

**HARVIN
ACADEMY**

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PREET VIHAR

JANAKPURI

MEERUT

HFT/3/19

Test Code

720

Max. Marks

3 hrs.

Time Allowed

Important Instructions:

1. This booklet carries 180 multiple choice questions; 45 in Physics, 45 in Chemistry and 90 in Biology.
2. The test is of 3 hours duration. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores.
3. Each question is followed by four alternatives as suggested answers. Mark the most appropriate alternative as your answer in the space provided in the OMR sheet.
4. Only one alternative is to be selected. Any cutting, overwriting, multiple responses will be treated as an incorrect response and will be awarded one negative mark.
5. Read the instructions on the OMR sheet carefully before filling up the responses.
6. Any indiscipline / use of unfair means in the Examination Hall will lead to disqualification of the candidate.
7. Use of white fluid for correction and use of electronic/manual calculator is prohibited.
8. The candidates are allowed to take away this test-booklet with them but must submit the OMR sheet before leaving the Examination Hall.
9. Use Blue/Black Ball Point Pen only for writing particulars on this page/markings responses.

Test Syllabus

Physics : Laws of Motion

Chemistry : States of Matter, Thermodynamics, Redox Reaction

Botany : Morphology and Anatomy

Zoology : Topic till cover

Name of the Candidate (in Capitals) : _____

Roll Number (In figures) : _____ Phone No. _____

Centre of Examination (in Capitals) : _____

Date of Examination : _____

Candidate's Signature : _____ Invigilator's Signature : _____

1. In which of the following cases the net force is NOT zero ?

1. A kite skillfully held stationary in the sky
2. A ball freely falling from a height
3. An aeroplane rising upwards at an angle of 45° with the horizontal with a constant speed
4. A cork floating on the surface of water

2. A horse pulls the cart. Which of the following forces makes the cart and horse move ?

1. Force exerted by the horse on the cart
2. Force exerted by the ground on the cart
3. Force exerted by the ground on the horse
4. Force exerted by the horse on the ground

3. The breaking load of the rope is half the weight of the climber. In which of the following cases, the rope is not likely to break ?

1. Climbing up fast
2. Climbing down fast
3. Climbing up slowly
4. Climbing down slowly

4. When a bullet of mass 5 g is fired, the impulse on it is 200 Ns. If mass of the gun is 10 kg, then the recoil velocity of the gun is

1. 20 ms^{-1}
2. 2 ms^{-1}
3. 0.2 ms^{-1}
4. 0.02 ms^{-1}

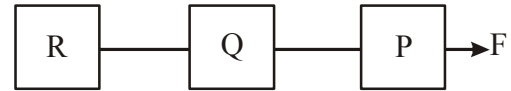
5. The vehicle of mass 500 kg is moving with a speed 10 m/s. Sand is poured into it at the rate of 12 kg per minute. How much force is needed to keep it moving with the same speed ?

1. 2 N
2. 3 N
3. 0 N
4. 12 N

6. The instantaneous displacement of the particle is given by $x = 2t^{3/2} - t + 6$. The force acting on the particle is proportional to

1. $t^{5/2}$
2. $t^{3/2}$
3. $t^{1/2}$
4. $t^{-1/2}$

7. Three equal masses P , Q and R are pulled with a constant force F . They are connected to each other with strings. The ratio of the tension between PQ and QR is



1. 1:1
2. 2:1
3. 1:2
4. 3:1

8. A goods train is moving at a constant speed of 10 m/s. To an open carriage in the train, water is added (with zero speed) at the rate of 5 kg/s. What additional force should act on the train to maintain the same speed ?

1. 0.5 N
2. 5 N
3. 50 N
4. 500 N

9. The linear momentum of the body depends on the time as $p = at + bt^2$, where a and b are constants. What is the force acting on the particle at $t = 0$?

1. a
2. $2b$
3. ab
4. $2ab$

10. A fireman wants to slide down a rope. The breaking load for the rope is $3/4$ th of the weight of the man. With what minimum acceleration, should the fireman slide down (Acceleration due to gravity is g) so that the rope does not break?

1. $\frac{g}{4}$
2. $\frac{1}{2}g$
3. $\frac{3}{4}g$
4. zero

11. What is the angle between action force and reaction force on a body ?

1. 30°
2. 60°
3. 90°
4. 180°

12. A rocket is fired vertically from the ground. It moves upwards with a constant acceleration 10 ms^{-2} for 30 seconds after which the fuel is consumed. After what time for the instant of firing the rocket will attain the maximum height ?

Take $g = 10 \text{ ms}^{-2}$.

1. 10 s
2. 15 s
3. 30 s
4. 60 s

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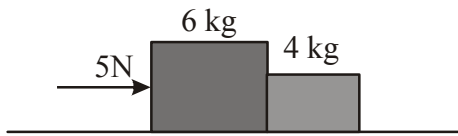
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13. A rocket of mass 6000 kg is set for vertical firing, If the exhaust speed be 1 km/s, how much gas must be ejected to give the rocket an upward acceleration of 20 m/s^2 ?

Take $g = 10 \text{ ms}^{-2}$

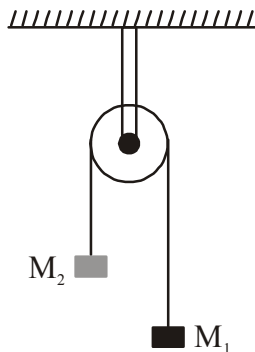
1. 45 kg/s
2. 90 kg/s
3. 120 kg/s
4. 180 kg/s

14. Two blocks of masses 4 kg and 6 kg are placed in contact with each other on a frictionless horizontal surface. See fig. If we apply a push of 5 N on the heavier mass, the force on the lighter mass will be



1. 5 N
2. 4 N
3. 2 N
4. None of the above

15. Two masses M_1 and M_2 are attached to a string, which passes over a frictionless fixed pulley as shown in fig. Given that $M_1 = 10 \text{ kg}$, $M_2 = 6 \text{ kg}$ and $g = 10 \text{ ms}^{-2}$. What is the acceleration of the masses ?



