SECTION-A BIOLOGY (1-60)

Q1) The process of double fertilization was demonstrated for the first time by
a) Zimmerman b) Nawaschin
c) Sherrington d) Naudin

Q2) The lower most cell of the suspensor adjacent to the embryonal cell is known as
a) Ephiphysis b) Hypophysis
c) Paraphysis d) Periphysis

Q3) The nucellus of ovule is surrounded by one or two cellular coats called
a) Columella b) Lamellae
c) Integuments d) Chalaza

Q4) If a part of flower other than ovary is also involved in the formation of fruit, it is called as
a) Parthenocarpic fruit b) Pseudocarpic fruit
c) True fruit d) Aggregate fruit

Q5) Which of the following characteristic of pea plant was not used by Mendel in his experiments
a) Seed colour b) Seed Shape
c) Pod length d) Flower position

Q6) Lack of independent assortment of two genes is due to
a) Recombination b) Crossing over
c) Linkage d) Repulsion

Q7) In the DNA strand has nitrogen base sequence ATTGCC, the mRNA formed from it will have?
a) UAACGG b) ATTGCC
c) ATCGGG d) UGGACC

Q8) The accepted hypothesis for DNA replication is
a) Conservative theory
b) Dispersive theory
c) Semi-conservative theory
d) Evolutionary theory

Q9) A Codon contains how many nucleotides?
a) One b) Two
c) Three d) Four

Q10) Which of the following would appear as the pioneer organisms on bare rocks?
a) Green algae b) Lichens
c) Liverworts d) Mosses

Q11) If we combine all the ecosystems present on the earth, then it is called
a) Biome b) Habitat
c) Biosphere d) Ecology

Q12) Which is an example of an ex-situ conservation of biodiversity?
a) Sacred groves b) Wildlife sanctuary
c) Seed bank d) National Park

Q13) Who is known as the Father of tissue culture?
a) Bonner b) Laibach
c) Haberlandt d) Gautheret

Q14) Biofertilizers are
a) Some bacteria and cyanobacteria
b) Fertilizers formed by ploughing in green plants
c) Fertilizers obtained by decay of dead plants
d) Fertilizers prepared by mixing cattle dung with crop residues

Q15) Golden rice is a promising transgenic crop. When released for cultivation, it will help in
a) Alleviation of vitamin-A deficiency
b) Pest resistance
c) Herbicide tolerance
d) Producing fuel from rice

Q16) Cell drinking is exclusively known as?
a) Phagocytosis b) Pinocytosis
c) Endocytosis d) Exocytosis

Q17) During which phase of the cell cycle, chromosomes replicate?
a) G_1 phase b) G_2 phase
c) S phase d) G_0 phase

Q18) Resting membrane potential of a neuron is approximately
a) -70 mV/-65mV b) -70 µV
c) +70 µV d) +70 mV

Q19) During which stage of cell cycle, crossing over take place?
a) Leptotene b) Zygotene
c) Pachytene d) Diplotene

Q20) Presence of mucous over the skin of frog is an adaptation for:
a) Buccal respiration
b) Cutaneous respiration
c) Pulmonary respiration
d) None of the above

Q21) The differentiation of spermatids into spermatozoa is called as
a) Spermatogenesis
b) Spermatocytogenesis
c) Spermiogenesis
d) None of the above

Q22) Which of the following disease is caused by Plasmodium vivax?
a) Malaria b) Chagas disease
c) Scurvy d) Sleeping sickness

Q23) Which of the following phylum is the most primitive among bilateral animals?
a) Coelentrata b) Porifera
c) Platyhelminthes d) Annelida

Q24) Clitellum in earthworms surrounds the segments
a) 12-14th b) 14-16th
c) 16-18th d) 13-15th

Q25) Curdling of milk in small intestine occur due to the action of
a) Rennin b) Trypsin
c) Renin d) Chymotrypsin

Q26) Which of the following gland performs both endocrine and exocrine functions?
a) Pancreas b) Hypothalamus
c) Ovary d) Testes

Q27) Hardy Weinberg law operates on?
a) Non-evolving populations
b) Slow evolving populations
c) Randomly evolving populations
d) Fast evolving populations

Q28) Which of the following is a poikilotherm?
a) Catfish b) Silverfish
c) Pigeon d) All of the above

Q29) Antibody 'A' and 'B' can be found in a person having which of the following blood group?
a) A b) B
c) AB d) O

Q30) Which of the following is phospholipid?
a) Sphingomyelin b) Glycogen
c) Oleic acid d) Prostaglandin

Q31) Which of the following is not a characteristic feature of Cephalochordates?
a) Presence of specialized head
b) Absence of paired limbs or fins
c) Rod like notochord present extending from rostrum to tail
d) Dorso-lateral muscles segmented into myotomes

Q32) Which national park is famous for 'Hangul'?
a) Kishtwar national park
b) Hemis high altitude national park
c) Dachigam national park
d) Jim corbett national park

Q33) Which organelle is known as the powerhouse of the cell?
a) Nucleus
b) Mitochondria
c) Endoplasmic reticulum
d) Ribosomes

