# Aakash
## +BYJU'S

MM : 720

Fortnightly Test 2023-24_RM(P1)-Test-09A

Time : 200 Min.

**Topics Covered:**
**Physics :** Electrostatic Potential and Capacitance, Current Electricity
**Chemistry :** Alcohols, Phenols and Ethers, Aldehydes, Ketones and Carboxylic Acids, Amines (Organic Compound containing Nitrogen)
**Botany :** Principles of Inheritance & Variation, Molecular Basis of Inheritance
**Zoology :** Human Reproduction, Reproductive Health

**General Instructions :**

1. There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.
2. Each question carries +4 marks. For every wrong response, –1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.
3. Use blue/black ballpoint pen only to darken the appropriate circle.
4. Mark should be dark and completely fill the circle.
5. Dark only one circle for each entry.
6. Dark the circle in the space provided only.
7. Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.

CC-020

## PHYSICS

### SECTION-A

1. As shown in figure, if a dielectric $K = 2$ is inserted into 1 μF capacitor then charge on 2 μF capacitor will
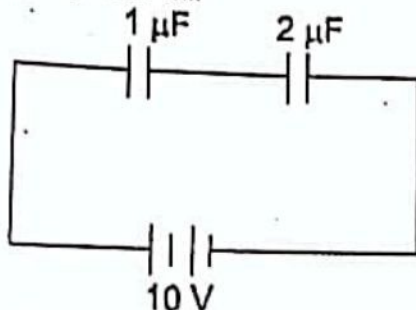


   Increase
   Decrease
   Remain same
   Need more information

2. A parallel plate capacitor of capacitance $C$ has been charged upto potential $V$. The plates of this capacitor are connected to another identical uncharged capacitor. The common potential acquired by the system is

   $\frac{V}{2}$

   $V$

   $2V$

   Zero

3. For a point charge, the equipotential surface is in shape of

   Sphere
   Paraboloid
   Ellipsoid
   Hyperboloid

4. An alpha particle of mass $m$ is accelerated from rest through a potential difference $V$. Its final speed will be [charge of electron is $e$]

   $\frac{eV}{m}$

   $\sqrt{\frac{2eV}{m}}$

   $2\sqrt{\frac{eV}{m}}$

   $\frac{eV}{2m}$

5. An electric dipole of dipole moment $\vec{P}$ is placed in uniform electric field $\vec{E}$, has maximum potential energy when the angle between $\vec{E}$ and $\vec{P}$ will be

   $0°$

   $90°$

   $120°$

   $180°$

6. $n$ identical capacitors are connected in series between points $A$ and $B$ as shown in the figure. The effective capacitance between points $A$ and $B$ is

   

   $nC$

   $n^2 C$

   $\frac{C}{n}$

   $\frac{C}{n^2}$
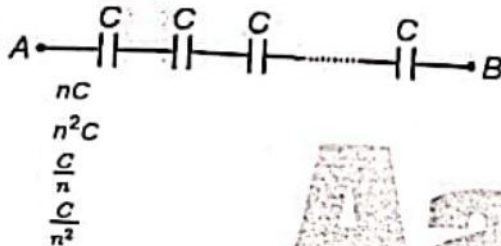
7. Four point charges are placed at the corner of a square of side $a$ as shown in the figure. A charge $q$ is displaced first from $P_1$ to $P_2$ and then from $P_1$ to $P_3$, then work done in displacing the charge
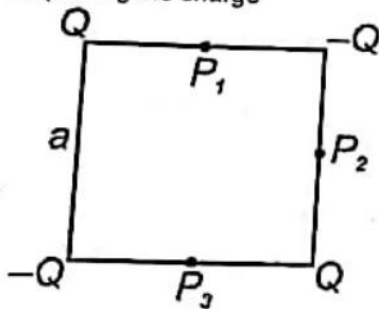
   

   From $P_1$ to $P_2$ is less than that from $P_1$ to $P_3$

   From $P_1$ to $P_3$ is less than that from $P_1$ to $P_2$
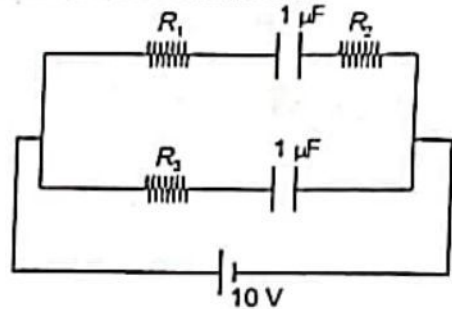
   From $P_1$ to $P_2$ is equal to work from $P_1$ to $P_3$ and is non-zero

   From $P_1$ to $P_2$ is equal to work from $P_1$ to $P_3$ and equal to zero

8. Two points are at a distances $a$ and $b$ ($a < b$) from a long thread having charge per unit length $\lambda$. The potential difference between the points is proportional to

   $\frac{a}{b}$

   $\frac{1}{\lambda}$

   $\frac{b}{a}$

   $\ln\frac{b}{a}$

9. Choose the correct statement

   

   In steady state charge on both the capacitor will be same

   Charge on upper capacitor will be more than the charge on lower capacitor in steady state

   If $R_1 = R_2 = R_3$ only then charge will be same on both the capacitor in steady state

   In steady state charge on lower capacitor will be more than charge on upper capacitor

10. In given circuit, the ratio of energy stored in capacitor $C_1 = 3\ \mu F$ and $C_2 = 4\ \mu F$, at steady state is
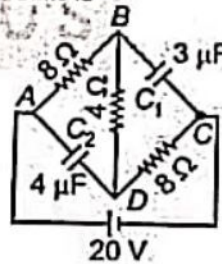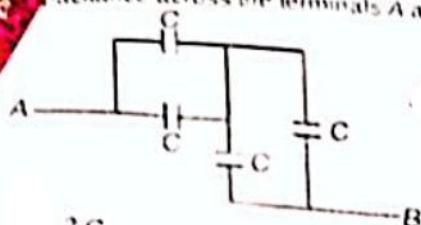
    

    $4 : 5$

    $3 : 4$

    $2 : 1$

    $3 : 1$

11. The work done in bringing a point charge 3 nC from infinity to a point at a distance of 10 cm from a fixed charge 6 nC, is

    $21.8\ \mu J$

    $0.2\ \mu J$

    $20\ \mu J$

    $1.62\ \mu J$

...acitance across the terminals A and B is



2 C

4 C

C

$\frac{C}{2}$

**13.** A : Capacitance of a capacitor increases with increase in potential difference across the plates of conductors.

R : Capacitance of a system of conductor can be negative, positive and zero.