1. 40 ms^{-2}
2. 20 ms^{-2}
3. 5 ms^{-2}
4. 2.5 ms^{-2}

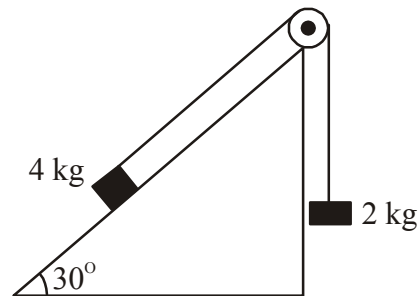
16. The mass of a body in a lift is 50 kg. When the lift is going up with an acceleration of 1 m/s^2 , then vertically upward force acting on the body is

1. 55 N
2. 550 N
3. 45 N
4. 450 N

17. With what maximum acceleration can a fireman go up a rope whose breaking strength is 160% of his weight ?

1. $(1/5) g$
2. $(2/5) g$
3. $(3/5) g$
4. $(4/5) g$

18. What will be the acceleration in terms of the acceleration due to gravity (g) of the block of 4 kg on the smooth inclined plane shown in the figure ?

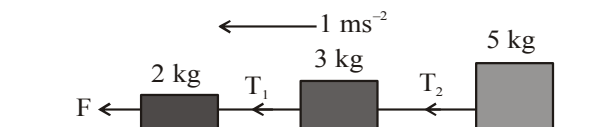


1. $g/2$ downwards
2. $g/2$ upwards
3. $g/3$ downwards
4. Zero

19. A book is lying on an inclined plane having inclination to the horizontal as θ° . What is the angle between the action of the book on the inclined plane and reaction of the inclined plane on the book?

1. 0°
2. θ°
3. $180^\circ - \theta^\circ$
4. 180°

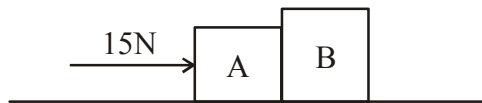
20. Three blocks of masses 2 kg, 3 kg and 5 kg are connected to each other with light strings and are then placed on a smooth frictionless surface. See fig. below. Let the system be pulled with a force F from the side of lighter mass so that it moves with an acceleration of 1 ms^{-2} . T_1 and T_2 denote the tensions in the other strings. The value of F is



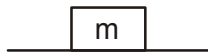
1. 2 N
2. 3 N
3. 5 N
4. 10 N

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21. On a smooth plane surface (figure below) two blocks A and B are accelerated up by applying a force 15 N on A. If mass of B is twice that of A, then force on B is



1. 30 N
 2. 15 N
 3. 10 N
 4. 5 N
22. A block is kept at rest on horizontal rough surface, what is the friction force on the block



1. μmg
 2. $\frac{\mu mg}{2}$
 3. zero
 4. $2\mu mg$
23. When a horse pulls a cart, the force that makes the horse run forward is the force exerted by
1. the horse on the ground
 2. the horse on the cart
 3. the ground on the horse
 4. the ground on the cart
24. Two equal masses of mass M each are attached to a string passing over a smooth massless pulley which is attached by a chain to the ceiling. The tension in the chain is
1. 0
 2. Mg
 3. $2Mg$
 4. $(1/2)Mg$
25. The mass of a lift is 500 kg. What will be the tension in the cable when it is going up with an acceleration of 2.0 m/s^2 ? ($g = 9.8 \text{ m/s}^2$)
1. 5000 N
 2. 5900 N
 3. 5600 N
 4. 6200 N
26. The average resisting force that must act on a 5 kg mass to reduce its speed from 65 cm/s to 15 cm/s in 0.2 s is
1. 12.5 N
 2. 25 N
 3. 50 N
 4. 100 N

27. Figure I, II, III and IV depict variation of force with time

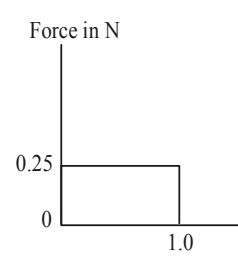


Fig. (i)

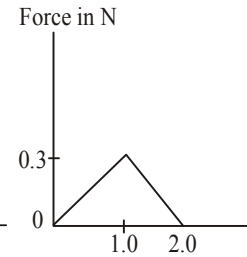


Fig. (ii)

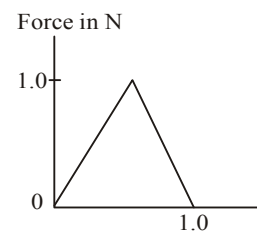


Fig. (iii)

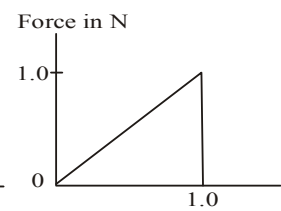


Fig. (iv)

The impulse is highest in the case of situations depicted in the figure(s)

1. I and II
 2. III and I
 3. III and IV
 4. IV only
28. A cricketer catches a ball of mass 150 g in 0.1 s moving with speed 20 m/s, then he experiences force of
1. 300 N
 2. 30 N
 3. 3 N
 4. 0.3 N
29. A lift is moving down with acceleration a . A man in the lift drops a ball inside the lift. The acceleration of the ball as observed by the man in the lift and a man standing stationary on the ground are respectively.
1. g, g
 2. $g-a, g-a$
 3. $g-a, g$
 4. a, g
30. When a body is sliding on a surface, the force of friction is called
1. static friction
 2. kinetic friction
 3. limiting friction
 4. rolling friction

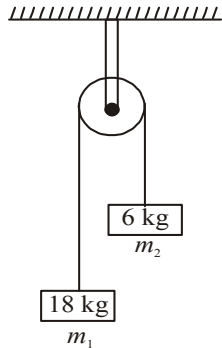
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31. A body of mass 1.0 kg is falling with an acceleration of 10 m/s^2 . Its apparent weight will be ($g = 10 \text{ m/s}^2$)

1. 1.0 kg wt
2. 2.0 kg wt
3. 0.5 kg wt
4. zero

32. Two masses m_1 and m_2 are attached to a string which passes over a frictionless smooth pulley. When $m_1 = 18 \text{ kg}$, $m_2 = 6 \text{ kg}$, the acceleration of masses is



1. 20 m/s^2
2. 5 m/s^2
3. 2.5 m/s^2
4. 10 m/s^2

33. A pulley fixed to the ceiling carries a string with blocks of mass m and $5m$ attached to its ends. The masses of string and pulley are negligible. When the system is released, the lighter mass moves with acceleration of

1. $g/4$
2. $g/3$
3. $2g/3$
4. $g/2$

34. You are on a frictionless horizontal plane. How can you get off if no horizontal force develops by pushing against the surface?

