



MH-CET-2014

Subjects : Physics, Chemistry & Biology

Question Booklet Version	MH-CET-2014 Roll No.	Question Booklet Sr. No.								
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Day and Date : Thursday, 08th May, 2014

Duration: 3.00 hours
Total Marks : 720

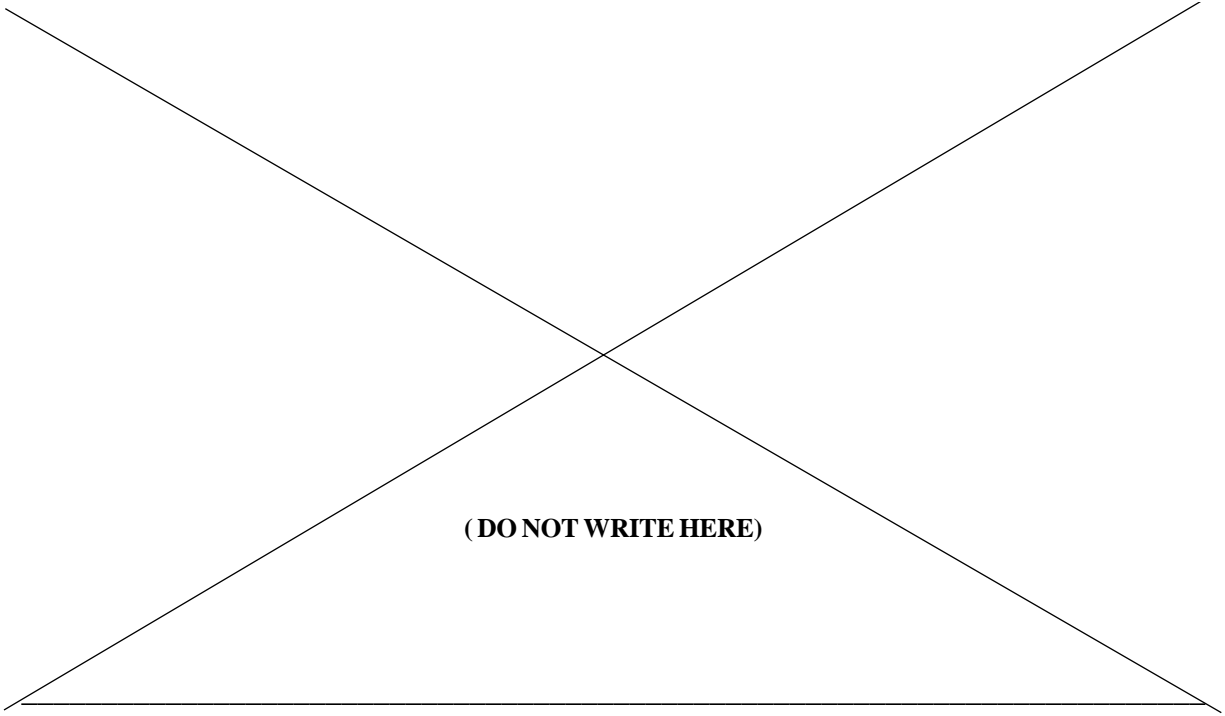
This is to certify that, the entries of MH-CET Roll No. and Answer Sheet No. have been correctly written and verified.

Candidate's Signature

Invigilator's Signature

Instructions to Candidates

1. This question booklet contains 180 Objective Type Questions in the subjects of Physics (45), Chemistry (45) and Biology (90).
2. The question paper and OMR (Optical Mark Reader) Answer Sheet is issued separately at the start of the examination.
3. Choice and sequence for attempting questions will be as per the convenience of the candidate.
4. Candidate should carefully read the instructions printed on the Question Booklet and Answer Sheet and make the correct entries on the Answer Sheet. As Answer Sheets are designed to suit the OPTICAL MARK READER (OMR) SYSTEM, special care should be taken to mark the entries correctly. Special care should be taken to fill QUESTION BOOKLET VERSION, SERIAL No. and MH-CET Roll No. accurately. The correctness of entries has to be cross-checked by the invigilators. **The candidate must sign on the Answer Sheet and Question Booklet.**
5. Read each question carefully.
6. Select the correct answer from the four available options given for each question.
7. Mark the appropriate circle completely like this ●, for answering a particular question. Mark with Black ink ball point pen only.
8. **Each question with correct response shall be awarded four (4) marks. There shall be negative marking. For wrong answers there will be deduction of one mark per question. One mark shall be deducted for marking two or more answers of same question, scratching or overwriting.**
9. **Use of whitener or any other material to erase/hide the circle once filled is not permitted.**
10. Avoid overwriting and/or striking of answers once marked.
11. Rough work should be done only on the blank space provided on the Question Booklet. **Rough work should not be done on the Answer Sheet.**
12. The required Log-Antilog table will be provided along with the Question Booklet.
13. Immediately after the prescribed examination time is over, the Question Booklet and Answer sheet is to be returned to the Invigilator. Confirm that both the Candidate and Invigilator have signed on question booklet and answer sheet.
14. No candidate is allowed to leave the examination hall till the end of examination.
15. No marks will be deducted if a particular question is not attempted.



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SPACE FOR ROUGH WORK



PHYSICS

1. In cyclotron, for a given magnet, radius of the semicircle traced by positive ion is directly proportional to

(v = velocity of positive ion)

- A) v^{-2} B) v^{-1} C) v D) v^2

2. A particle at rest is moved along a straight line by a machine giving constant power. The distance moved by the particle in time 't' is proportional to

- A) $t^{1/2}$ B) $t^{2/3}$ C) t D) $t^{3/2}$

3. In insulators (C.B. is conduction band and V.B. is valence band)

- A) V.B. is partially filled with electrons
B) C.B. is partially filled with electrons
C) C.B. is empty and V.B. is filled with electrons
D) C.B. is filled with electrons and V.B. is empty

4. An object of radius 'R' and mass 'M' is rolling horizontally without slipping with speed 'V'.

It then rolls up the hill to a maximum height $h = \frac{3v^2}{4g}$. The moment of inertia of the object

is (g = acceleration due to gravity)

- A) $\frac{2}{5} MR^2$ B) $\frac{MR^2}{2}$ C) MR^2 D) $\frac{3}{2} MR^2$

5. In Wheatstone's bridge, three resistors P, Q, R are connected in three arms in order and 4th arm s is formed by two resistors s_1 and s_2 connected in parallel. The condition for bridge to

be balanced is $\frac{P}{Q} =$

- A) $\frac{R(s_1 + s_2)}{s_1 s_2}$ B) $\frac{s_1 s_2}{R(s_1 + s_2)}$ C) $\frac{R s_1 s_2}{(s_1 + s_2)}$ D) $\frac{(s_1 + s_2)}{R s_1 s_2}$