Both Assertion & Reason are true and the reason is the correct explanation of the assertion

Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

Assertion is true statement but Reason is false

Both Assertion and Reason are false statements

**14.** A : In practice earth is considered to be zero potential.

R : The radius of earth is very large.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
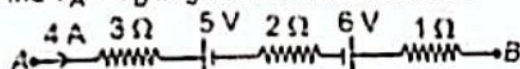
(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

**15.** Kirchhoff's loop rule is based on

(1) Law of conservation of energy

(2) Law of conservation of charge

(3) Law of conservation of momentum

(4) Wheatstone bridge

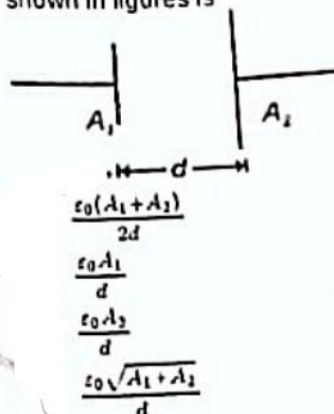**16.** Find $V_A - V_B$ in given branch of a circuit



(1) – 25 V

(2) 23 V

(3) 25 V

(4) –23 V

**17.** The energy density in a parallel plate capacitor (having electric field E between its plates) is

(1) $\frac{1}{2}\epsilon_0 E^2$

(2) $\epsilon_0 E^2$

(3) $\frac{E^2}{\epsilon_0}$

(4) $\frac{E^2}{2\epsilon_0}$

**18.** The capacitance of capacitor of plate area $A_1$ and $A_2$ ($A_1 < A_2$) at a distance d as shown in figures is



$\frac{\epsilon_0(A_1+A_2)}{2d}$

$\frac{\epsilon_0 A_1}{d}$

$\frac{\epsilon_0 A_2}{d}$
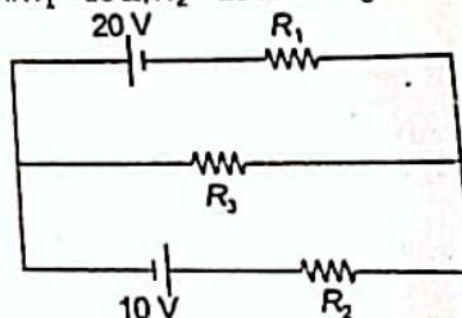
$\frac{\epsilon_0\sqrt{A_1+A_2}}{d}$

**19.** In the figure shown, the power generated in y is maximum if $R = 8\ \Omega$. The value of resistance of resistor marked as Y is



(1) 6 Ω

(2) 8 Ω

(3) 10 Ω

(4) 4 Ω
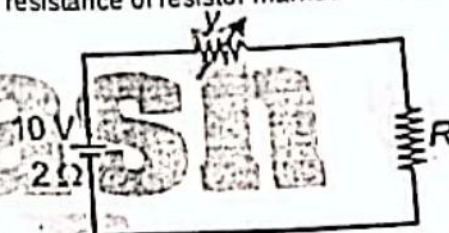
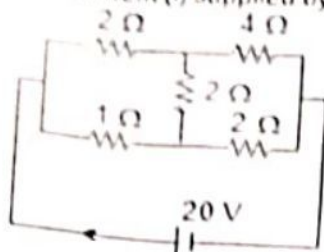**20.** If $R_1 = 10\ \Omega$, $R_2 = 15\ \Omega$ and $R_3 = 2\ \Omega$



The current through $R_3$ is

(1) 0.5 A

(2) 2 A

(3) 1 A

(4) 1.5 A

21. Flow of charge through a given cross-section of a conductor is given by $Q = (t^3 + 20)$ C. Then the current through the conductor at $t = 1$ s is

    15 A

    10 A

    5 A

    2.5 A

22. The current ($I$) supplied by the battery is



    (1) 10 A

    (2) 5 A

    (3) 20 A

    (4) 2 A

23. A parallel plate capacitor is connected across a battery and fully charged to a charge Q and potential difference V. If it is disconnected from the battery and the separation between its plates made 4 times, then

    (1) Charge stored on it becomes 4 times

    (2) Charge remains unchanged

    (3) Potential difference between its plates becomes $\frac{V}{4}$

    (4) Both (2) and (3)

24. A : Resistance of combination of two resistors is maximum when resistors are connected in series.
    R : Resistance of combination of two resistors is minimum when resistors are connected in parallel.

    (1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

    (2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

    (3) Assertion is true statement but Reason is false

    (4) Both Assertion and Reason are false statements

25. An electric bulb of rating 60 W, 220 V is connected across a voltage of 110 V. Power consumed by bulb is

    (1) 60 W

    (2) 12 W

    (3) 15 W

    (4) 30 W

26. $n$ small drops of same size are potential V volt each. If they coale a single large drop, then its potent

    (1) $n^{\frac{2}{3}} V$

    (2) $n^{\frac{1}{3}} V$

    (3) $\frac{V}{n}$

    (4) $\frac{V}{\sqrt{n}}$

27. The current $I$ in a conductor varies wi as $I = 4t + 9t^2$ where $I$ is in ampere an second. Total electric charge flowing ti a section of conductor from time $t = 1$ 4 s is

    5 C

    224 C

    219 C

    300 C

28. In a metallic conductor, drift velocity v related with electric field E as

    $v_d \propto E^2$

    $v_d \propto E^{1/2}$

    $v_d \propto E^0$

    $v_d \propto E$

29. Two conductors have the same resistance a 0°C but their temperature Co-efficient o resistance are $\alpha_1$ and $\alpha_2$. The effective temperature co-efficient of their series combination is

    (1) $\frac{\alpha_1 + \alpha_2}{4}$

    (2) $\alpha_1 \times \alpha_2$

    (3) $\alpha_1 + \alpha_2$

    (4) $\frac{\alpha_1 + \alpha_2}{2}$

30. A copper wire is stretched to make it 0.2% longer. The percentage increase in resistance will be

    (1) 0.2%

    (2) 0.4%

    (3) 0.1%

    (4) No change

31. A resistance of 6 Ω is connected in one gap of a meter bridge and an unknown resistance less than 6 Ω is connected in other gap. When the resistances are interchanged, the balance point shifts by 20 cm. Neglecting end correction, the unknown resistance is

    (1) 5 Ω

    (2) 4 Ω

    (3) 4.4 Ω

    (4) 3.8 Ω

Two electric bulbs rated as (100 W, 220 V) and (50 W, 220 V) are connected in series across a 300 V supply. Heat generated will be more in

(1) 100 W bulb

(2) 50 W bulb

(3) Both bulbs will be equally bright

(4) 50 W bulb will fuse

33. The electric current drawn from cell is
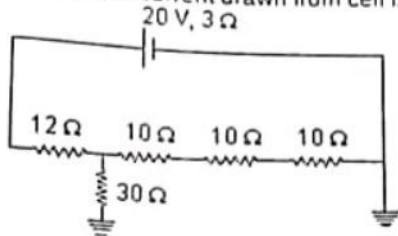


(1) $\frac{2}{3}$ A

(2) $\frac{4}{9}$ A

(3) $\frac{4}{15}$ A

(4) Zero

34. A: Motion of electrons are ceased in the absence of potential difference across conductor.
R: Electrons accelerates uniformly inside the conductor.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

35. Equivalent resistance between point $x$ and $y$ will be (resistance of each branch is 15 $\Omega$)



(1) 8 $\Omega$

(2) 7 $\Omega$

(3) 15 $\Omega$

(4) 20 $\Omega$
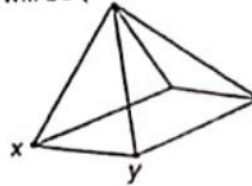
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SECTION-B

36. A disc of radius $R$ is charged with charge density, $\sigma = \frac{\sigma_0 r}{R}$, where $\sigma_0$ is constant and $r$ is distance from centre. If $Q$ be the total charge and $V$ be potential at centre then

(1) $Q = \frac{\pi \sigma_0 R^2}{3}$

(2) $Q = \frac{2\pi \sigma_0 R^2}{3}$

(3) $V = \frac{\sigma_0 R}{4\varepsilon_0}$

(4) Both (2) and (3)

37. If $n$ cells each of emf $E$ and internal resistance $r$ are connected in series and $m$ such rows are connected in parallel and the combination is connected in series with an external resistance $R$, then for maximum power across $R$