1. By jumping
2. By spitting or sneezing
3. By rolling your body on the surface
4. By running on the plane

35. If rope of lift breaks suddenly. The normal reaction exerted by the surface of lift on a body in the lift is

(a = acceleration of lift and m = mass of the body)

1. mg
2. $m(g+a)$
3. $m(g-a)$
4. zero

36. A bullet of mass 0.1 kg is fired with a speed of 100 m/s, the mass of the gun 50 kg. The velocity of the recoil is

1. 0.05 m/s
2. 0.5 m/s
3. 0.2 m/s
4. 0.1 m/s

37. A boy of mass 50 kg is standing in a lift moving down with an acceleration 8.8 m/s^2 . The apparent weight of the boy is (take $g = 9.8 \text{ m/s}^2$)

1. $(50/9.8) \text{ N}$
2. $50 \times 9.8 \text{ N}$
3. 50 N
4. Zero

38. A light spring balance hangs from the hook of the other light spring balance and a block of mass $M \text{ kg}$ hangs from the former one. Then the true statement about the scale reading is

1. both the scales read $M/2 \text{ kg}$ each
2. both the scales read $M \text{ kg}$ each
3. both the scale of the lower one reads $M \text{ kg}$ and of the upper one zero
4. the reading of the two scales can be anything but the sum of reading will be $M \text{ kg}$.

39. A rocket with a lift-off mass $3.5 \times 10^4 \text{ N kg}$ is blasted upward with an initial acceleration of 10 m/s^2 . Then the initial thrust of the blast is

1. $1.75 \times 10^5 \text{ N}$
2. $3.5 \times 10^5 \text{ N}$
3. $7.0 \times 10^5 \text{ N}$
4. $14.0 \times 10^5 \text{ N}$

40. When a U^{238} nucleus originally at rest, decays by emitting an α particle having speed ' u ' the residual nucleus recoils back due to

1. action reaction
2. velocity conservation
3. conservation of mass
4. conservation of energy

41. A man weighs 80 kg. He stands on the scale in a lift which is moving upward with a uniform acceleration of 5 m/s^2 . What will be the reading on the scale? ($g = 10 \text{ m/s}^2$)

1. 400 N
2. 800 N
3. 1200 N
4. Zero

42. If on a body of weight 5 N the applied upthrust is 3N then, what is the resultant force ?

1. 2 N
2. 7 N
3. 9 N
4. 0

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43. A bird weighing 1 kg is sitting on the base of a wire mesh cage weighing 1.5 kg. The birds starts flying inside the cage. The weight of the bird cage assembly will now be
1. Infinite
 2. 2.5 kg
 3. 3.5 kg
 4. 1.5 kg
44. In the case of horse pulling a cart, the force that causes the cart to move forward is the force that
1. The horse exerts on the ground
 2. The horse exerts on the cart
 3. The ground exerts on the horse
 4. The cart exerts on the horse
45. A body whose momentum is constant, must have
1. constant acceleration
 2. variable acceleration
 3. constant force
 4. zero net force
46. 10 g of a gas at NTP occupies 5 litres. The temperature at which the volume becomes double for the same mass of gas at the same pressure at
1. 273K
 2. -273°C
 3. 273°C
 4. 546°C
47. At constant temperature 200 cm^3 of N_2 at 720 mm and 400 cm^3 of O_2 at 750 mm pressure are put together in a one litre flask. The final pressure of mixture is
1. 111 mm
 2. 222 mm
 3. 333 mm
 4. 444 mm
48. The partial pressure of hydrogen in a flask containing 2g of H_2 and 32g of SO_2 is
1. 1/16 of total pressure
 2. 1/2 of total pressure
 3. 2/3 of total pressure
 4. 1/8 of total pressure
49. Equal masses of SO_2 , CH_4 and O_2 are mixed in empty container at 298 K, when total pressure is 2.1 atm. The partial pressure of CH_4 in the mixture is
1. 0.5 atm
 2. 0.75 atm
 3. 1.2 atm
 4. 0.6 atm
50. A flask containing air (open to the atmosphere) is heated from 300 K to 500 K. The percentage of air escaped to the atmosphere is
1. 16.6
 2. 40
 3. 60
 4. 20
51. The rate of diffusion of two gases A and B is in the ratio of 1 : 4 and the B and C in the ratio 1 : 3 the rate of diffusion of C with respect to A is
1. 1/12
 2. 12
 3. 3
 4. 4
52. A sample of air contains only N_2 , O_2 and H_2O . It is saturated with water vapours and the total pressure of 640 torr. The vapour pressure of water is 40 torr and the molar ratio of $\text{N}_2 : \text{O}_2$ is 3 : 1. The partial pressure of N_2 in the sample in
1. 480 torr
 2. 600 torr
 3. 525 torr
 4. 450 torr
53. What weight of hydrogen at STP could be contained in a vessel that hold 4.8g of oxygen at STP
1. 4.8g
 2. 3.0g
 3. 0.6g
 4. 0.3g
54. The temperature at which the r.m.s. velocity of carbon dioxide becomes the same as that of nitrogen at 21°C is
1. 462°C
 2. 273K
 3. 189°C
 4. 546K
55. Which set of conditions represents easiest way of liquify a gas?
1. Low temperature and high pressure
 2. High temperature and low pressure
 3. Low temperature and low pressure
 4. High temperature and high pressure
56. The correct order for T_i , T_B and T_C is
1. $T_i < T_C < T_B$
 2. $T_B < T_C < T_i$
 3. $T_C < T_B < T_i$
 4. $T_i < T_B < T_C$

