5 + 3

80. Which of the following body is the regulatory authority of teacher education programme ?
(A) AICTE
(B) NCERT
(C) NAAC
(D) NCTE

81. Find the missing number at '?' in the following series.
?, 90, 720, 5040, 30240
(A) 6
(B) 9
(C) 10
(D) 15

82. When the sixth prime number is multiplied by the tenth prime number the resultant value becomes :
(A) 319
(B) 377
(C) 403
(D) 493

83. What is the sum of all the first twenty five positive odd numbers ?
(A) 625
(B) 650
(C) 1225
(D) 1275

84. Which of the following numbers, when divided by 42 yields no fraction ?
(A) 26565
(B) 26574
(C) 26586
(D) 26600

85. How many times in a day the hands of a clock are in a straight line, diametrically opposite to each other ?
(A) 21
(B) 22
(C) 23
(D) 24

Consider the following statements and subsequent conclusions. Which of the given options regarding the conclusions is correct ?

Statements: In the train compartments there are some locations where a handle to pull the chain is given with the following warning.

"To stop the train pull the chain. Penalty for improper use - Rs.500."

Assumptions: (i) On certain exigencies passengers may want to pull the chain;

(ii) Some miscreants may misuse the alarm chain.

(A) Both the assumptions are implicit
(B) Neither of the assumptions are implicit
(C) Only assumption (i) is implicit
(D) Only assumption (ii) is implicit

87. Why do some people prefer to wear goggles while going out? Select the most plausible answer from the following options.
(A) For a better visibility
(B) For looking smart and handsome
(C) To conceal their eyes
(D) To protect their eyes from scorching light

88. If in a coded language the English alphabets are used, in which the consonants follow the vowels and are arranged in the same order as that of the English alphabets. What will be word for ISOBUTANE in the same coded language ?
(A) FRIETSAOU
(B) FROETBALU
(C) FRMEOSALU
(D) FRMETSALU

89. Rina is elder to Mina but younger to Tina. Nina is younger to Rina but elder to Bina. If Bina is elder to Mina, which of the following sequences is in correct ascending order ?
(A) Bina, Mina, Rina, Nina, Tina
(B) Mina, Bina, Nina, Rina, Tina
(C) Mina, Bina, Nina, Tina, Rina
(D) Tina, Rina, Nina, Bina, Mina

90. Binoy started from a point **A** and drove 23 km towards the west, and then took a left turn and drove 6 km to reach point **B**. At **B** he took a left turn and drove for another 14 km to reach the point **C**. At **C** he took a right turn and drove for 13 km and then turned left and drove 9 km to stop at point **D**. If all turns are right angles, then towards which direction and for what straight line distance from **D** should he move to arrive at his origin **A** ?

(A) 19 km to North
(B) 20 km to South
(C) 23 km to East
(D) 32 km to North

91. In education, problem-solving basically aims at developing :

(A) Passive listening
(B) Mechanical learning
(C) Critical and creative thinking
(D) Rote Memory

92. Heuristic method of teaching was advocated by :

(A) E. L. Thorndike
(B) Jean Piaget
(C) H. E. Armstrong
(D) B. F. Skinner

93. Insightful learning theory is associated with :

(A) Sigmund Freud
(B) Robert M. Gagne
(C) John Watson
(D) Wolfgang Kohler

94. Positive reinforcement in a classroom means :

(A) Ignoring mis-behaviour
(B) Rewarding desired behaviour
(C) Expelling students
(D) Giving punishment

95. Which of the following is a common sign of emotional disturbance in learners ?

(A) Irregular attendance
(B) Lack of participation
(C) Sudden withdrawal from activities
(D) Gossiping among fellow students

96. The goal of education which emphasizes harmonious development of body, mind and spirit is known as :

(A) Utilitarian aim
(B) Vocational aim
(C) Integral development
(D) Individual development

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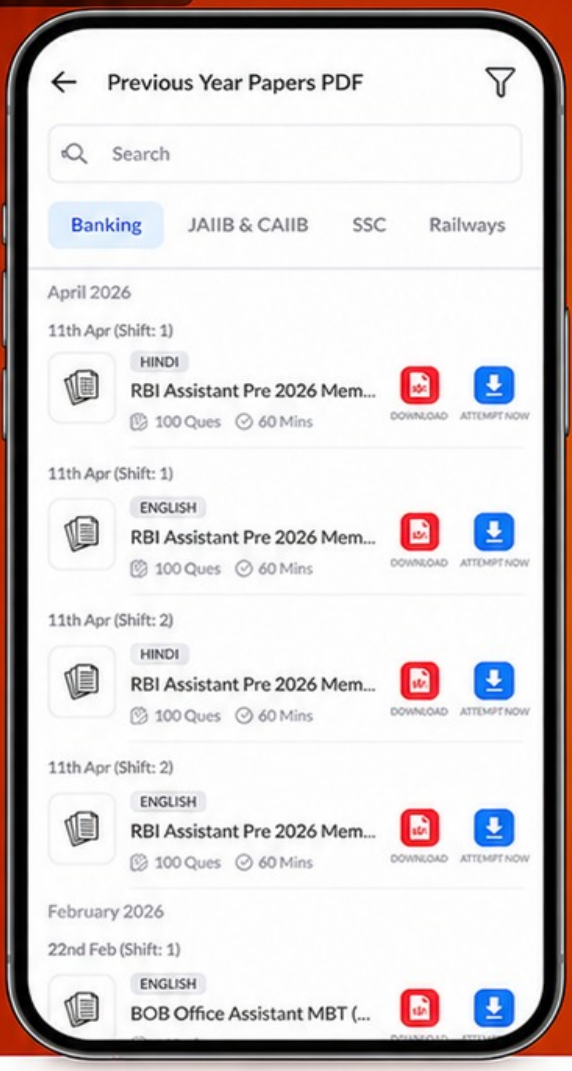

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97. Which international organization plays a major role in global educational planning, literacy and cultural preservation ?
(A) UNFPA
(B) UNICEF
(C) UNESCO
(D) UNDP

98. Which of the following organization is the apex body for providing support and advice to School Education in India ?
(A) NCTE
(B) NAAC
(C) NCERT
(D) NIEPA

99. When a teacher uses 'proxemics' as a classroom strategy, they are primarily managing :
(A) The amount of "wait time" after asking a question
(B) The sequence of instructional steps in a lesson plan
(C) The use of physical space and distance between themselves and students
(D) The volume and tone of their voice

100. A driving test, where an individual must demonstrate specific skills to pass regardless of how others perform, is an example of :
(A) Diagnostic assessment
(B) Criterion-referenced assessment
(C) Formative assessment
(D) Norm-referenced assessment