SPACE FOR ROUGH WORK



6. In common base circuit of a transistor, current amplification factor is 0.95. Calculate the emitter current if base current is 0.2 mA
 A) 2 mA B) 4 mA C) 6 mA D) 8 mA
7. The ratio of magnetic dipole moment of an electron of charge 'e' and mass 'm' in Bohr's orbit in hydrogen atom to its angular momentum is
 A) $\frac{e}{m}$ B) $\frac{m}{e}$ C) $\frac{2m}{e}$ D) $\frac{e}{2m}$
8. Gases exert pressure on the walls of the container because the gas molecules
 A) have finite volume B) obey Boyle's law
 C) possess momentum D) collide with one another
9. Two coherent sources of intensity ratio ' α ' interfere. In interference pattern $\frac{I_{\max} - I_{\min}}{I_{\max} + I_{\min}} =$
 A) $\frac{2\alpha}{1 + \alpha}$ B) $\frac{2\sqrt{\alpha}}{1 + \alpha}$ C) $\frac{2\alpha}{1 + \sqrt{\alpha}}$ D) $\frac{1 + \alpha}{2\alpha}$
10. Light of wavelength λ_A and λ_B falls on two identical metal plates A and B respectively. The maximum kinetic energy of photoelectrons in K_A and K_B respectively, then which one of the following relations is true ? ($\lambda_A = 2\lambda_B$)
 A) $K_A < \frac{K_B}{2}$ B) $2K_A = K_B$ C) $K_A = 2K_B$ D) $K_A > 2K_B$
11. If an electron in hydrogen atom jumps from an orbit of level $n = 3$ to an orbit of level $n = 2$, emitted radiation has a frequency (R = Rydberg's constant, C = velocity of light)
 A) $\frac{3RC}{27}$ B) $\frac{RC}{25}$ C) $\frac{8RC}{9}$ D) $\frac{5RC}{36}$
12. In electromagnetic wave, according to Maxwell, changing electric field gives
 A) stationary magnetic field B) conduction current
 C) eddy current D) displacement current

SPACE FOR ROUGH WORK



13. The de-Broglie wavelength of an electron in 4th orbit is (r = radius of 1st orbit)
A) $2\pi r$ B) $4\pi r$ C) $8\pi r$ D) $16\pi r$
14. A string of length ' L ' and force constant ' K ' is stretched to obtain extension ' l '. It is further stretched to obtain extension ' l_1 '. The work done in second stretching is
A) $\frac{1}{2} K l_1 (2l + l_1)$ B) $\frac{1}{2} K l_1^2$ C) $\frac{1}{2} K (l^2 + l_1^2)$ D) $\frac{1}{2} K (l_1^2 - l^2)$
15. The equiconvex lens has focal length ' f '. If it is cut perpendicular to the principal axis passing through optical centre, then focal length of each half is
A) $f/2$ B) f C) $3f/2$ D) $2f$
16. If ' N ' is the number of turns in a circular coil then the value of self inductance varies as
A) N^0 B) N C) N^2 D) N^{-2}
17. Surface density of charge on a sphere of radius ' R ' in terms of electric intensity ' E ' at a distance ' r ' in free space is
(ϵ_0 = permittivity of free space)
A) $\epsilon_0 E \left(\frac{R}{r} \right)^2$ B) $\frac{\epsilon_0 ER}{r^2}$ C) $\epsilon_0 E \left(\frac{r}{R} \right)^2$ D) $\frac{\epsilon_0 Er}{R^2}$
18. A body at rest starts sliding from top of a smooth inclined plane and requires 4 second to reach bottom. How much time does it take, starting from rest at top, to cover one-fourth of a distance ?
A) 1 second B) 2 second C) 3 second D) 4 second
19. In vacuum, to travel distance ' d ', light takes time ' t ' and in medium to travel distance ' $5d$ ', it takes time ' T '. The critical angle of the medium is
A) $\sin^{-1} \left(\frac{5T}{t} \right)$ B) $\sin^{-1} \left(\frac{5t}{3T} \right)$ C) $\sin^{-1} \left(\frac{5t}{T} \right)$ D) $\sin^{-1} \left(\frac{3t}{5T} \right)$

SPACE FOR ROUGH WORK



20. In electromagnetic spectrum, the frequencies of γ -rays, X-rays and ultraviolet rays are denoted by n_1 , n_2 and n_3 respectively then
 A) $n_1 > n_2 > n_3$ B) $n_1 < n_2 < n_3$ C) $n_1 > n_2 < n_3$ D) $n_1 < n_2 > n_3$
21. In LCR series circuit, an alternating e.m.f. 'e' and current 'i' are given by the equations
 $e = 100 \sin(100t)$ volt,
 $i = 100 \sin\left(100t + \frac{\pi}{3}\right)$ mA.
 The average power dissipated in the circuit will be
 A) 100 W B) 10 W C) 5 W D) 2.5 W
22. A block resting on the horizontal surface executes S.H.M. in horizontal plane with amplitude 'A'. The frequency of oscillation for which the block just starts to slip is (μ = coefficient of friction, g = gravitational acceleration)
 A) $\frac{1}{2\pi} \sqrt{\frac{\mu g}{A}}$ B) $\frac{1}{4\pi} \sqrt{\frac{\mu g}{A}}$ C) $2\pi \sqrt{\frac{A}{\mu g}}$ D) $4\pi \sqrt{\frac{A}{\mu g}}$
23. A plane sound wave travelling with velocity 'v' in a medium A reaches a point on the interface of medium A and medium B. If velocity of sound in medium B is $2v$, the angle of incidence for total internal reflection of the wave will be greater than ($\sin 30^\circ = 0.5$ and $\sin 90^\circ = 1$)
 A) 15° B) 30° C) 45° D) 90°
24. A gas is compressed isothermally. The r.m.s. velocity of its molecules
 A) increases B) decreases
 C) first increases and then decreases D) remains the same
25. Two concentric spheres kept in air have radii 'R' and 'r'. They have similar charge and equal surface charge density ' σ '. The electric potential at their common centre is (ϵ_0 = permittivity of free space)
 A) $\frac{\sigma(R+r)}{\epsilon_0}$ B) $\frac{\sigma(R-r)}{\epsilon_0}$ C) $\frac{\sigma(R+r)}{2\epsilon_0}$ D) $\frac{\sigma(R+r)}{4\epsilon_0}$

SPACE FOR ROUGH WORK



26. The velocity of water in river is 9 km/hr of the upper surface. The river is 10 m deep. If the coefficient of viscosity of water is 10^{-2} poise then the shearing stress between horizontal layers of water is