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57. At what temperature will the total K.E. of 0.3 mol of He be the same as the total K.E. of 0.4 mol of Ar at 400 K
1. 400K
 2. 300 K
 3. 346K
 4. 533K
58. If excluded volume is taken zero, compressibility factor Z is
1. $\left(1 - \frac{a}{RTV}\right)$
 2. $\left(1 + \frac{Pb}{RT}\right)$
 3. $\left(1 + \frac{a}{RTV}\right)$
 4. $\frac{RT}{PV}$
59. Root mean square velocity of gas molecule is 300 m/sec. The r.m.s. velocity of molecules of gas with twice the molecular weight and half the absolute temperature is
1. 300 m/s
 2. 600 m/s
 3. 75 m/s
 4. 150 m/s
60. The values of van der waal's constant 'a' for the gases O₂, N₂, NH₃ and CH₄ are 1.360, 1.390, 4.170 and 2.253 L atm. mol⁻² respectively. The gas which can most easily be liquified is
1. O₂
 2. N₂
 3. NH₃
 4. CH₄
61. Which among the following state functions is an extensive property of the system?
1. Temperature
 2. Volume
 3. Refractive index
 4. Viscosity
62. Which among the following is not a state function?
1. Internal energy
 2. Free energy
 3. Work
 4. Enthalpy
63. Which of the following is correct for isothermal expansion of ideal gas
1. $W_{rev} = W_{irr}$
 2. $W_{rev} + W_{irr} = 0$
 3. $W_{rev} > W_{irr}$
 4. $q_{rev} = q_{irr}$
64. The heat of combustion of solid benzoic acid at constant volume is -321.30 kJ at 27°C. The heat of combustion at constant pressure is
1. -321.30 - 300R
 2. -321.30 + 300R
 3. -321.30 - 150R
 4. -321.30 + 900R
65. The hypothetical reaction, A → 2B, proceed through following sequence of steps
- A → C; ΔH = q₁
 C → D; ΔH = q₂
 (1/2)D → B; ΔH = q₃
- The heat of reaction
1. q₁ - q₂ + 2q₃
 2. q₁ + q₂ - 2q₃
 3. q₁ + q₂ + 2q₃
 4. q₁ + 2q₂ - 2q₃
66. A solution of 200 mL of 1 M KOH is added to 200 mL of 1 M HCl and the mixture is well shaken. The rise in temperature T₁ is noted. The experiment is repeated by using 100 mL of each solution and increase in temperature T₂ is again noted. Which of the following is correct?
1. T₁ = T₂
 2. T₂ is twice as large as T₁
 3. T₁ is twice as large as T₂
 4. T₁ is four times as large as T₂
67. Given that
- CH₄(g) + 360kJ → C(g) + 4H(g)
 C₂H₆(g) + 620kJ → 2C(g) + 6H(g)
- The value of C—C bond energy is
1. 260 kJ mol⁻¹
 2. 180 kJ mol⁻¹
 3. 130 kJ mol⁻¹
 4. 80 kJ mol⁻¹
68. The work done on the system when one mole of an ideal gas at 500 K is compressed isothermally and reversibly to 1/10th of its original volume (R = 2 cal)
1. 500 kcal
 2. 1.51 kcal
 3. -23.30 kcal
 4. 2.303 kcal
69. Given
- C(s) + O₂(g) → CO₂(g); ΔH = -395kJ
 S(s) + O₂(g) → SO₂(g); ΔH = -295kJ
 CS₂(l) + 3O₂(g) → CO₂(g) + 2SO₂(g); ΔH = -1110kJ
- The heat of formation of CS₂(l) is
1. 125 kJ mol⁻¹
 2. 31.25 kJ mol⁻¹
 3. 25.6 kJ mol⁻¹
 4. 250 kJ mol⁻¹

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70. Which of the following process has negative value of ΔS ?
1. Dissolution of sugar in water
 2. Stretching of rubber bond
 3. Decomposition of lime stone
 4. Evaporation of water
71. A particular reaction at 27°C for which $\Delta H > 0$ and $\Delta S > 0$ is found to be non-spontaneous. The reaction may proceed spontaneously
1. The temperature is decreased
 2. The temperature is increased
 3. The temperature is kept constant
 4. It is carried in an open vessel at 27°C
72. For the reaction between CO_2 and graphite
- $$\text{CO}_2(\text{g}) + \text{C}(\text{s}) \rightarrow 2\text{CO}(\text{g})$$
- $\Delta H = +170.0\text{kJ}$ and $\Delta S = 170 \text{ JK}^{-1}$. The reaction spontaneous at
1. 298K
 2. 1000K
 3. 900K
 4. 1200K
73. Entropy of vaporisation of water at 100°C , if molar heat of vaporisation is $9710 \text{ cal mol}^{-1}$ will be
1. $20 \text{ cal mol}^{-1}\text{K}^{-1}$
 2. $26 \text{ cal mol}^{-1}\text{K}^{-1}$
 3. $24 \text{ cal mol}^{-1}\text{K}^{-1}$
 4. $28 \text{ cal mol}^{-1}\text{K}^{-1}$
74. For the process
- $$\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$$
1. Both ΔH and ΔS are +ve
 2. ΔH is -ve and ΔS is +ve
 3. ΔH is +ve and ΔS is -ve
 4. Both ΔH and ΔS are -ve
75. One mole of perfect gas expands isothermally to ten times its original volume. The change in entropy is
1. $0.1R$
 2. $2.303R$
 3. $10.0R$
 4. $100.0R$
76. The oxidation number of Cl in CaOCl_2 is
1. Zero
 2. -1
 3. +1
 4. -1 as well as +1
77. In the conversion, $\text{H}_2\text{SO}_4 \rightarrow \text{H}_2\text{S}_2\text{O}_8$ which process occurs?
1. Oxidation
 2. Reduction
 3. Oxidation as well as reduction
 4. Neither oxidation nor reduction
78. Which acts as reducing agent only?
1. SO_2
 2. H_2SO_4
 3. H_2S
 4. HNO_2
79. In the reaction, $2 \text{Cu}^+ \rightarrow \text{Cu} + \text{Cu}^{2+}$, the equivalent weight of Cu^+ is (M is the mol. wt. of Cu^+)
1. M
 2. $\frac{M}{2}$
 3. $\frac{M}{4}$
 4. $2M$
80. The oxidation number of S in $\text{Na}_2\text{S}_4\text{O}_6$ is
1. 2.5
 2. +2 and +3
 3. Zero and +5
 4. +1 and +4
81. For the reaction, $\text{MnO}_4^{2-} \rightarrow \text{MnO}_4^- + \text{MnO}_2$, How many moles of MnO_4^- and MnO_2 are obtained after the disproportionation of one mole of MnO_4^{2-} respectively?
1. $\frac{2}{3}$ and $\frac{1}{3}$
 2. $\frac{1}{3}$ and $\frac{2}{3}$
 3. $\frac{1}{2}$ and $\frac{1}{2}$
 4. 2 and 1
82. How many moles of $\text{K}_2\text{Cr}_2\text{O}_7$ are required to oxidise one mole of FeSO_4 in acidic medium?
1. 6
 2. $\frac{1}{2}$
 3. $\frac{1}{3}$
 4. $\frac{1}{6}$
83. KMnO_4 is strong oxidising agent in acidic medium. To provide acidic medium, H_2SO_4 is used instead of HCl. This is because
1. H_2SO_4 is stronger acid than HCl
 2. HCl is oxidised by KMnO_4 to Cl_2
 3. H_2SO_4 is dibasic acid
 4. Rate is faster in the presence of H_2SO_4