(1) $R = r$

(2) $\frac{n}{m} = \frac{R}{r}$

(3) $\frac{n^2}{m^2} = \frac{r}{R}$

(4) $\frac{n}{m} = \frac{r}{R}$

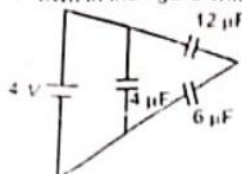38. If key $K$ is turned from 1 to 2, the percentage of stored energy of $C$ dissipated
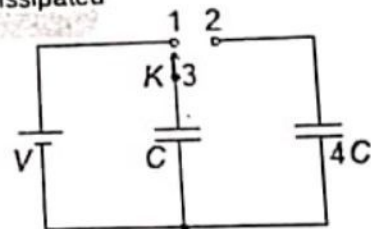


(1) 50%

(2) 80%

(3) 30%

(4) 20%

39. The electric potential $V$ is given as a f of distance $x$ (metre) by $V = (5x^2 + 1$ volt. The value of electric field at $x = 1$
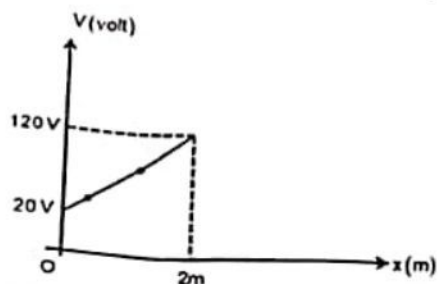
(1) $-20$ V/m

(2) 6 V/m

(3) $-12$ V/m

(4) $-10$ V/m

**40.** Total energy stored in the capacitor system shown in the figure will be



12 µF
4 V
4 µF
6 µF

16 µJ

32 µJ

8 µJ

64 µJ

**41.** The electric potential along the X–axis in a one dimensional electric field is changing as shown in the graph. The electric intensity is



V(volt)

120 V

20 V

O    2m    → x(m)

$50\ Vm^{-1}$ in the X–positive direction

$50\ Vm^{-1}$ in the X–negative direction

$200\ Vm^{-1}$ in the X–positive direction

$200\ Vm^{-1}$ in the X–negative direction

**42.** In a meter bridge with standard resistance of 5 Ω in the left gap, the ratio of balancing lengths of meter wire is 2 : 3. The unknown resistance is
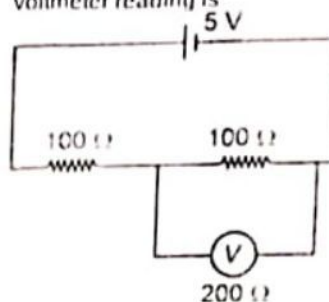
1 Ω

15 Ω

10 Ω

7.5 Ω

**43.** Charge $-2q$, $Q$ and $-3q$ are placed on a straight line as shown in figure. If the total potential energy of the system is zero then value of $\dfrac{Q}{q}$ will be



$-2q$     $Q$     $-3q$

← r → ← r →
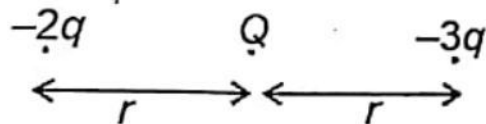
(1) $\dfrac{1}{3}$

(2) $\dfrac{3}{5}$

(3) $\dfrac{2}{3}$

(4) $\dfrac{2}{5}$

**44.** In the circuit as shown in figure the voltmeter reading is



5 V

100 Ω     100 Ω

V

200 Ω

(1) 2 V

(2) 2.5 V

(3) 3 V

(4) 5 V

**45.** A : The slope of charge versus time $(q\text{-}t)$ graph gives us the total electric current through a given cross-section of conductor. R : The area under current versus time $(I\text{-}t)$ graph gives us the total flow of charge through a given cross-section of conductor in a certain interval of time.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

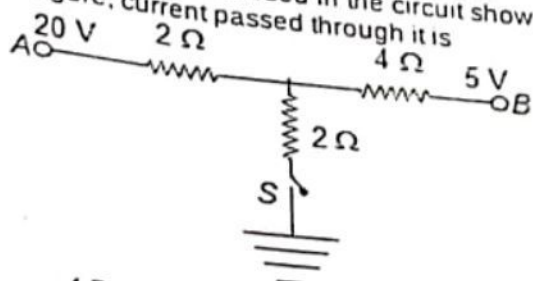**46.** If the ammeter in the given circuit reads 2 A, then the value of resistance $R$ will be



R

1 Ω

6 Ω

A

6 V

(1) 1 Ω

(2) 2 Ω

(3) 4 Ω

(4) 3 Ω

**...be ...nce between points A**
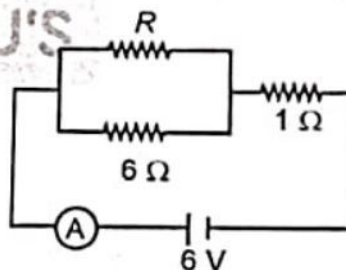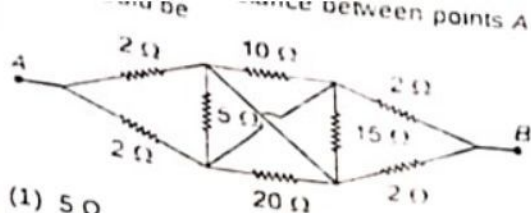


(1) $5 \Omega$

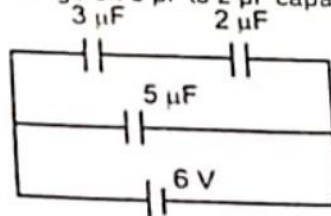(2) $2 \Omega$

(3) $4 \Omega$

(4) $\frac{15}{2} \Omega$

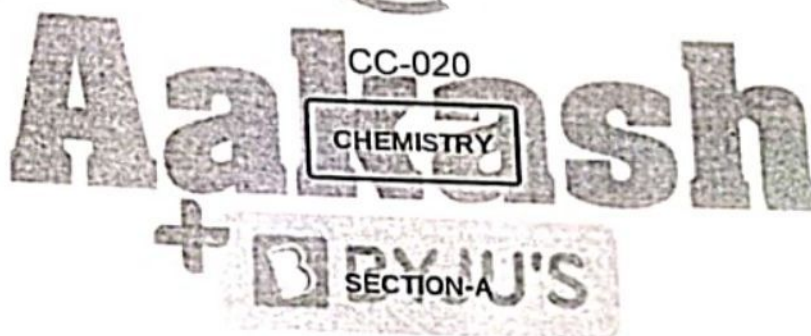48. As the switch S is closed in the circuit shown in figure, current passed through it is



4.5 A

6.0 A

3.0 A

Zero

49. If current density inside a conductor is $\vec{J} = \left(2\hat{i} + \hat{k}\right)$ and the area through which the current flows is $\vec{A} = \left(4\hat{i} + 2\hat{j}\right)$ A/m², then current through the area is

10 A

2 A

8 A

4 A

50. In the circuit shown in the figure, the ratio of charge on 5 µF to 2 µF capacitor is



5/40

5/30

3/80

25/6
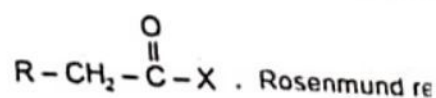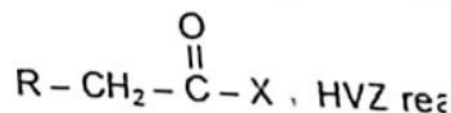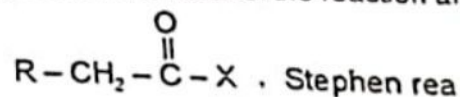
51. Wolff-Kishner reduction is used for the preparation of