A) $0.25 \times 10^{-2} \text{ N/m}^2$

B) $0.25 \times 10^{-3} \text{ N/m}^2$

C) $0.5 \times 10^{-3} \text{ N/m}^2$

D) $0.75 \times 10^{-3} \text{ N/m}^2$

27. A sphere 'P' of mass 'm' moving with velocity 'u' collides head-on with another sphere 'Q' of mass 'm' which is at rest. The ratio of final velocity of 'Q' to initial velocity of 'P' is (e = coefficient of restitution)

A) $\frac{e-1}{2}$

B) $\left[\frac{e+1}{2}\right]^{1/2}$

C) $\frac{e+1}{2}$

D) $\left[\frac{e+1}{2}\right]^2$

28. Magnetic induction produced at the centre of a circular loop carrying current is 'B'. The magnetic moment of the loop of radius 'R' is

(μ_0 = permeability of free space)

A) $\frac{BR^3}{2\pi\mu_0}$

B) $\frac{2\pi BR^3}{\mu_0}$

C) $\frac{BR^2}{2\pi\mu_0}$

D) $\frac{2\pi BR^2}{\mu_0}$

29. In air, a charged soap bubble of radius 'r' is in equilibrium having outside and inside pressures being equal. The charge on the drop is (ϵ_0 = permittivity of free space, T = surface tension of soap solution)

A) $4\pi r^2 \sqrt{\frac{2T\epsilon_0}{r}}$

B) $4\pi r^2 \sqrt{\frac{4T\epsilon_0}{r}}$

C) $4\pi r^2 \sqrt{\frac{6T\epsilon_0}{r}}$

D) $4\pi r^2 \sqrt{\frac{8T\epsilon_0}{r}}$

SPACE FOR ROUGH WORK



30. A block is pushed momentarily on a horizontal surface with initial velocity 'v'. If ' μ ' is the coefficient of sliding friction between the block and surface, the block will come to rest after time ('g' = acceleration due to gravity)
- A) $\frac{v}{\mu g}$ B) $\frac{vg}{\mu}$ C) $\frac{v\mu}{g}$ D) $\frac{\mu g}{v}$
31. Two charges of equal magnitude 'q' are placed in air at a distance '2a' apart and third charge '-2q' is placed at midpoint. The potential energy of the system is (ϵ_0 = permittivity of free space)
- A) $-\frac{q^2}{8\pi\epsilon_0 a}$ B) $-\frac{3q^2}{8\pi\epsilon_0 a}$ C) $-\frac{5q^2}{8\pi\epsilon_0 a}$ D) $-\frac{7q^2}{8\pi\epsilon_0 a}$
32. An electron in potentiometer wire experiences a force 2.4×10^{-19} N. The length of potentiometer wire is 6m. The e.m.f. of the battery connected across the wire is (electronic charge = 1.6×10^{-19} C)
- A) 6 V B) 9 V C) 12 V D) 15 V
33. The dimensional formula for Reynold's number is
- A) $[L^0 M^0 T^0]$ B) $[L^1 M^1 T^1]$
 C) $[L^{-1} M^1 T^1]$ D) $[L^1 M^1 T^{-1}]$
34. Calculate angular velocity of earth so that acceleration due to gravity at 60° latitude becomes zero. (Radius of earth = 6400 km, gravitational acceleration at poles = $10 \frac{m}{s^2}$, $\cos 60^\circ = 0.5$)
- A) 7.8×10^{-2} rad/s B) 0.5×10^{-3} rad/s
 C) 1×10^{-3} rad/s D) 2.5×10^{-3} rad/s
35. A stationary object explodes into masses m_1 and m_2 . They move in opposite directions with velocities V_1 and V_2 . The ratio of kinetic energy E_1 to kinetic energy E_2 is
- A) $\frac{m_2}{m_1}$ B) $\frac{m_1}{m_2}$ C) $\frac{2m_2}{m_1}$ D) $\frac{2m_1}{m_2}$

SPACE FOR ROUGH WORK



36. The moment of inertia of a thin uniform rod rotating about the perpendicular axis passing through one end is 'I'. The same rod is bent into a ring and its moment of inertia about the diameter is 'I₁'. The ratio $\frac{I}{I_1}$ is
- A) $\frac{4\pi}{3}$ B) $\frac{8\pi^2}{3}$ C) $\frac{5\pi}{3}$ D) $\frac{8\pi^2}{5}$
37. Three identical spheres each of mass 1 kg are placed touching one another with their centres in a straight line. Their centres are marked as A, B, C respectively. The distance of centre of mass of the system from A is
- A) $\frac{AB + AC}{2}$ B) $\frac{AB + BC}{2}$ C) $\frac{AC - AB}{3}$ D) $\frac{AB + AC}{3}$
38. The relation between force 'F' and density 'd' is $F = \frac{x}{\sqrt{d}}$. The dimensions of x are
- A) $[L^{-1/2} M^{3/2} T^{-2}]$ B) $[L^{-1/2} M^{1/2} T^{-2}]$
C) $[L^{-1} M^{3/2} T^{-2}]$ D) $[L^{-1} M^{1/2} T^{-2}]$
39. When a wave travels in a medium, displacement of a particle is given by $y = a \sin 2\pi (bt - cx)$ where 'a', 'b', 'c' are constants. The maximum particle velocity will be twice the wave velocity if
- A) $b = ac$ B) $b = \frac{1}{ac}$ C) $c = \pi a$ D) $c = \frac{1}{\pi a}$
40. Electromagnets are made of soft iron because soft iron has
- A) high susceptibility and low retentivity
B) low susceptibility and high retentivity
C) low susceptibility and low retentivity
D) high susceptibility and high retentivity

SPACE FOR ROUGH WORK



41. The masses of three copper wires are in the ratio 1 : 3 : 5 and their lengths are in the ratio 5 : 3 : 1. The ratio of their resistance is
- A) 25 : 1 : 125 B) 1 : 125 : 25
 C) 125 : 1 : 25 D) 125 : 25 : 1
42. A body of mass 'm' is raised to a height '10 R' from the surface of earth, where 'R' is the radius of earth. The increase in potential energy is (G = universal constant of gravitation, M = mass of earth and g = acceleration due to gravity)
- A) $\frac{GMm}{11R}$ B) $\frac{GMm}{10R}$ C) $\frac{mgR}{11G}$ D) $\frac{10GMm}{11R}$
43. The angle θ between the vector $\vec{p} = \hat{i} + \hat{j} + \hat{k}$ and unit vector along x-axis is
- A) $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$ B) $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$ C) $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ D) $\cos^{-1}\left(\frac{1}{2}\right)$
44. A small metal ball of mass 'm' is dropped in a liquid contained in a vessel, attains a terminal velocity 'v'. If a metal ball of same material but of mass '8m' is dropped in same liquid then the terminal velocity will be
- A) V B) 2V C) 4V D) 8V
45. A wooden block of mass 8 kg slides down an inclined plane of inclination 30° to the horizontal with constant acceleration 0.4 m/s^2 . The force of friction between the block and inclined plane is ($g = 10 \text{ m/s}^2$)
- A) 12.2 N B) 24.4 N C) 36.8 N D) 48.8 N