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84. The stoichiometric coefficient of S in the following reaction

$$\text{H}_2\text{S} + \text{HNO}_3 \rightarrow \text{NO} + \text{S} + \text{H}_2\text{O}$$
 is balanced (In acidic medium)
 1. 1 2. 2
 3. 3 4. 4
85. Equal volumes of 1M each of KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ are used to oxidise Fe(II) solution in acidic medium. The amount of Fe oxidised will be
 1. More with KMnO_4
 2. More with $\text{K}_2\text{Cr}_2\text{O}_7$
 3. Equal with both oxidising agent
 4. Cannot be determined
86. The oxidation number of Pt in $[\text{Pt}(\text{C}_2\text{H}_4)\text{Cl}_3]^-$ is:
 1. +1 2. +2
 3. +3 4. +4
87. Oxidation state of nitrogen is incorrectly given for:
- | Compound | Oxidation State |
|---|-----------------|
| 1. $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ | -3 |
| 2. NH_2OH | -1 |
| 3. $(\text{N}_2\text{H}_5)_2\text{SO}_4$ | +2 |
| 4. Mg_3N_2 | -3 |
88. A, B and C are three elements forming a part of compound in oxidation states of +2, +5 and -2 respectively. What could be the compounds?
 1. $\text{A}_2(\text{BC})_2$ 2. $\text{A}_2(\text{BC}_4)_3$
 3. $\text{A}_3(\text{BC}_4)_2$ 4. ABC
89. Consider the following reaction :

$$x\text{MnO}_4^- + y\text{C}_2\text{O}_4^{2-} + z\text{H}^+ \longrightarrow x\text{Mn}^{2+} + 2y\text{CO}_2 + \frac{z}{2}\text{H}_2\text{O}$$
 The values of x, y and z in the reaction are respectively :
 1. 2, 5 and 16 2. 5, 2 and 8
 3. 5, 2 and 16 4. 2, 5 and 8
90. The difference in the oxidation number of the two types of sulphur atoms in $\text{Na}_2\text{S}_4\text{O}_6$ is :
 1. 4 2. 5
 3. 6 4. 7
91. Pneumatophores help in
 1. Photosynthesis 2. Food storage
 3. Respiration 4. Reproduction
92. The stem of Maize and Sugercane has support roots coming out of the lower nodes of stem. They are called :
 1. Stilt roots 2. Prop roots
 3. Pneumatophores 4. Adventitious roots
93. In *Opuntia*, the spines are modification of:
 1. Stems 2. Leaves
 3. Roots 4. None of the above
94. Flat green photosynthetic stem is :
 1. Phylloclade 2. Petiole
 3. Stipule 4. Pedicel
95. Whorled phyllotaxy with simple reticulate leaves occurs in:
 1. Alstonia 2. Gauva
 3. Calotropis 4. Mustard
96. Petiole part of the leaf is also known as:
 1. Epipodium 2. Mesopodium
 3. Hypopodium 4. None of the above
97. Axis of the inflorescence is called
 1. Peduncle 2. Thalamus
 3. Petiole 4. Pedicel
98. Edible part of Cauliflower is:
 1. Bud 2. Bract
 3. Inflorescence 4. Leaves
99. Inflorescence is collection of:
 1. Petals 2. Stamens
 3. Flowers 4. Carpels
100. Individual components of perianth are called:
 1. Sepals 2. Petals
 3. Tepals 4. Bracts
101. Arrangement of ovules on the placentae developed from central axis of ovary is:
 1. Parietal placentation
 2. Basal placentation
 3. Marginal placentation
 4. Axile placentation

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102. Aestivation found in Pea flowers is:

1. Twisted
2. Valvate
3. Imbricate
4. Vexillary

103. Placentation in Tomato and Lemon is:

1. Parietal
2. Marginal
3. Free central
4. Axile

104. Thalamus grows to enclose ovary and other parts arise above the ovary in condition:

1. Hypogynous
2. Perigynous
3. Epigynous
4. None of these

105. Coir is obtained from:

1. Fruit of *Cocos nucifera*
2. Seed of *Cocos nucifera*
3. Stem of *Cocos nucifera*
4. Leaves of *Cocos nucifera*

106. Cotyledons and testa are respectively edible in:

1. Walnut and Tamarind
2. French Bean and Coconut
3. Cashew Nut and Litchi
4. Groundnut and Pomegranate

107. Pericarp develops from :

1. Ovary wall
2. Inner integument
3. Outer integument
4. Placenta

108. Drupe occurs in :

1. Pea
2. Mango
3. Tomato
4. Wheat

109. Placenta and pericarp are both edible in:

1. Banana
2. Tomato
3. Potato
4. Apple

110. In floral formula, (K) denotes

1. Polysepalous
2. Gamossepalous
3. Polypetalous
4. Gamopetalous

111. Bicarpellary syncarpous ovary with axile placentation is found in :

1. Solanaceae
2. Asteraceae
3. Malvaceae
4. Caesalpiniaceae

112. Which family is characteristic representative of monocotyledonous plants ?

1. Liliaceae
2. Solanaceae
3. Fabaceae
4. Brassicaceae

113. Plants which provides pulses belong to family:

1. Asteraceae
2. Fabaceae
3. Poaceae
4. Solanaceae

114. Zygomorphic flower with vexillary aestivation, diadelphous androecium and marginal placentation occurs in:

1. *Pisum*
2. *Aloe*
3. Brinjal
4. *Belladonna*

115. Separate xylem and phloem bundles are known as:

1. Radial
2. Amphivasal
3. Collateral
4. Bicollateral

116. Common features in vessel elements and sieve tube elements is:

1. Eucleate condition
2. Presence of P-protein
3. Thick secondary wall
4. Pores on lateral walls

117. Bicollateral conjoint vascular bundles possess:

1. Xylem and phloem on alternate radii
2. Phloem surrounds xylem
3. Xylem surrounds phloem
4. Xylem and phloem on same radius with two groups of phloem, on the two sides of xylem