(1) Aldehyde

(2) Ketones

(3) Hydrocarbons

(4) Alcohols

52. Formaldehyde and formic acids can be distinguished by

(1) Tollen's test

(2) Fehling's test
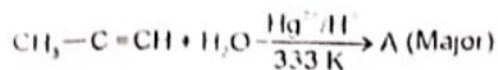
(3) $FeCl_3$

(4) $NaHCO_3$

53. Reagent used in Etard's reaction is

$K_2Cr_2O_7$

$Cr_2O_3$

$CrO_2Cl_2$

$KMnO_4$

54. Anisole on heating with HI gives

(1) Phenol and methanol

(2) Phenol and methyl iodide

(3) Iodobenzene and methanol

(4) Iodobenzene and methyl iodide

55. $R\,CH_2 - COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } X_2/\text{Red phosphorus}}$

The product and name of the reaction ar

$R - CH_2 - \overset{\overset{\displaystyle O}{\|}}{C} - X$ , Stephen rea

$R - \overset{\overset{\displaystyle X}{|}}{C}H - COOH$ , HVZ rea

$R - CH_2 - \overset{\overset{\displaystyle O}{\|}}{C} - X$ , HVZ rea

$R - CH_2 - \overset{\overset{\displaystyle O}{\|}}{C} - X$ , Rosenmund re

56. $CH_3 - C \equiv CH + H_2O \xrightarrow[333\ K]{Hg^{2+}/H^+} A$ (Major)
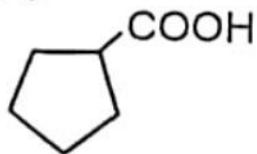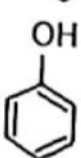
Identify A.

Propanone

Propanal

Ethanal

Methanal

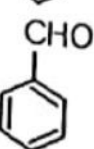57. The compound which will reacts with 2,4-DNP is

(1) 



(2) 



(3) 



(4) 
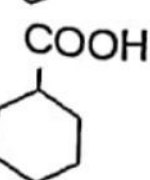


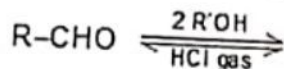58. Identify compound (A) in the following reaction:

$A \xrightarrow{H_2/Pd/BaSO_4}$ 
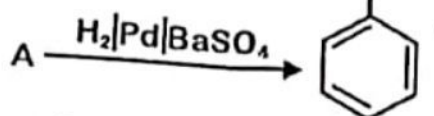


Benzoic acid

Benzoyl chloride

Toluene

Acetophenone

59. Product formed in the reaction

$R-CHO \xrightleftharpoons[HCl\ gas]{2\ R'OH}$
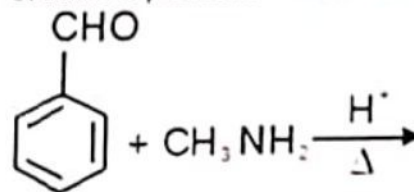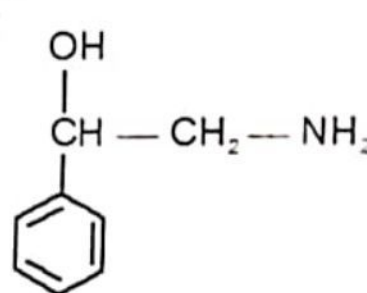
Hemiacetal

Acetal

Hemiketal

Ketal

60. The strongest acid among the following is

HCOOH

$CH_3COOH$

$CCl_3COOH$

$NO_2 - CH_2COOH$

61. Structure of product formed in the reaction is

 $+ CH_3NH_2 \xrightarrow[\Delta]{H^+}$

(1) 



(2) 
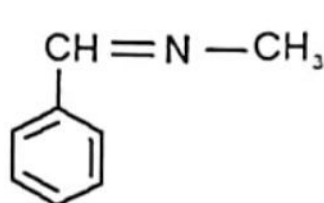


(3) 
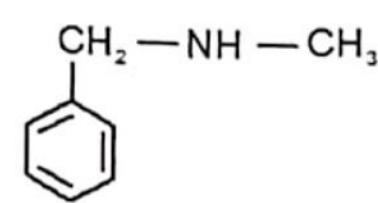


(4) 
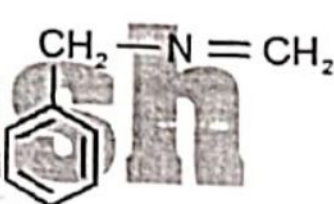


62. Consider the following molecules
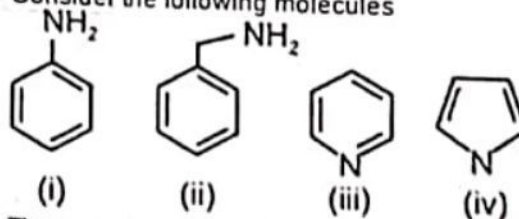


(i)          (ii)          (iii)          (iv)

The correct order of their basic strength is

(iv) > (iii) > (ii) > (i)

(ii) > (iii) > (i) > (iv)

(iii) > (ii) > (i) > (iv)

(ii) > (i) > (iii) > (iv)

63. Product obtained in the reaction is

$CH_3-CH=CH-CH_2-CN \xrightarrow[(ii)\,H_2O]{(i)\,DIBAL-H}$
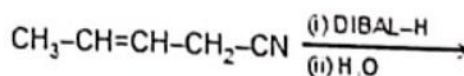
$CH_3-CH=CH-CH_2-CHO$

$CH_3-CH=CH-CH_2-COOH$

$CH_3CH_2CH_2CH_2COOH$

$CH_3-CH_2-CH_2-CH_2-CHO$

$X$ is _____ in given _____ reaction.

- RCOCl, Friedel-Crafts acylation
- RCHO, Friedel-Crafts acylation
- RCOR, Friedel-Crafts alkylation
- RCOCl, Friedel-Crafts alkylation

65. Which of the following amine will not react with Hinsberg's reagent?
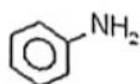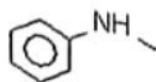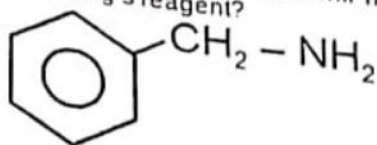


66. Which of the following would undergo Hoffmann bromamide reaction to give primary amine?

- RCOCl
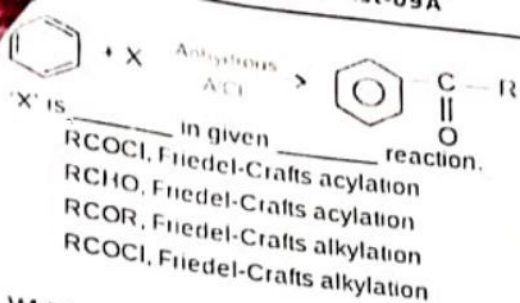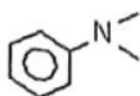- RCOOR
- RCONH₂
- RNO₂

67. Consider the following reaction.

$$C_6H_5NO_2 \xrightarrow{Sn/HCl} A \xrightarrow[0-5°C]{NaNO_2/HCl} B$$
$$\xrightarrow{HBF_4} C \xrightarrow[Cu,\Delta]{NaNO_2} D$$
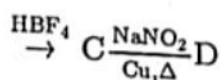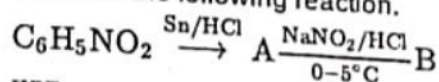
Major product D of the reaction sequence is
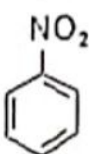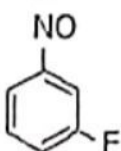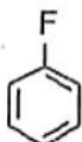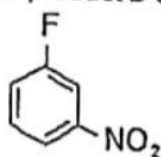


68.