SPACE FOR ROUGH WORK



CHEMISTRY

46. Which of the following complexes has lowest molar conductance ?
A) $\text{CoCl}_3 \cdot 3\text{NH}_3$ B) $\text{CoCl}_3 \cdot 4\text{NH}_3$
C) $\text{CoCl}_3 \cdot 5\text{NH}_3$ D) $\text{CoCl}_3 \cdot 6\text{NH}_3$
47. The volume of oxygen evolved at STP, by decomposition of 0.68 g '20 volume' hydrogen peroxide solution, is
A) 2.24 mL B) 22.4 mL C) 224 mL D) 2240 mL
48. What is the molality of a solution containing 200 mg of urea (molar mass 60 g mol^{-1}) dissolved in 40 g of water ?
A) 0.0825 B) 0.825 C) 0.498 D) 0.0013
49. Alkaline hydrolysis of which among the following compounds leads to the formation of a racemate ?
A) 1-Bromo-1-phenylethane B) 1-Chloro-3-methylbutane
C) Bromoethane D) 1-Chloropropane
50. The work done when two mole of an ideal gas is compressed from a volume of 5 m^3 to 1 dm^3 at 300 K, under a pressure of 100 kPa is
A) 499.9 kJ B) -499.9 kJ C) -99.5 kJ D) 42495 kJ
51. Which among the following group 16 elements exists in more than two allotropic states ?
A) Polonium B) Tellurium C) Selenium D) Oxygen
52. Solubility of which among the following substances in water increases slightly with rise in temperature ?
A) Potassium bromide B) Potassium chloride
C) Potassium nitrate D) Sodium nitrate

SPACE FOR ROUGH WORK



53. Assuming enthalpy of combustion of hydrogen at 273 K, -286 kJ and enthalpy of fusion of ice at the same temperature to be $+6.0$ kJ, calculate enthalpy change during formation of 100 g of ice
- A) $+1622$ kJ B) -1622 kJ C) $+292$ kJ D) -292 kJ
54. How is electrical conductance of a conductor related with length and area of cross section of the conductor ?
- A) $G = l \cdot a \cdot k^{-1}$ B) $G = k \cdot l \cdot a^{-1}$
C) $G = k \cdot a \cdot l^{-1}$ D) $G = k \cdot l \cdot a^{-2}$
55. What is the orbital angular momentum of an electron in 'f' orbital ?
- A) $\frac{1.5h}{\pi}$ B) $\frac{\sqrt{6}h}{\pi}$ C) $\frac{\sqrt{3}h}{\pi}$ D) $\frac{\sqrt{3}h}{2\pi}$
56. Which statement is NOT correct about fullerene C_{60} ?
- A) It contains 20 six membered rings and 12 five membered rings
B) All carbon atoms undergo SP^2 hybridization
C) A six membered ring is fused with six membered rings only
D) A five membered ring is fused with six membered ring only
57. The product of molar concentrations of hydrogen ions and hydroxide ions in a 0.01 M aqueous solution of sodium chloride is known as
- A) Hydrolysis constant of salt B) Dissociation constant of acid
C) Dissociation constant of base D) Ionic product of water

SPACE FOR ROUGH WORK



58. Select the coloured compound amongst the following :

(Atomic no. Ti = 22, Cr = 24, Cu = 29, Zn = 30)

- A) TiCl_4 B) CrCl_3 C) ZnCl_2 D) CuCl

59. Which among the following solids crystallises as a face centred cube ?

- A) Iron B) Rubidium C) Uranium D) Platinum

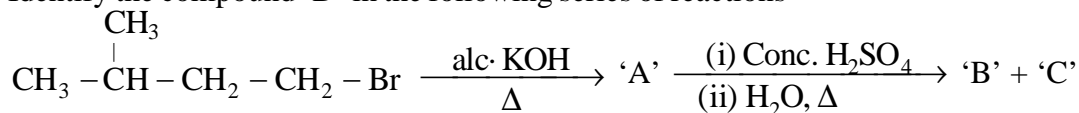
60. What is the pH of millimolar solution of ammonium hydroxide which is 20% dissociated ?

- A) 3.699 B) 10.301 C) 4.691 D) 9.301

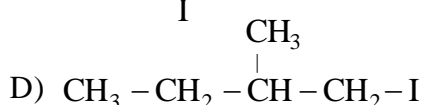
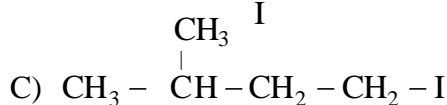
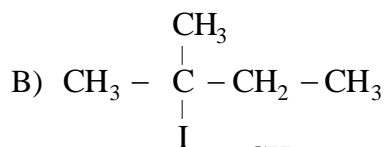
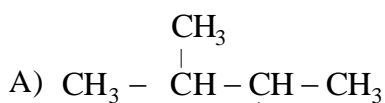
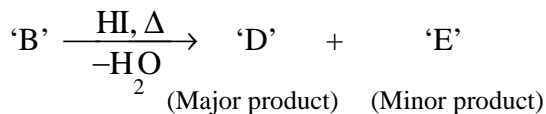
61. What is the geometry of molecule of bromine penta fluoride ?

- A) square planar B) trigonal bipyramidal
C) square pyramidal D) octahedral

62. Identify the compound 'D' in the following series of reactions



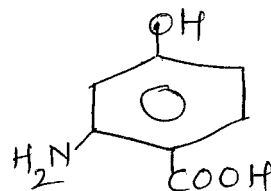
(Major product) (Minor product)



SPACE FOR ROUGH WORK



63. Write IUPAC name of following compound



- A) 2-Amino-4-hydroxybenzoic acid B) 6-Amino-4-hydroxybenzoic acid
 C) 3-Amino-4-carboxyphenol D) 2-Carboxy-5-hydroxyaniline
64. Which among the following metals is employed to provide cathodic protection to iron ?
 A) Zinc B) Nickel C) Tin D) Lead
65. Oxidation number of nitrogen in which among the oxides of nitrogen is the lowest ?
 A) Nitric oxide B) Nitrous oxide
 C) Nitrogen dioxide D) Nitrogen trioxide
66. Select the ether among following that yields methanol as one of the products on reaction with cold hydroiodic acid
 A) 1-Methoxybutane B) 1-Methoxy-2-methylpropane
 C) 2-Methoxy-2-methylpropane D) Methoxybenzene
67. Rate law for the reaction $A + B \rightarrow \text{product}$ is $\text{rate} = k [A]^2 [B]$. What is the rate constant, if rate of reaction at a given temperature is 0.22 Ms^{-1} , when $[A] = 1 \text{ M}$ and $[B] = 0.25 \text{ M}$.
 A) $3.52 \text{ M}^{-2} \text{ s}^{-1}$ B) $0.88 \text{ M}^{-2} \text{ s}^{-1}$
 C) $1.136 \text{ M}^{-2} \text{ s}^{-1}$ D) $0.05 \text{ M}^{-2} \text{ s}^{-1}$