118. Which pair has lignin in both:

1. Tracheid and collenchyma
2. Sclerenchyma and sieve tube
3. Sclerenchyma and tracheids
4. Parenchyma and endodermis

119. Which one consists of living cells :

1. Vessels
2. Tracheids
3. Companion cells
4. Sclerenchyma

120. Transport of food material in higher plants takes place through :

1. Companion cells
2. Sieve tube
3. Tracheids
4. Transfusion tissue

121. The composition of stele is:

1. Pith, vascular bundles
2. Endodermis, pericycle, pith
3. Endodermis, pericycle
4. Pericycle, pith, cortex

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- 122. Closed vascular bundles lack :**
 1. Ground tissue 2. Conjunction tissue
 3. Cambium 4. Pith
- 123. Long plants are able to stand erect due to presence of :**
 1. Sclerenchyma 2. Collenchyma
 3. Parenchyma 4. Prosenchyma
- 124. Epidermis is produced from:**
 1. Ground meristem 2. Phellogen
 3. Procambium 4. Protoderm
- 125. The arrangement of vascular tissue in hadrocentric vascular bundle is _____**
 1. Concentric 2. Radial
 3. Collateral 4. Bicollateral
- 126. Colleateral open vascular bundles and eustele occur in:**
 1. Monocot stem 2. Dicot stem
 3. Monocot root 4. Dicot root
- 127. Radial conduction of water occurs by:**
 1. Phloem 2. Vessels and tracheids
 3. Vessels 4. Medullary rays
- 128. A common character of monocot and dicot roots is:**
 1. Exarch protoxylem
 2. Endarch xylem
 3. Number of xylem strands
 4. Occurrence of secondary growth
- 129. Secondary cortex is:**
 1. Phellogen 2. Phellem
 3. Phelloderm 4. Bark
- 130. Lenticles are involved in:**
 1. Photosynthesis
 2. Transpiration
 3. Gaseous exchange
 4. Food transport
- 131. Cork cambium of dicot stem originates from:**
 1. cortex
 2. Endodermis
 3. Parenchyma cells of medullary rays
 4. Parenchyma cells of pericycle
- 132. Identify the tissue not formed during secondary growth in plants:**
 1. Phellogen 2. Wood
 3. Phellem 4. Pericycle
- 133. When one wood is lighter in colour with lower density, the other wood is darker with higher density. They are :**
 1. Springwood and autumn-wood
 2. Heartwood and late wood
 3. Springwood and early wood
 4. Autumn wood and springwood
- 134. Read a to d and tell the correct order of components from outer side to inner side in a woody dicot stem**
(a) Secondary cortex
(b) Wood
(c) Secondary phloem
(d) Phellem
 1. (c), (d), (b), (a) 2. (a), (b), (d), (c)
 3. (d), (a), (c), (b) 4. (d), (c), (a), (b)
- 135. The girth of the stem increases due to activity of:**
 1. Apical meristems
 2. Intercalary meristems
 3. Lateral meristems
 4. Parenchyma cells
- 136. Triploblastic organization, bilateral symmetry but lack of coelom will be seen in: [Page 51]**
 1. *Planaria* 2. *Pheretima*
 3. *Periplaneta* 4. *Pinctada*
- 137. All the following are feature of non chordates except: [Page 55]**
 1. A dorsal heart, if present
 2. Ventral, solid and double central nervous system
 3. Absence of gill slits
 4. Post anal tail
- 138. Identify the incorrectly matched pair: [Pages 51, 52, 53, 54]**
- | Phylum | Characteristic |
|---------------|---------------------------|
| 1. Porifera | Water vascular system |
| 2. Ctenophora | Bioluminescence |
| 3. Molluska | Radula |
| 4. Annelida | Closed circulatory system |

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- 139. Cyclostomes:** [Page 56]
- are fresh water organisms that move to marine water for spawning
 - have an open circulatory system
 - have a sucking and circular mouth without jaws
 - do not have scales on body and paired fins

- 140. Identify the number of animals that do not have homiothermy from the list given in the box below:** [Pages 56, 57, 58, 59, 60]

Aptenodytes, Hemidactylus, Pteropus, Icthyophis, Pterophyllum, Carcharodon, Neophron, Myxine

- 3
- 4
- 5
- 6

- 141. The animals belonging to all the following groups are exclusively marine except:** [Pages 49, 51, 54, 55]

- Ctenophora
- Porifera
- Protochordata
- Echnodermata

- 142. All the following would be characteristics of a general reptile except:** [Page 58]

- Dermal scales or scutes
- Poikilothermy
- Direct development
- Heart usually three chambered

- 143. The type of connective tissue present in the skin is:** [Page 103]

- Dense regular
- Dense irregular
- Loose
- Specialized

- 144. Communication junctions at some fusion points of the plasma membranes of the adjacent cells will be seen in:** [Page 105]

- Skeletal muscle
- Smooth muscle
- Cardiac muscle
- Epitheliomuscular cells

- 145. Identify the correctly matched pair:** [Page 101]

	Type of epithelium	Location
1.	Simple cuboidal brush bordered	Intestine
2.	Simple columnar brush bordered	Proximal convoluted tubule
3.	Ciliated	Fallopian tube
4.	Stratified squamous	Walls of blood vessels

- 146. In *Periplaneta americana*, which of the following mouth parts functions as a lower lip?** [Page 112]