Major product X is
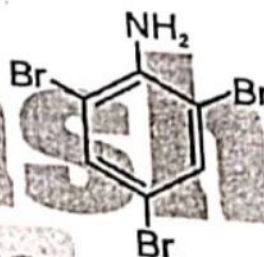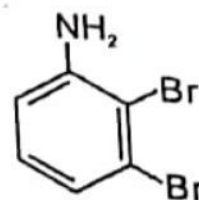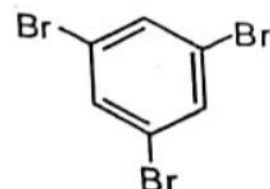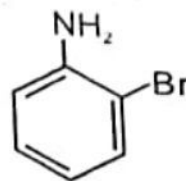


69. Methyl amine on heating with chlorofo and alcoholic KOH forms

- Methyl alcohol
- Methyl cyanide
- Methyl isocyanide
- Methane

70. A : Acetylsalicylic acid is called aspirin.
R : Salicylic acid on reaction with a anhydride forms aspirin.

(1) Both Assertion & Reason are true the reason is the correct explanati the assertion

(2) Both Assertion & Reason are tru the reason is not the c explanation of the assertion

(3) Assertion is true statement but R is false

(4) Both Assertion and Reason ar statements

71. In the reaction



A is
- Benzaldehye
- Aniline
- Benzene
- Phenol
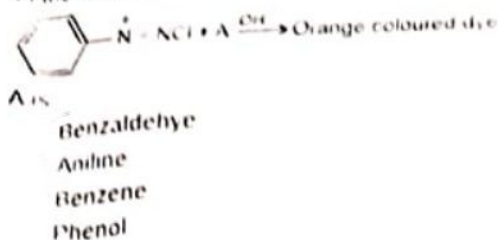
72.
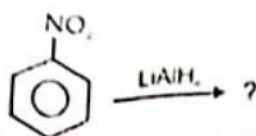


The product formed in the above reaction is
- Aniline
- Azobenzene
- Hydrazobenzene
- Azoxybenzene

73. Aniline and benzylamine can be chemically distinguished by
- Benzenesulphonyl chloride
- $Br_2$/water
- aq.HCl
- $CHCl_3$/KOH/$\Delta$

74.



; A is
- Benzene
- Catechol
- Benzoquinone
- Toluene

75. A : Zwitter-ion in form of sulphanilic acid is

$H_3N^+ \!\!-\!\!\langle\ \rangle\!\!-\!\!SO_3^-$

R : It contains strong acidic part ($-SO_3^-$) and

weak basic part $\left(-\overset{+}{N}H_3\right)$

- Both Assertion & Reason are true and the reason is the correct explanation of the assertion
- Both Assertion & Reason are true but the reason is not the correct explanation of the assertion
- Assertion is true statement but Reason is false
- Both Assertion and Reason are false statements

76.



P is



77.



A is
- Phenylmethanamine
- Azobenzene
- Azoxybenzene
- Aniline

78.
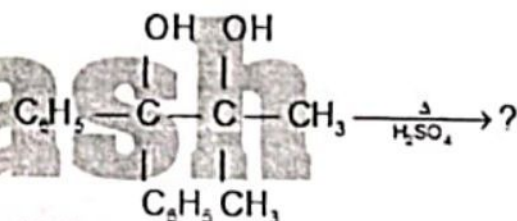


The major product of the above reaction is
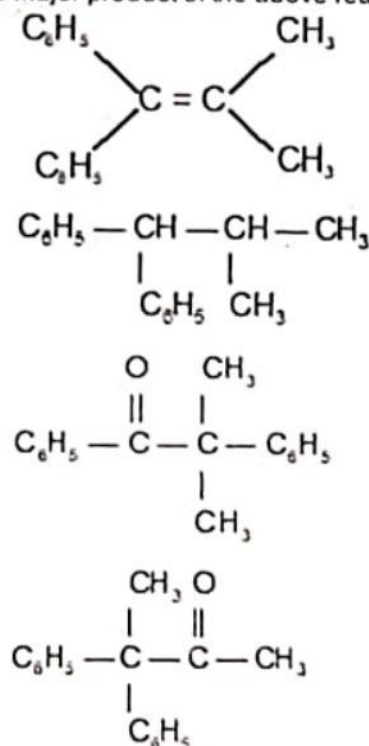
...ic acid is
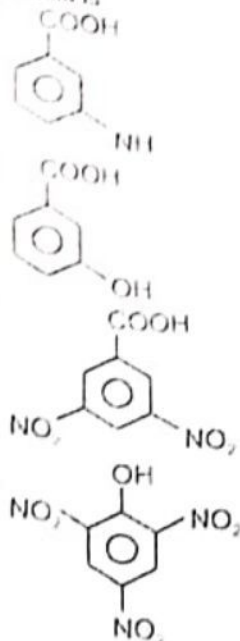


**80.** IUPAC name of Phenetole is
- Ethylphenyl ether
- Ethoxybenzene
- Phenoxyethane
- Phenylethanol

**81.** Phenol decolourises bromine water and gives white precipitate by which reaction mechanism
- Electrophilic addition reaction
- Nucleophilic addition reaction
- Electrophilic aromatic substitution
- Nucleophilic aromatic substitution

**82.** Which of the following alcohols is most reactive in esterification reaction?
- $CH_3OH$
- $CH_3CH_2OH$
- $(CH_3)_2CHOH$
- $(CH_3)_3C - OH$

**83.** Which of the following reaction is known as Gattermann reaction?
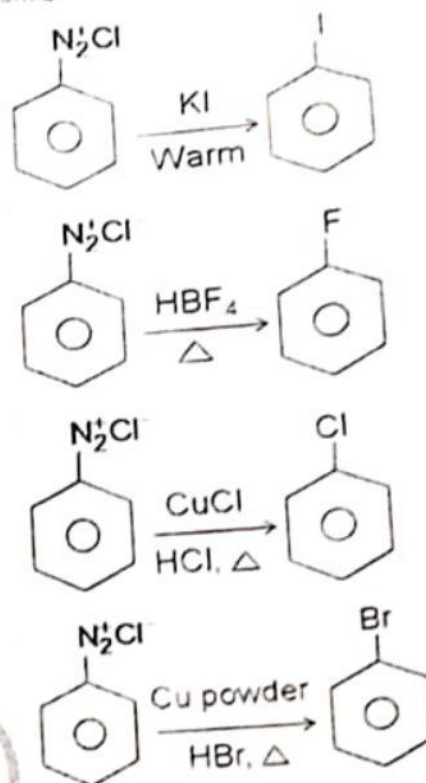


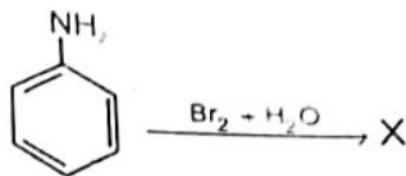**84.** The compound which will boil at higher temperature is
- $HO-CH_2CH_2-OH$
- $C_2H_5-O-C_2H_5$
- $CH_2Cl_2$
- $C_2H_5OH$
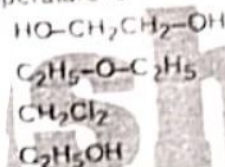
**85.** Consider the following reaction sequence

Phenol $\xrightarrow{Zn\ dust}$ A $\xrightarrow[anhy\ AlCl_3]{CH_3CH_2Cl}$ B $\xrightarrow{alkaline\ KMnO_4}$

The product C is
- Benzoic acid
- Acetophenone
- Phenol
- Dimethyl phenyl carbinol