SPACE FOR ROUGH WORK



68. Presence of nitrogen in which among the following compounds can NOT be detected by Lassaigne method ?

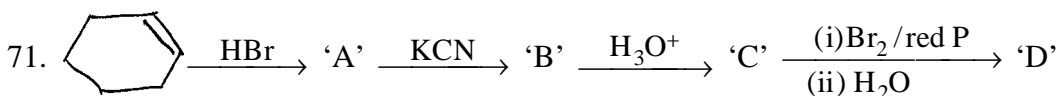
- A) Hydrazine B) Aniline C) p-Toluidine D) Picric acid

69. 20 ml solution of 0.1 M ferrous sulphate was completely oxidised using a suitable oxidising agent. What is the number of electrons exchanged ?

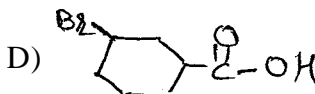
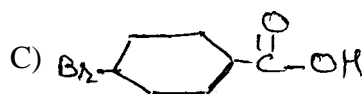
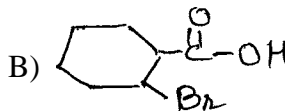
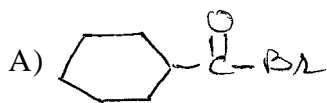
- A) 1.204×10^{22} B) 193 C) 1930 D) 1.204×10^{21}

70. Among the following select the alkane that is expected to have lowest boiling point

- A) Hexane B) 2-Methylpentane
C) 3-Methylpentane D) 2,2-Dimethylbutane



Identify the compound 'D' in above mentioned series of reactions.



72. Which among the following gases can be liquified easily ?

- A) Chlorine B) Nitrogen C) Oxygen D) Hydrogen

73. What is the mass of one molecule of yellow phosphorus ? (Atomic mass, P = 30)

- A) 1.993×10^{-22} kg B) 1.993×10^{-19} mg
C) 4.983×10^{-20} mg D) 4.983×10^{-23} kg

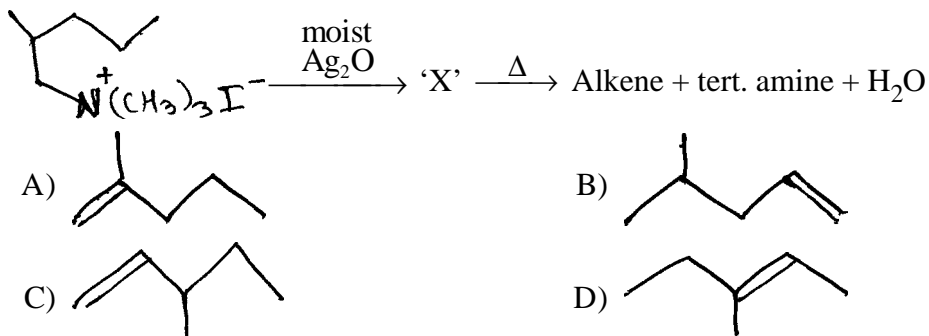
74. Ozone is present as a chief constituent in which region of the atmosphere ?

- A) Troposphere B) Stratosphere
C) Mesosphere D) Thermosphere

SPACE FOR ROUGH WORK



75. The plot of square root of frequency of X-ray emitted against atomic number led to suggestion of which law/rule ?
 A) Periodic law
 B) Modern periodic law
 C) Hund's rule
 D) Newland's law
76. The compound that yields only ketonic compound/s on ozonolysis is
 A) But-2-ene
 B) Pent-2-ene
 C) 2, 3-Dimethylbut-2-ene
 D) 2-Methylbut-2-ene
77. Which among the following metals is refined by electrolytic method ?
 A) Aluminium
 B) Bismuth
 C) Tin
 D) Lead
78. The two monomers used in the preparation of dextran are
 A) 3-hydroxy butanoic acid and 3-hydroxy pentanoic acid
 B) ϵ amino caproic acid and glycine
 C) Isobutylene and isoprene
 D) Lactic acid and glycolic acid
79. Which oxyacid of sulphur contains S-S single bond ?
 A) Oleum
 B) Marshall's acid
 C) Dithionic acid
 D) Thiosulphuric acid
80. Amongst the followings, select the element having highest ionization enthalpy
 A) Sodium
 B) Potassium
 C) Beryllium
 D) Magnesium
81. Identify the alkene that is produced in the following series of reactions



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82. 'X' is an optically active alkane having lowest molecular mass. Predict the structure of the major product obtained on monochlorination of 'X'

- A) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \begin{array}{c} \text{CH}_3 \\ | \\ \text{C} - \text{CH}_2 - \text{CH}_3 \\ | \\ \text{Cl} \end{array}$
- B) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} - \text{CH} - \text{CH}_3 \\ | \\ \text{Cl} \end{array}$
- C) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{Cl} \end{array}$
- D) $\text{Cl} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} - \text{CH}_2 - \text{CH}_3 \end{array}$

83. Butylated hydroxy toluene is used in

- A) preventing oxidative rancidity of fats B) preserving food grains
C) killing bacteria in living tissues D) reducing stress and anxiety

84. Deficiency of which vitamin causes degeneration of spinal cord ?

- A) E B) K C) B₁₂ D) A

85. Bond order of which among the following molecules is zero ?

- A) F₂ B) O₂ C) Be₂ D) Li₂

86. Benzene can be conveniently converted into n-propyl benzene by

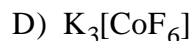
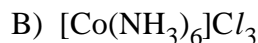
- A) Friedel – Craft alkylation with n-propyl chloride
B) Friedel – Craft acylation with propionyl chloride followed by Wolff – Kishner reduction
C) Friedel – Craft acylation with propionyl chloride followed by catalytic hydrogenation
D) Friedel – Craft acylation with propionyl chloride followed by reduction with LiAlH₄

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87. Select the diamagnetic complex ion amongst the following complexes

(Atomic No. Fe = 26, Co = 27)



88. One mole of stachyose on hydrolysis yields

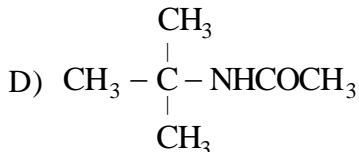
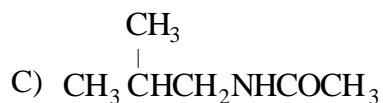
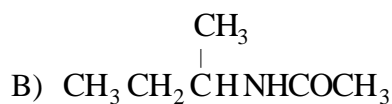
A) 1 mole of glucose + 1 mole of fructose + 2 mole of galactose