- Labrum
- Mandible
- Maxillae
- Labium

- 147. Identify the incorrect matched pair with respect to anatomy of cockroach:**

[Page 113, 114]

1.	Hepatic caecae	Junction of midgut and hindgut
2.	Openings of the tracheal system	10 pairs of spiracles
3.	Lining of Malpighian tubules	Glandular and ciliated epithelium
4.	Ommatidia	Consists of about 2000 compound eyes

- 148. To reach the adult form, the nymph of cockroach grows by moulting about:**

[Page 115]

- 7 times
- 10 times
- 13 times
- 17 times

- 149. Glucosamine and N-acetyl galactosamine are building blocks of:** [Page 149]

- Agar
- Lecithin
- Collagen
- Chitin

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150. A protein with 100 amino acids will have:
[Page 150 and common sense]

1. 99 peptide bonds with the first amino acid at the N-terminus and the last at C-terminus
2. 99 peptide bonds with the first amino acid at the C-terminus and the last at N-terminus
3. 100 peptide bonds with the first amino acid at the N-terminus and the last at C-terminus
4. 100 peptide bonds with the first amino acid at the C-terminus and the last at N-terminus

151. The DNA of the bacteriophage Phi X 174 [it has single stranded DNA] is found to have G-C content as 44%. What would be the expected percentage of AT content in this phage DNA? [Done in class and common sense]

1. 28
2. 44
3. 56
4. Cannot be predicted

152. The pitch of the B DNA is: [Page 152]

1. 34 Angstroms
2. 34 nm
3. 3.4 Angstroms
4. 0.34 nm

153. The number of high energy bonds in an ATP molecule is/are: [Done in class]

1. 1
2. 2
3. 3
4. 4

154. What would be the correct representation of a general enzyme catalyzed reaction?

[Page 156]

1. $E + S \rightleftharpoons ES \rightleftharpoons EP \rightarrow E + P$
2. $E + S \rightleftharpoons ES \rightleftharpoons EP \rightleftharpoons E + P$
3. $E + S \rightarrow ES \rightleftharpoons EP \rightarrow E + P$
4. $E + S \rightleftharpoons ES \rightarrow EP \rightarrow E + P$

155. Inhibition of succinic dehydrogenase by malonate is an example of: [Page 158]

1. competitive enzyme inhibition
2. non competitive enzyme inhibition
3. allosteric feedback inhibition
4. uncompetitive enzyme inhibition

156. Enzymes which catalyze joining of C-O, C-S, C-N and P-O bonds are called: [Page 159]

1. Transferases
2. Hydrolases
3. Lyases
4. Ligases

157. A co-factor for the proteolytic enzyme carboxypeptidase is: [Page 159]

1. Haem
2. NAD
3. Riboflavin
4. Zinc

158. In a typical plant cell, during the S phase of the cell cycle: [Page 163]

- I. DNA synthesis takes place
- II. Replication of centrioles takes place

1. Only I is correct
2. Only II is correct
3. Both I and II are correct
4. Both I and II are incorrect

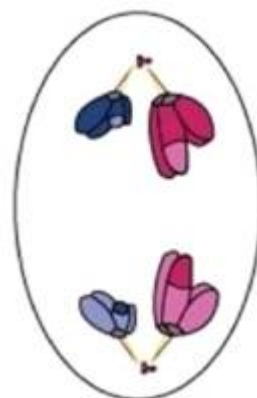
159. Cells in the quiescent stage of the cell cycle are: [Page 164]

1. metabolically inert and do not proliferate
2. metabolically inert and can proliferate if called on to do so
3. metabolically active and continue to proliferate at a very slow rate
4. metabolically active and do not proliferate

160. According to the NCERT, spindle fibers attach to the kinetochores of chromosomes during mitotic: [Page 165]

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase

161. The stage of cell division shown in the given figure is: [Page 169]



1. Mitotic anaphase
2. Mitotic metaphase
3. Anaphase I
4. Metaphase I

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- 162. Regarding diplotene of prophase I of meiosis I:** [Page 168]
- I. There is dissolution of the synaptonemal complex
 - II. There is tendency of the homologues to remain together except at the sites of crossovers
 - III. It can last for months and years in oocytes of some vertebrates
1. Only I and II are correct
 2. Only I and III are correct
 3. Only II and III are correct
 4. I, II and III are correct
- 163. In plant cells, during mitosis, organelles like mitochondria and plastids get distributed between the two daughter cells at the time of:** [Page 166]
1. Early anaphase
 2. Late anaphase
 3. Telophase
 4. Cytoplasmic division
- 164. During meiosis, splitting of the centromere takes place during:** [Page 169]
1. Anaphase I
 2. Anaphase II
 3. Metaphase I
 4. Metaphase II
- 165. Crossing over during pachytene can be most accurately described as:** [Page 168]
1. exchange of segments between non-sister chromatids of homologous chromosomes and is an enzyme mediated process
 2. exchange of segments between sister chromatids of homologous chromosomes and is not an enzyme mediated process
 3. exchange of segments between non-sister chromatids of heterologous chromosomes and is not an enzyme mediated process
 4. exchange of segments between sister chromatids of heterologous chromosomes and is an enzyme mediated process
- 166. The layer in the wall of alimentary canal lined by thin mesothelium [epithelium of visceral organs] is known as the:** [Page 259]
1. Mucosa
 2. Submucosa
 3. Muscularis
 4. Serosa
- 167. In the wall of the alimentary canal, an oblique layer:** [Page 259, Done in class]
1. is the outermost layer in the muscularis of stomach
 2. is the innermost layer in the muscularis of stomach
 3. is the outermost layer in the muscularis of duodenum
 4. is the innermost layer in the muscularis of duodenum
- 168. The structural and functional unit of human liver is:** [Page 260]
1. Porta hepatis
 2. Hepatic lobe
 3. Glisson's capsule
 4. Hepatic lobule
- 169. Vitamin B₁₂ will not be properly absorbed in the intestine if there is inadequate secretion from which of the following cells in the gastric mucosa?** [Page 262]
1. Chief cells
 2. Enterochromaffin like cells
 3. Parietal cells
 4. Mucus neck cells
- 170. Lipases can be activated by:** [Page 262]
1. Bile
 2. Cholecystokinin
 3. Secretin
 4. Gastric inhibitory peptide
- 171. Bile pigments help in:** [Page 262]
1. Emulsification of fats
 2. Absorption of fatty acids and glycerol in the intestinal epithelium
 3. Hydrolysis of fats
 4. Nothing
- 172. All the following glands in the alimentary canal are located in the mucosa except:** [Page 262]
1. Goblet cells
 2. Brunner's glands
 3. Crypts of Lieberkuhn
 4. Deep tubular glands
- 173. Sphincter of Oddi guards the opening of:** [Page 261]
1. Esophagus into stomach
 2. Stomach into duodenum
 3. Common hepato-pancreatic duct into duodenum
 4. Small intestine into large intestine