SECTION-B

86. Which of the following statement is incorrect?

o-nitrophenol is more volatile than p-nitrophenol

o-nitrophenol and p-nitrophenol are separated by steam distillation

o-nitrophenol has intermolecular H-bonding

p-nitrophenol has higher boiling point than o-nitrophenol

87. When cumene oxidised in air followed by treatment with dilute acid forms

(1) Anisole
(2) Phenol
(3) Toluene
(4) Benzyl alcohol

88. Vinyl alcohol among the following is

$CH_3CH_2CH_2 - OH$

$CH_2 = CH - CH_2 - OH$

$CH_2 = CH - OH$
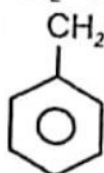


89. Butan-2-one on reaction with ethyl magnesium bromide followed by hydrolysis gives

Aldehyde
Secondary alcohol
Tertiary alcohol
Carboxylic acid

90. Number of Primary amines of the formula $C_4H_{11}N$ is

1
2
3
4

91. The electrophile involved in Reimer-Tiemann reaction is

$\overset{\oplus}{C}HCl_2$

$:CCl_2$

$\overset{\ominus}{C}Cl_3$

$\overset{\oplus}{C}HO$

92. 

Identify Y

(1) 

(2) 

(3) 

(4) 

93. 

(1) 

(2) 

(3) 

(4) 

94. Which of the following will be most stable diazonium salt?

(1) $C_6H_5CH_2 \overset{+}{N_2} X^-$

(2) $CH_3 \overset{+}{N_2} X^-$

(3) $C_6H_5 \overset{+}{N_2} X^-$

(4) $CH_3CH_2 \overset{+}{N_2} X^-$

out of the following compounds, choose the one which will not undergo Cannizzaro's reaction

HCHO

$(CH_3)_3CCHO$

$C_6H_5CHO$

$CH_3CHO$

96. The compound which will react fastest with $NaHSO_3$ is

(1) $CH_3CHO$

(2) $CH_3COCH_3$

(3) PhCHO

(4) $PhCOCH_3$

97. Reagent used in Clemmensen reduction is

DIBAL–H

Zn-Hg/HCl

$LiAlH_4$

$NaBH_4$

98. $CH_3 \quad Br \xrightarrow[\text{(ii)}CO_2 \text{ (iii)}H_3O^+]{\text{(i)}Mg, Et_2O}$ Product is

(1) $CH_4$

(2) $CH_3COCH_3$

(3) $CH_3COOH$

(4) $(CH_3COO)_2Mg$

99. Correct order of basicity in aqueous medium is

$(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH$

$CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

$(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$

$(C_2H_5)_3N > (C_2H_5)_2NH > C_2H_5NH$

100. Electrolytic reduction of nitrobenzene in weakly acidic medium produces

Aniline

Phenylhydroxylamine

p-Aminophenol

Azoxybenzene

**BOTANY**

SECTION-A
CC-020

101. Which of the following types of gamete will not be produced by the plant with the genotype AaBBCcdd?

(1) aBcd

(2) AbCd

(3) ABCd

(4) aBCd

102. Down's syndrome occurs due to

Gain in extra copy of chromosome 20

Gain in extra copy of chromosome 5

Gain in extra copy of chromosome 21

Gain in extra copy of chromosome 18

103. Select the **correct** example w.r.t. incomplete dominance.

Seed shape in pea

Starch grain size in pea

Flower position in pea

Pod shape in pea

104. Sex determination in humans takes place by

Number of sperms

Sex–chromosome of father

Number of eggs

Sex chromosome of mother

105. Consider the following Assertion and Reason and choose the correct option.

Assertion (A) : In sickle cell anaemia, the shape of RBC changes from biconcave dis to elongated sickle like structure.

Reason (R) : The mutant haemoglobi molecule undergoes polymerization und low oxygen tension causing the change shape of RBC.

(1) Both Assertion & Reason are true an the reason is the correct explanation the assertion

(2) Both Assertion & Reason are true b the reason is not the corre explanation of the assertion

(3) Assertion is true statement but Reas is false

(4) Both Assertion and Reason are fa statements

106. Which of the following represents genetic makeup of female grasshopper

(1) AA + XY

(2) AA + XO

(3) AA + XX

(4) AA + YY

07. Choose the genotype which does not represent a true breeding/pure line.
(1) AABB
(2) aabb
(3) AAbb
(4) AABb

108. How many types of gametes are possible from genotype AaBBCcDd?
3
16
8
4

109. Which of the following is an example of polygenic inheritance?
Sickle cell anaemia
Phenylketonuria
Skin colour in humans
Thalassemia

110. Find the odd one w.r.t. Mendelian disorders.
Colourblindness
Haemophilia
Sickle cell anaemia
Klinefelter's syndrome

111. Pleiotropic gene
Affects multiple metabolic pathway
Controls expression of a single trait only
Does not follow Mendel's law of segregation
Has multiple alleles

112. How many true-breeding pea plant varieties were taken by Mendel for his experiments?
(1) 7
(2) 14
(3) 21
(4) 5

113. The term used for the units of inheritance by Mendel was
(1) Traits
(2) Genes
(3) Alleles
(4) Factors

114. RNA polymerase I transcribes all, except
28 S rRNA
5 S rRNA
5.8 S rRNA
18 S rRNA

115. Which of the following traits studied by Mendel in pea plant can not express their unless the plant is homozygous for that character?
Inflated green pods
Round yellow seeds
Terminal white flowers
Axial violet flowers

116. Term linkage and recombination were proposed by
(1) Morgan and Sturtevant respectively
(2) Sturtevant
(3) T. H. Morgan
(4) Sutton and Morgan respectively

117. The genes present on a chromosome
(a) Are always tightly linked to each other
(b) Form one linkage group
(c) Can show high recombination frequency or low recombination frequency
Choose the correct one(s)
(1) b & c
(2) a & b
(3) a & c
(4) c only

118. Operon model in bacteria was given by
(1) Watson and crick
(2) Jacob and Monod
(3) Severo Ochoa
(4) Nirenberg

119. A cytidine molecule does not contain
N-glycosidic linkage
A pyrimidine
Ribose sugar
Phosphoester linkage

120. Initiation of transcription in E. coli is catalysed by
Sigma factor of DNA dependent RNA polymerase
Sigma factor of RNA dependent RNA polymerase
DNA dependent DNA polymerase without sigma factor
Rho factor of RNA polymerase

121. The process of removal of introns and joining of exons in a defined order is called
Splicing
Capping
Tailing
Methylation

... structure of DNA, if the sequence of bases in one strand is known, then the sequence in other strand can be predicted

This is conferred by which of the given property of DNA molecule?