B) 2 mole of glucose + 1 mole of fructose + 1 mole of galactose

C) 1 mole of glucose + 2 mole of fructose + 1 mole of galactose

D) 2 mole of glucose + 2 mole of fructose

89. An organic compound 'X' having molecular formula $C_4H_{11}N$ reacts with p-toluene sulphonyl chloride to form a compound 'Y' that is soluble in aqueous KOH. Compound 'X' is optically active and reacts with acetyl chloride to form compound 'Z'. Identify the compound 'Z'



90. If average velocity of a sample of gas molecules at 300 K is 5 cm s^{-1} , what is RMS velocity of same sample of gas molecules at the same temperature? (Given, $\alpha : u : v = 1 : 1.224 : 1.127$)

A) 6.112 cm/s

B) 4.605 cm/s

C) 4.085 cm/s

D) 5.430 cm/s

SPACE FOR ROUGH WORK

**BIOLOGY**

91. Animals obtain all their carbon through
A) plants B) soil C) air D) water
92. Which one of the following is NOT true about monocotyledonae ?
A) embryo has single cotyledon
B) leaves show parallel venation
C) flowers are generally trimerous
D) vascular bundles are conjoint, collateral and open
93. How many NAD molecules get reduced in complete oxidation of one glucose molecule ?
A) 2 B) 5 C) 10 D) 12
94. Which one of the following is used in the production of citric acid ?
A) *Aspergillus niger* B) *Rhizopus arrhizus*
C) *Acetobacter aceti* D) *Saccharomyces cerevisiae*
95. What will be the number of histone molecules in a chromatin fibre having 50 nucleosomes ?
A) 400 B) 450 C) 500 D) 1000
96. Which one of the following is the first group of vascular plants ?
A) Thallophyta B) Bryophyta
C) Pteridophyta D) Spermatophyta
97. An angiospermic male plant with 24 chromosomes in its pollen mother cells is crossed with female plant bearing 24 chromosomes in its root cells. What would be the ploidy of embryo and endosperm respectively formed after this cross ?
A) 24 and 48 B) 24 and 24 C) 48 and 72 D) 24 and 36
98. Which one of the following has bast fibres ?
A) parenchyma B) sclerenchyma C) phloem D) xylem
99. In how many interlocking rings are the carbon atoms arranged in a steroid molecule ?
A) 1 B) 2 C) 3 D) 4
100. What are the spindle fibres that connect the centromere of chromosome to the respective poles called ?
A) Astral rays B) Interpolar fibres
C) Chromosomal fibres D) Inter chromosomal fibres
101. In plant breeding, the entire collection of plants/seeds having the diverse alleles of all genes in a particular organism is called
A) gene bank B) cDNA library C) genomic library D) germ plasm



102. Acetylation of Pyruvate takes place in the _____
A) perimitochondrial space B) mitochondrial matrix
C) cristae D) F_1 particles
103. Cross pollination does not occur in
A) allogamous flowers B) geitonogamous flowers
C) cleistogamous flowers D) chasmogamous flowers
104. Which one of the following is a dicot weedicide ?
A) 2, 4-D B) NAA C) IBA D) IAA
105. Senescence in plants leads into _____ of cells.
A) increase in size B) increase in number
C) death D) differentiation
106. In *Albizzia*, vegetative propagation takes place with the help of
A) fasciculated tuberous roots B) epiphyllous buds
C) subaerial branches D) nonfleshy roots
107. Which of the following cross will give recessive progeny in F_1 generation ?
A) $TT \times tt$ B) $Tt \times TT$ C) $tt \times tt$ D) $TT \times TT$
108. Select the correct statements from the following :
I. Endosperm is generally triploid in angiosperms.
II. All angiosperms have monosporic and endosporic embryo sac.
III. Angiosperms are characterised by double-fertilization.
IV. All angiosperms show-indirect pollination and siphonogamy.
A) I, II and III B) II, III and IV C) I, III and IV D) I, II, III and IV
109. The structure producing basidium in Basidiomycetes is formed by the fusion of
A) two vegetative cells B) two male gametes
C) two female gametes D) male and female gametes
110. The sequence of nucleotides AUGCUUCUC indicates that it is a segment of
A) sense strand of DNA B) anti sense strand of DNA
C) RNA D) polypeptide chain
111. The largest collection of herbarium in India is
A) Central National Herbarium, Kolkata
B) Southern Circle Herbarium, Coimbatore
C) Central Circle Herbarium, Allahabad
D) Blatter Herbarium, Mumbai



112. Enzyme enolase catalyses the conversion of 2 PGA to phosphoenol Pyruvic acid in presence of _____ which is the cofactor.
A) Mn^{++} B) Fe^{++} C) Mg^{++} D) Zn^{++}
113. Excess of Manganese inhibits the translocation of _____ to the shoot apex.
A) Calcium B) Potassium C) Iron D) Magnesium
114. The correct sequence of the substages of Prophase I is
A) Diakinesis \rightarrow Pachytene \rightarrow Diplotene \rightarrow Zygotene \rightarrow Leptotene
B) Leptotene \rightarrow Zygotene \rightarrow Pachytene \rightarrow Diplotene \rightarrow Diakinesis
C) Pachytene \rightarrow Zygotene \rightarrow Leptotene \rightarrow Diplotene \rightarrow Diakinesis
D) Leptotene \rightarrow Zygotene \rightarrow Diplotene \rightarrow Diakinesis \rightarrow Pachytene
115. Capsule is a kind of _____ fruit.
A) simple, dry and dehiscent B) simple, dry and indehiscent
C) an aggregate D) simple and fleshy
116. The inactive protoxin is activated in the gut of the insect by
A) acidic pH B) alkaline pH
C) low temperature D) high temperature
117. In angiosperms, the formation of two male gametes from a pollen grain involves _____ divisions.
A) one meiotic and one mitotic B) two meiotic and two mitotic
C) only two mitotic D) only two meiotic
118. In a plant cell the Diffusion Pressure Deficit is zero when it is _____
A) plasmolysed B) turgid C) flaccid D) incipient
119. The life cycle of algae such as *Spirogyra* is
A) haplontic B) diplontic
C) haplo-diplontic D) diplo-haplontic
120. During which stage of Prophase I, genetic recombination of parental characters, takes place ?
A) Zygotene B) Pachytene C) Diplotene D) Diakinesis
121. Multicostate divergent reticulate venation is seen in _____ leaf.
A) *Zizyphus* B) Bamboo C) Castor D) Mango
122. Synthesis of one glucose molecule requires _____ reduced NADP molecules.
A) 6 B) 12 C) 18 D) 24
123. The arrangement of vascular tissue in hadrocentric vascular bundle is _____
A) concentric B) radial C) collateral D) bicollateral