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174. Normally, the muscularis layer of the wall of alimentary canal has: [Page 260]

1. Two layers of circular muscles and one of longitudinal muscles
2. Two layers of longitudinal muscles and one of circular muscles
3. An outer layer of circular muscles and an inner layer of longitudinal muscles
4. An outer layer of longitudinal muscles and an inner layer of circular muscles

175. Final step of hydrolysis of nucleic acids in the human alimentary canal is carried out by:

[Page 263]

1. Nuclease
2. Nucleotidase
3. Nucleosidase
4. DNase

176. Chylomicrons are: [Page 265]

1. Fat coated protein globules
2. Protein coated fat globules
3. Carbohydrate coated protein globules
4. Carbohydrate coated fat globules

177. Hormonal control of secretion of digestive juices is carried out by: [Page 264]

1. local hormones
2. hypothalamic releasing and inhibitory hormones
3. anterior pituitary
4. pancreatic islets of Langerhans

178. The lymph vessels ultimately release the absorbed fats into the: [Page 265, Done in class]

1. Liver
2. A vein
3. An artery
4. Interstitial fluid

179. A sphincter is present at all the following locations except: [Page 267]

1. Lower end of esophagus
2. Opening of stomach into duodenum
3. Opening of Common hepato-pancreatic duct
4. Junction of ileum and caecum

180. Defecation is a/an: [Page 265]

1. voluntary process caused by a neural reflex
2. involuntary process carried out by haustral movements
3. voluntary process carried out by a mass peristaltic movement
4. involuntary process brought about by localized hormonal reflexes

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Answer (HFT-3)

1. 2	2. 3	3. 2	4. 1	5. 1
6. 4	7. 2	8. 3	9. 1	10. 1
11. 4	12. 4	13. 4	14. 3	15. 4
16. 2	17. 3	18. 4	19. 4	20. 4
21. 3	22. 3	23. 3	24. 3	25. 2
26. 1	27. 3	28. 2	29. 3	30. 2
31. 4	32. 2	33. 3	34. 2	35. 4
36. 3	37. 3	38. 2	39. 3	40. 1
41. 3	42. 1	43. 4	44. 2	45. 4
46. <u>3</u>	47. 4	48. <u>3</u>	49. <u>3</u>	50. <u>2</u>
51. <u>2</u>	52. <u>4</u>	53. <u>4</u>	54. <u>3</u>	55. <u>1</u>
56. <u>3</u>	57. <u>4</u>	58. <u>1</u>	59. <u>4</u>	60. <u>3</u>
61. <u>2</u>	62. <u>3</u>	63. <u>3</u>	64. <u>3</u>	65. <u>3</u>
66. <u>1</u>	67. <u>4</u>	68. <u>4</u>	69. <u>1</u>	70. <u>2</u>
71. <u>2</u>	72. <u>4</u>	73. <u>2</u>	74. <u>4</u>	75. <u>2</u>
76. <u>4</u>	77. <u>1</u>	78. <u>3</u>	79. <u>4</u>	80. <u>3</u>
81. <u>1</u>	82. <u>4</u>	83. <u>2</u>	84. <u>3</u>	85. <u>2</u>
86. <u>2</u>	87. <u>3</u>	88. <u>3</u>	89. <u>1</u>	90. <u>2</u>
91. <u>3</u>	92. <u>1</u>	93. <u>2</u>	94. <u>1</u>	95. <u>1</u>
96. <u>2</u>	97. <u>1</u>	98. <u>3</u>	99. <u>3</u>	100. <u>3</u>
101. <u>4</u>	102. <u>4</u>	103. <u>4</u>	104. <u>3</u>	105. <u>1</u>
106. <u>4</u>	107. <u>1</u>	108. <u>2</u>	109. <u>2</u>	110. <u>2</u>
111. <u>1</u>	112. <u>1</u>	113. <u>2</u>	114. <u>1</u>	115. <u>1</u>
116. <u>1</u>	117. <u>4</u>	118. <u>3</u>	119. <u>3</u>	120. <u>2</u>
121. <u>1</u>	122. <u>3</u>	123. <u>1</u>	124. <u>4</u>	125. <u>1</u>
126. <u>2</u>	127. <u>4</u>	128. <u>1</u>	129. <u>3</u>	130. <u>3</u>
131. <u>1</u>	132. <u>4</u>	133. <u>1</u>	134. <u>3</u>	135. <u>3</u>
136. <u>1</u>	137. <u>4</u>	138. <u>1</u>	139. <u>3</u>	140. <u>3</u>
141. <u>2</u>	142. <u>1</u>	143. <u>2</u>	144. <u>3</u>	145. 3
146. <u>4</u>	147. 4	148. <u>3</u>	149. <u>4</u>	150. <u>1</u>
151. <u>3</u>	152. <u>1</u>	153. <u>2</u>	154. <u>4</u>	155. <u>1</u>
156. <u>4</u>	157. <u>4</u>	158. <u>1</u>	159. <u>4</u>	160. <u>2</u>
161. <u>3</u>	162. <u>2</u>	163. <u>4</u>	164. <u>2</u>	165. <u>1</u>
166. <u>4</u>	167. <u>2</u>	168. <u>4</u>	169. <u>3</u>	170. <u>1</u>
171. <u>4</u>	172. <u>2</u>	173. <u>3</u>	174. <u>4</u>	175. <u>3</u>
176. <u>2</u>	177. <u>1</u>	178. 2	179. 4	180. <u>3</u>