(1) The two chain have antiparallel polarity
(2) Base pairing in DNA is complementary to each other
(3) Coiling of polynucleotide chains in a right handed fashion
(4) The plane of one base pair stacks over the other

123. Which of the given histone proteins attach(es) to DNA strand between two nucleosomes?

(1) $H_2A, H_2B, H_3$ and $H_4$
(2) $H_1$ only
(3) $H_2A$ and $H_2B$ only
(4) $H_1, H_2A, H_2B, H_3$ and $H_4$

124. During transcription, unwinding of DNA helix is performed by

(1) Helicase
(2) Gyrase
(3) Topoisomerase
(4) RNA polymerase

125. UTRs are
a. Found towards 5' end after start codon
b. Present in m-RNA
c. Required for efficient translation process

Only b
Only b and c
Only a and b
All a, b and c

126. The genetic codon for which no tRNA is found is

(1) AUG
(2) UUU
(3) UUA
(4) UAG

127. Structural genes of lac-operon

(1) Synthesise enzymes required for breakdown of lactose
(2) Form enzymes that catalyse an anabolic pathway of E. coli
(3) Are not expressed even in the presence of inducer
(4) Are monocistronic genes

128. Choose the correct option w.r.t. RNA

It cannot be catalytic
Absence of free 2 OH in sugar
Presence of thymine in place of uracil
Mutates at faster rate as compared to DNA

129. All of the following are STOP codons, except

UAA
UAG
UGA
UAC

130. All of the following are pyrimidines, except

Adenine
Cytosine
Uracil
Thymine

131. The basis of DNA fingerprinting is/are

Sequence annotation
ESTs
Non-constitutive genes
VNTR

132. The debate between proteins versus DNA as the genetic material was finally resolved from the experiment of

Frederick Griffith
Hershey and Chase
Watson and Crick
Meselson and Stahl

133. Which of the following chromosome has the fewest genes in human?

X chromosome
Y chromosome
Chromosome-1
Chromosome-21

134. The first genetic material on earth was

(1) RNA
(2) Protein
(3) DNA
(4) Carbohydrate

135. Two nucleotides of a strand in RNA ar linked by

(1) Hydrogen bonds
(2) N-glycosidic bonds
(3) Phosphodiester bond
(4) Peptide bond

136. Which of the following features is/are associated with heterochromatin?
(i) Light stained region
(ii) Densely packed
(iii) Transcriptionally inactive
   (1) (i) and (ii)
   (2) (ii) and (iii)
   (3) Only (ii)
   (4) (i) and (iii)

137. In Griffith's experiments, mice died when injected with
   (1) Heat killed R-strain bacteria
   (2) Live R-strain bacteria
   (3) Heat killed S-strain combined with R strain bacteria
   (4) Heat killed S-strain bacteria

138. Methylated form of uracil
   (1) Is a purine base
   (2) Is present in DNA
   (3) Is present in mRNA
   (4) Has four N-atoms

139. Genetic code is degenerate, which means
   One codon codes for only one amino acid
   Codon is read on mRNA in a contiguous fashion
   Three codons do not code for any amino acid
   Some amino acids are coded by more than one codon

140. DNA, which is an acidic substance was first identified by
   (1) Friedrich Meischer
   (2) Altmann
   (3) Wilkins and Franklin
   (4) Watson and Crick

141. Select correct reasons for *Drosophila melanogaster* as material for experimental Genetics
   (a) Life span is about two weeks
   (b) Single mating produce hundreds of offspring
   (c) It has smaller number of chromosomes i.e. 8 pairs
   (d) It could be grown on simple synthetic medium in the laboratory
   1) (a),(b),(d)
   2) (b),(c),(d)
   3) (a),(b),(c)
   4) (a),(b),(c),(d)

142. Match the following columns and choose the correct option.

| | Column-I | | Column-II |
|---|---|---|---|
| a | Permease | (i) | 23 S rRNA |
| b | Repressor protein | (ii) | Mini satellite DNA |
| c | VNTR | (iii) | Synthesized by regulator gene |
| d | RNA enzyme | (iv) | Synthesized by *lac y* gene |

Select the option which is correct.
   (1) a(i), b(ii), c(iv), d(iii)
   (2) a(iv), b(iii), c(i), d(ii)
   (3) a(iv), b(iii), c(ii), d(i)
   (4) a(i), b(ii), c(iii), d(iv)

143. The last step of DNA fingerprinting is
   Blotting
   Hybridisation
   Electrophoresis
   Autoradiography

144. When a carrier woman for haemophilia is married to a normal man then what will be the percentage of their son to be haemophilic?
   (1) 25 %
   (2) 0 %
   (3) 50 %
   (4) 75 %

145. Genes responsible for eye and body colour in *Drosophila* are present on
   1) Two different autosomes
   2) The same chromosome
   3) An autosome and X-chromosome respectively
   4) Both X and Y-chromosomes

146. Which of the given is an autosomal dominant disorder?
   1) Haemophilia
   2) Sickle cell anemia
   3) Myotonic dystrophy
   4) Phenylketonuria

147. Presence of more than two alleles for a gene is known as
   1) Co-dominance
   2) Pleiotropy
   3) Multiple allelism
   4) Incomplete dominance

Which of the following law(s) of Mendel is/are universally applicable?

( ) Law of dominance

( ) Law of segregation

( ) Law of independent assortment

( ) Both (1) and (2)

149. Red eye colour of *Drosophila* is

( ) A recessive trait

( ) Regulated by a gene present on Y-chromosome

( ) A sex-linked trait

( ) Seen in females only

15°. Who prepared first chromosomal map for *Drosophila*?

( ) A.H. Sturtevant

( ) T.H. Morgan

( ) F.W. Went

( ) Mendel

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## ZOOLOGY

### SECTION-A

151. Which of the following cell can have 22 + X or 22 + Y chromosomes?

(1) Primary spermatocyte

(2) Sperm

(3) Primary oocyte

(4) Secondary follicle

152. Which one of the following is an **Incorrect** match?

) Spermiogenesis – The spermatids are transformed into spermatozoa

) Spermiation – Release of sperms from vasa efferentia

) Ejaculation – Release of sperms from the body of males

) Middle piece of sperm – Energy source for swimming

153. Select the option which **correctly** fills the blank in the given statement.

The human male ejaculate normally contains about _____ during a coitus.

) 40–60 million sperms

) 200 to 300 million sperms

) 300 to 500 million sperms

) 100 to 150 million sperms

154. The hormone secreted by the placenta, which acts on the corpus luteum stimulating it to produce estrogens and progesterone to maintain the uterine lining is called

) Estrogen

) hCG

) LH

) Oxytocin

155. Study the items given in the box below

Primary spermatocyte, Oogonia, Zygote, Secondary oocyte, Ovum, Spermatid

How many of the above are diploid?

( ) One

( ) Two

( ) Four

( ) Three

156. Select the structures which secrete the sar hormone

(1) Pituitary gland and uterus

(2) Uterus and ovary

(3) Thyroid gland and pituitary gland

(4) Placenta and corpus luteum

157. Which one of the following is an **Incor** match?

( ) Spermiogenesis – The spermatids transformed into spermatozoa

( ) Spermiation – Release of sperms vasa efferentia

( ) Ejaculation – Release of sperms body of males

( ) Middle piece of sperm – Energy s for swimming

158. In humans, at the end of the first division, primary spermatocytes form

) Spermatogonia

) Male germ cells

) Secondary spermatocytes

) Spermatids

159. What is the duration of luteal phase if menstrual cycle is of 35 days?
( ) 10 days
( ) 21 days
( ) 28 days
( ) 14 days

160. A new theca layer appears for the first time in structure called
) Primary oocytes
) Graafian follicle
) Tertiary oocyte
) Secondary follicle

161. Choose the gland which lies at the base of the urinary bladder and surrounds the first part of the urethra
( ) Prostate gland
( ) Seminal vesicles
( ) Bulbourethral gland
( ) Cowper's gland

162. Secretions of epididymis are essential for
( ) Spermiation
( ) Ejaculation
( ) Maturation and mobility of sperms
( ) Spermatogenesis

163. Which layer of uterine wall undergoes strong contractions during child birth?
( ) Complete wall of uterus
( ) Perimetrium
( ) Endometrium
( ) Myometrium

164. In humans, oogenesis is completed in
) Ovary
) Uterus
) Fallopian tube
) Vagina

165. Number of primary follicles found in each ovary at puberty is
60,000 - 80,000
7,000 - 8,000
80,000 - 90,000
50,000 - 60,000