124. 'Cry' gene is obtained from
A) *Agrobacterium tumefaciens* B) *Bacillus thuringiensis*
C) *Rhizobium leguminosarum* D) *Rhizobium phaseoli*
125. Identify the incorrect match between the protein and its role.
A) Keratin – structural component of hair
B) Immunoglobulins – protection of body against diseases
C) Haemoglobin – transport of O₂ in muscles
D) Thrombin – blood clotting
126. In India, research in genetic modification of organisms and safety issues are controlled by
A) DBT B) IARI C) CSIR D) GEAC
127. Guttation occurs through _____
A) roots B) hydathode C) trichome D) stomata
128. A couple, both carriers for the gene sickle cell anaemia planning to get married, wants to know the chances of having anaemic progeny ?
A) 100% B) 75% C) 50% D) 25%
129. A simple, living permanent tissue which is absent in roots is _____
A) Collenchyma B) Chlorenchyma
C) Aerenchyma D) Parenchyma
130. Which of the following show dimorphic chloroplast ?
A) Mango B) Castor C) Banyan D) Amaranthus
131. Gross primary productivity is the rate of production of _____ during photosynthesis.
A) organic matter B) oxygen
C) carbon di-oxide D) Chlorophyll
132. Flowers showing basipetal succession are observed in
A) *Caesalpinia* and *Clerodendron* B) Jasmine and Gold mohar
C) Gold mohar and *Caesalpinia* D) *Clerodendron* and Jasmine
133. The total number of types of gametes produced in a cross between a negro and albino parent is
A) 64 B) 16 C) 08 D) 04
134. Enzymes required for phosphorylation are located in _____ of chloroplast.
A) Peristromium B) Plastidome C) Stroma D) Quantosome



135. Afforestation is
A) restoring a forest
B) plantation in barren lands
C) cultivation under agriculture
D) jhum cultivation
136. Cellular organization of body is present in
A) Annelida
B) Platyhelminthes
C) Porifera
D) Urochordata
137. In the following process of digestion, the enzymes at location 'X' and 'Y' are respectively
proteins \xrightarrow{X} proteoses and peptones \xrightarrow{Y} Dipeptides
A) Chymotrypsin and pepsin
B) Pepsin and trypsin
C) Ptyalin and pepsin
D) Trypsin and di-peptidase

138. Find out the correct match from the following table :

Column I	Column II	Column III
i. Corpus luteum	Progesteron	Degeneration of endometrium
ii. Pineal gland	Vasopressin	Intracellular transport
iii. Pars nervosa	Coherin	Induces contraction of jejunum
A) i only		B) i and ii
C) iii only		D) ii and iii

139. The colostrum provides _____
A) Naturally acquired active immunity
B) Naturally acquired passive immunity
C) Artificially acquired active immunity
D) Artificially acquired passive immunity

140. Identify and select the correct Match in the Columns I, II and III.

I	II	III
A) Earthworm	- Annelida	- Superclass
B) Frog	- <i>Rana</i>	- Species
C) Lancelet	- Vertebrata	- Division
D) Walrus	- Mammalia	- Class

141. The structural unit of bone is _____
A) chondrin
B) cyton
C) osteon
D) ossein
142. The stato-acoustic receptor responds to changes in the _____
A) Light and pressure
B) Pressure and touch
C) Pain and pressure
D) Sound and equilibrium
143. The chromosome with centromere near the end is called _____
A) Acrocentric
B) Metacentric
C) Sub-metacentric
D) Telocentric



144. One of the following is NOT a possible reason for use of CNG in automobiles
- A) It can be adulterated B) It is cheaper than petrol
C) It burns more efficiently D) It reduces pollution
145. Oviparous mammal is _____
- A) *Equus* B) *Macropus*
C) *Ornithorhynchus* D) *Pteropus*
146. The salivary amylase shows maximum digestive action at pH _____
- A) 3.6 B) 6.8 C) 7.5 D) 8.5
147. The central hollow portion of the vertebra is called _____
- A) Neural canal B) Central canal
C) Auditory canal D) Vertebro-arterial canal
148. The depolarization of nerve membrane takes place through influx of _____ ions.
- A) Calcium B) Potassium C) Sodium D) Magnesium
149. Which of the following is used to promote growth of new blood vessels, thus helping in wound healing ?
- A) HUMULIN B) TPA
C) TGF – B D) $\alpha - 1$ antitrypsin
150. Select the correct statement regarding the Schwann cells
- A) Surround axon of myelinated nerve fibre
B) Support muscle fibres
C) Found in Haversian system of bones
D) Form basement membrane of epithelium
151. The correct match is
- I. DCT – Secretion of H^+ and K^+ ions
II. Henle's loop – Reabsorption of glucose, water and Na^+ ions
III. Podocytes – Attached to parietal layer of Bowman's capsule
IV. JGA – Rise in glomerular blood pressure activates it to release rennin
- A) III B) II C) I D) IV
152. The diurnal rhythms are regulated by _____
- A) Adrenalin B) Melatonin C) Serotonin D) Vasopressin
153. In DNA fingerprinting technique, _____ probe is used for hybridization of DNA fragments.
- A) Double stranded RNA B) Double stranded non-radio active DNA
C) Single stranded radio active DNA D) Single stranded radio active RNA



154. Find the Odd one out :
A) *Adamsia* B) *Astraea* C) *Physalia* D) *Pleurobrachia*
155. The totipotent cell can form a _____
A) Bud B) Cell membrane
C) Cell organelle D) Complete new organism
156. The nodal tissue located in the lower left corner of the right atrium is _____
A) SA node B) AV node C) AV bundle D) Purkinje fibres
157. Which of the following hormones initiate the parturition ?
A) ACTH, HCG, Oxytocin
B) ACTH, Corticosteroid, Oxytocin
C) Corticosteroid, ACTH, Prostaglandin
D) ACTH, Progesteron, HCG
158. The primary lymphoid organ is _____
A) Tonsils B) Payer's patches
C) Lymph nodes D) Thymus
159. Synapse is _____
A) Crossing over between non-homologous chromosomes
B) Pairing of homologous chromosomes
C) Junction between axon and dendrites of two different neurons
D) Zig zag junctions in cardiac muscle fibres
160. Which of the following animal has enucleated erythrocytes ?
A) Earthworm B) Sepia C) Frog D) Rat
161. Which of the following produces erythropoietin ?
A) Kidney B) Pancreas C) Pineal gland D) Thyroid gland
162. Identify the correct match from the Columns I, II and III.
- | I | II | III |
|---------------------------|-------------------------|---------------------------------|
| 1. Interstitial cells | a. Cortex of ovary | i. Follicular fluid |
| 2. Sertoli cells | b. Ovarian follicle | ii. Progesterone |
| 3. Granulosa cells | c. Testis | iii. Attachment of sperm bundle |
| 4. Cells of corpus luteum | d. Seminiferous tubules | iv. Testosterone |
- A) 2-a-iii, 1-c-iv, 3-b-i, 4-d-ii B) 1-c-iv, 2-d-iii, 3-b-i, 4-a-ii
C) 1-d-iii, 2-a-iv, 3-b-i, 4-c-ii D) 2-d-iii, 1-c-iv, 3-a-ii, 4-b-iv



163. Which of the following is correct match ?

I	II	III
A) Thalassaemia	a) XO	i) Flat nose, simian crease
B) Down's syndrome	b) 42 AA + XY	ii) Webbing of neck
C) Turner's syndrome	c) 44 AA + XXX	iii) Anaemia, jaundice
D) Klinefelter's syndrome	d) 44 AA + XXY	iv) Tall thin eunuchoid

164. Which is CORRECT regarding genetically engineered insulin using *E. coli* ?

- A) Difficult to purify
- B) Obtained in large unlimited quantities
- C) Possibility of transmission of animal diseases
- D) Insulin obtained varies in chemical structure

165. Dobson unit is used in measurement of _____ level.

- A) Chlorofluoro carbons
- B) Nitrous oxide
- C) Ozone
- D) UV – B radiation

166. In cockroach, the common duct of salivary reservoir opens at the base of the _____

- A) Pharynx
- B) Maxilla
- C) Mandible
- D) Hypopharynx

167. The wall of urinary bladder in humans shows a thick layer of smooth muscle called _____

- A) Dartos
- B) Detrusor
- C) Deltoid
- D) Depressor

168. Identify the correct match :

Accessory glands	Functions
i. Seminal vesicles	a. Lubricates vagina
ii. Prostate gland	b. Provide energy, coagulation of sperm
iii. Cowper's gland	c. Neutralizes acidity of vagina
A) i-b, ii-c, iii-a	B) i-c, ii-b, iii-a
C) i-a, ii-c, iii-b	D) i-c, ii-a, iii-b

169. The technique used to block the passage of sperm in male _____

- A) Tubectomy
- B) Vasectomy
- C) Coitus interruptus
- D) Rhythm method

170. Find the incorrect match :

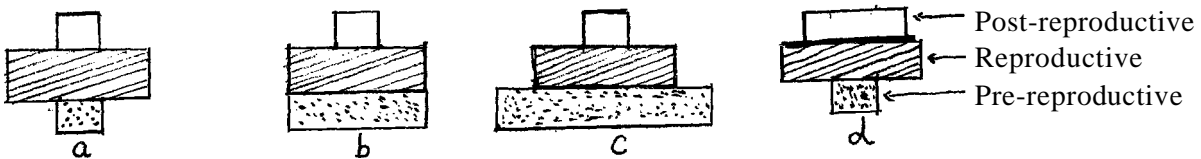
I	II	III	
i. Crab	Sacculina	Interaction ++	
ii. Human being	Mosquito	Interaction – +	
iii. Sea anemone	Hermit crab	Interaction + 0	
A) i only	B) ii and iii	C) iii and i	D) ii only

171. The structure which prevents the entry of food particles into the respiratory passage is _____

- A) Epiglottis
- B) Glottis
- C) Larynx
- D) Pharynx



172. Identify vertebrochondral ribs from the following :
- A) All 12 pairs of ribs B) 1st to 7th pairs of ribs
 C) 8th, 9th and 10th pairs of ribs D) 11th and 12th pairs of ribs
173. "Testis are extraabdominal in position". Which of the following is most appropriate reason ?
- A) Narrow pelvis in male
 B) Special protection for testis
 C) Prostate gland and seminal vesicles occupy maximum space
 D) 2.0 – 2.5° C lower than the normal body temperature
174. The Malignant malaria is caused by _____
- A) *Plasmodium vivax* B) *Plasmodium malariae*
 C) *Plasmodium ovale* D) *Plasmodium falciparum*
175. The total number of podomeres in each leg of cockroach is _____
- A) 5 B) 6 C) 7 D) 8
176. Which of the following store proteins ?
- A) Chromoplasts B) Aleuroplasts C) Amyloplasts D) Elaioplasts
177. Pneumotaxic centre is located in _____
- A) Medulla oblongata B) Pons
 C) Cerebrum D) Diencephalon
178. In case of a couple where a man is having very low sperm count, which of the following technique will be suitable for fertilization ?
- A) Infra uterine transfer
 B) Gamete intra cytoplasmic fallopian transfer
 C) Artificial insemination
 D) Intra cytoplasmic sperm injection
179. The rise of 1st primates occurred in _____ epoch.
- A) Palaeocene B) Oligocene C) Miocene D) Eocene
180. Which of the following statements correctly correlates with the diagrams ?



- A) a and b are steady population B) a and d are declining population
 C) c and d are growing population D) b and d are declining population



SPACE FOR ROUGH WORK

PROVISIONAL KEY
MH-CET-2014 (180 QUESTIONS)

Q.No.	Key	Q.No.	Key	Q.No.	Key	Q.No.	Key	Q.No.	Key	Q.No.	Key
1	C	31	D	61	C	91	A	121	C	151	C
2	D	32	B	62	B	92	D	122	B	152	B
3	C	33	A	63	A	93	C	123	A	153	C
4	B	34	D	64	A	94	A	124	B	154	D
5	A	35	A	65	B	95	B	125	C	155	D
6	B	36	B	66	C	96	C	126	D	156	B
7	D	37	D	67	B	97	D	127	B	157	B
8	C	38	A	68	A	98	C	128	D	158	D
9	B	39	D	69	D	99	D	129	A	159	C
10	A	40	A	70	D	100	C	130	D	160	D
11	D	41	D	71	B	101	D	131	A	161	A
12	D	42	D	72	A	102	A	132	D	162	B
13	C	43	A	73	B	103	C	133	C	163	D
14	A	44	C	74	B	104	A	134	D	164	B
15	D	45	C	75	B	105	C	135	B	165	C
16	C	46	A	76	C	106	D	136	C	166	D
17	C	47	C	77	A	107	C	137	B	167	B
18	B	48	A	78	D	108	C	138	C	168	A
19	C	49	A	79	C	109	A	139	B	169	B
20	A	50	A	80	C	110	C	140	D	170	A
21	D	51	C	81	A	111	A	141	C	171	A
22	A	52	B	82	A	112	C	142	D	172	C
23	B	53	B	83	A	113	A	143	A	173	D
24	D	54	C	84	C	114	B	144	A	174	D
25	A	55	C	85	C	115	A	145	C	175	A
26	B	56	C	86	B	116	B	146	B	176	B
27	C	57	D	87	B	117	C	147	A	177	B
28	B	58	B	88	A	118	B	148	C	178	C
29	D	59	D	89	B	119	A	149	C	179	A
30	A	60	B	90	D	120	B	150	A	180	B