166. How many second polar bodies will be formed from 100 primary oocytes after completion of their meiosis?
( ) 200
( ) 400
( ) 100
( ) 50

167. Match column I with column II

| | Column I | | Column II |
|---|---|---|---|
| a | Fimbriae | (i) | Columnar ciliated epithelium |
| b | Fallopian tube | (ii) | Capture ova released into coelom |
| c | Infundibulum | (iii) | Site of fertilization |
| d | Ampulla | (iv) | Part of oviduct closer to ovary |

( ) a(iv), b(i), c(ii), d(iii)
( ) a(ii), b(i), c(iv), d(iii)
( ) a(i), b(ii), c(iii), d(iv)
( ) a(i), b(iii), c(iv), d(ii)

168. Trace the correct pathway of synthesis and flow of milk in a functional mammary gland
Mammary alveoli → mammary ampulla → mammary duct → lactiferous duct
Mammary alveoli → mammary duct → mammary ampulla → lactiferous duct
Mammary alveoli → mammary duct → mammary lobe → mammary ampulla → lactiferous duct
Mammary lobe → mammary duct → mammary ampulla → mammary alveoli → lactiferous duct

CC-029. A specialized embryo forming procedure in which sperm is directly injected into the ovum is
GIFT
ZIFT
IUI
ICSI

170. Which of the following is not true w.r.t GIFT?
) Fertilisation takes place in uterus
) This method does not involve in-vitro fertilisation
) This method is adopted by women who cannot produce ova
) Both ovum (Donor) and sperm (Donor/Husband) are transferred in fallopian tube

171. Where was Saheli developed?
( ) Central Drug Research Institute, Lucknow
( ) All India Institute of Medical Sciences, New Delhi
( ) National Institute of Immunology, New Delhi
( ) JNCASR, Bengaluru

Read the following statements A and B and choose the **correct** option.

**Statement (A)** Lactational amenorrhoea has been reported to be effective upto a period of six months following parturition.

**Statement (B)** Side effects are almost nil and failure rate is high in case of natural methods of contraception.

(1) Both statements are correct

(2) Both statements are incorrect

(3) Only statement (A) is correct

(4) Only statement (B) is correct

173. Read the following statements about ZIFT. All the given statements are correct regarding ZIFT, **except**

( ) Ova from wife / donor (female) and sperms from husband / donor (male) are collected

( ) Zygote is formed under simulated conditions in the laboratory

( ) The zygote with upto 8 blastomeres could be transferred into fallopian tube

( ) The zygote with more than 8 blastomeres stage could be transferred into fallopian tube

174. One of the most widely accepted method of contraception in India is use of

(1) Cervical cap

(2) Lactational amenorrhoea

(3) IUDs

(4) Periodic abstinence

175. Listed below are the objectives of RCH, **except**

1) Sex education in schools

2) Awareness about contraception through audio-visual and print media

3) Calculation of population growth rate after every ten years

4) Awareness about STDs, methods of their transmission, prevention and cure

176. The term 'infertility' is used if a couple is unable to produce children even after how many years of unprotected sexual co-habitation?

) 2 years

) 1.5 years

) 0.5 year

) 1 year

177. Diaphragms, cervical caps and vaults are the barrier methods of contraception used to cover

) Vagina

) Cervix of uterus

) Penis

) Fundus of uterus

178. Which of the following is not a natural method of contraception?

1) Periodic abstinence

2) Coitus interruptus

3) Lactational amenorrhea

4) Condom

179. Which of the following is true for tubectomy?

Ova production decreases

Loss of sexual desire

Degeneration of ovaries

It blocks the transport of ova

180. Among the disease given below, which one is caused by a protozoan?

( ) Genital herpes

( ) Trichomoniasis

( ) Chancroid

( ) Genital warts

181. If a male of 26 years old have coitus with multiple partners and forgets to use condom sometimes then he is least susceptible to

( ) Genital herpes

( ) HIV infection

( ) Cancer

( ) Chlamydiasis

182. In a mature human male, if the vasa deferentia of both sides are cut and ligated then all of the following may be observed **except**

(1) Secretion of male sex hormone continues

(2) Semen is without sperms

(3) Transport of sperms to ejaculatory duct is blocked

(4) Increase in sperm count

183. Choose the ART which mainly falls under the umbrella of the 'test tube baby programme'.

) AI

) IUI

) ZIFT

) GIFT

184. Hormone containing IUD is

Multiload 375

Lippes loop

LNG-20

CuT

185. Government of India legalized MTP in

1971

2001

2011

1951

## SECTION-B

186. Choose the duct through which milk is sucked out

Mammary duct

Mammary lobe

Lactiferous duct

Alveolar duct

187. Lactation process includes

Synthesis of milk sugar only

Synthesis of milk protein only

Structural development of mammary lobules and alveoli by estrogen

Production of milk

188. The major source of estrogen in a human female between day 7 to 12th day of the menstrual cycle is

) Adrenal cortex

) Ovarian follicle

) Corpus luteum

) Pituitary gland

189. Identify the structure marked 'X'.
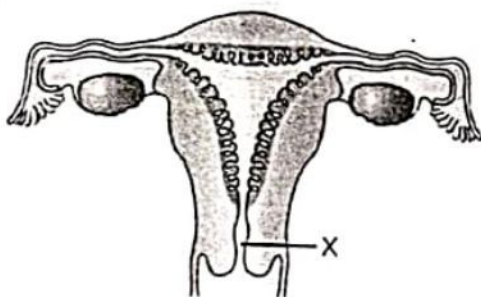


Choose the **correct** option.

(1) Cervical canal

(2) Fundus

(3) Vagina

(4) Hymen

190. Approximately, in which month of pregnancy eyelids separate and eyelashes are formed?

(1) $2^{nd}$ month

(2) $3^{rd}$ month

(3) $5^{th}$ month

(4) $6^{th}$ month

191. Leydig cells synthesize and secrete hormone which are called

1) FSH

2) LH

3) Androgen

4) GnRH

192. _____ are finger like projections that appear on the trophoblast after implantation.

) Flagella

) Cilia

) Chorionic villi

) Microvilli

193. Limbs and external genital organs are formed at which time of pregnancy?

1) End of $5^{th}$ week of pregnancy

2) End of $12^{th}$ week of pregnancy

3) End of $2^{nd}$ trimester

4) End of $5^{th}$ month of pregnancy

194. According to the 2011 census report, the population growth rate was

) More than 3.7%

) Less than 2.0%

) Equal to 3%

) Equal to 2.7%

5. IVF involves the fertilization _____ the body followed by _____.
Choose the option which fills the blanks respectively **correctly**.

(1) Outside, test tube

(2) Outside, embryo transfer

(3) Inside, embryo transfer

(4) Inside, test tube

196. Though all persons are vulnerable to STIs but their incidences are reported to be very high among persons of age group

1) 25-35 years

2) 5-10 years

3) 15-24 years

4) 40-50 years

197. According to MTP (Amendment) Act, within how many weeks of pregnancy, MTP can be perform with the opinion of only one registered medical practitioner?

(1) 12 weeks

(2) 12 to 24 weeks

(3) 24 to 36 weeks

(4) 36 to 48 weeks

198. Population growth can be controlled by all, except

1) Encouraging couples to use contraceptive methods

2) Giving incentives to couples with smaller families

3) Raising the marriageable age of males and females

4) Promoting unprotected sexual co-habitation

199. STI which is completely curable if detected early and treated properly is

) Hepatitis-B

) Gonorrhoea

) Genital herpes

) HIV infection

200. According to 2011 census report, the world population was around

(1) 6 billion

(2) 6 million

(3) 7.2 billion

(4) 7.2 million

2