Q34) Which of the following is not a STD (Sexually transmitted disease).
a) Chlamydia b) HIV/AIDS
c) Syphilis d) Lupus

Q35) What is the full form of ZIFT?
a) Zygote Inter Fallopian Transfer
b) Zygote Intra Fallopian Transfer
c) Zygote In-vitro Fallopian Transfer
d) Zygote In-vivo Fallopian Transfer

Q36) Trisomy of 21st chromosome causes?
a) Down syndrome
b) Turner syndrome
c) Klinefelter syndrome
d) Patau Syndrome

Q37) How can we perform DNA fingerprinting?
a) PCR of DNA containing VNTR's
b) Southern blotting using RFLP's
c) Both (a) & (b)
d) None of the above

Q38) Vaccines provides
a) Active immunity b) Passive immunity
c) Both (a) & (b) d) None of the above

Q39) Honey is rich in
a) Anti-oxidants b) Vitamins
c) Minerals d) All of the above

Q40) Where can we use recombinant DNA technology?
a) Crop improvement
b) Medicine development
c) Industrial applications
d) All of the above

Q41) Why is Gene therapy still not a permanent cure?
a) It's very expensive and difficult to perform
b) The cells die after some time and patient may need periodic infusions
c) Virus sometimes effects other type of cells too which may cause sickness and other diseases.
d) All of the above

Q42) Which of the following is not an ethical issue regarding recombinant DNA technology?
a) Gene pollution
b) Superweed generation
c) Restriction of natural flow of gene pool
d) None of the above

Q43) Which of the following is known as the suicide bags of the cell?
a) Ribosomes b) Lysosomes
c) Nucleosomes d) Centrioles

Q44) In an ECG, which wave represents 'ventricular depolarization'?
a) P wave b) QRS wave
c) T wave d) None of the above

Q45) Sickle cell anemia is caused by?
a) Point mutation in beta globulin chain
b) Point mutation in alpha globulin chain
c) Frame shift mutation in beta globulin chain
d) Frame shift mutation in alpha globulin chain

Q46) The most popular and outstanding natural system of classification is that of
a) Hutchinson b) Bentham and Hooker
c) Bessey d) De Candole

Q47) What is the shape of chloroplast in Chlamydomonas?
a) Cup shaped b) Spiral
c) Stellate d) Collar shaped

Q48) Gymnosperms do not bear
a) Seeds b) Fruits
c) Cones d) None of them

Q49) The principal components of xylem tissue include
a) Companion cells and tracheids
b) Fibres and sieve tubes
c) Companion cells and vessels
d) Tracheids and vessels

Q50) In dicots, there is a layer of meristematic cells in-between the phloem and xylem, known as
a) Protoxylem b) Protophloem
c) Vascular cambium d) Differentiation zone

Q51) Potato belongs to which family?
a) Solanaceae b) Liliaceae
c) Asteraceae d) Poaceae

Q52) Vascular bundles are scattered in
a) Dicot Stem b) Dicot root
c) Monocot Stem d) Algae

Q53) Polyarch and exarch vascular bundles occur in
a) Dicot stem b) Monocot stem
c) Dicot root d) Monocot root

Q54) The minimum number of pigment molecules capable of acting cooperatively in a photochemical act to evolve one molecule of O_2 or to reduce one molecule of CO_2 is known as
a) Quantum unit b) Quantasome unit
c) Photosynthetic unit d) Photochemical unit

Q55) In C4 plants, initially the carbon dioxide of the atmosphere comes in contact with mesophyll cells where it combines with phosphoenol pyruvic acid to form
a) Malic acid b) Aspartic acid
c) Oxaloacetic acid d) Pyruvic acid

Q56) The enzymes for the Kreb's cycle are located in
a) Matrix of the mitochondria
b) Cristae of the mitochondria
c) Outer membrane of the mitochonria
d) Chloroplast

Q57) The factors that favour guttation include
a) High water absorption
b) Low root pressure
c) High rate of transpiration
d) All of the above

Q58) The highest concentration of auxin is found in
a) Nodes of the plant
b) Growing tips of the plant
c) Dead cells of the plant
d) None of the above

Q59) The light-sensitive lettuce seeds that are imbibing are treated with red light followed by far red light:
a) The Pr form is converted to the active PFr form
b) The PFr form is not affected
c) Germination takes place
d) Germination does not take place

Q60) The condition where some flowers never open to ensure complete self-pollination is known as
a) Cleistogamy b) Homogamy
c) Geitonogamy d) Xenogamy

SECTION-A AGRICULTURE(1A-60A)

Q1A) A homozygous trait in an organism is defined as-
a) The appearance of a trait in that organism
b) Appearance of same trait in two organisms
c) The presence of two different alleles in that organism
d) Presence of two identical alleles in that organism

Q2A) Which of the following were not taken into accounts in Mendel's experiments on hybridization?
a) Plant height and flower position
b) Length of pods and width of pods
c) Flower colour and seed colour
d) Pod shape and pod colour

Q3A) Which of the following crops have been approved for commercial cultivation in India?
a) Golden rice and high protein maize
b) Bt Maize and Bt rice
c) Bt cotton only
d) Bt brinjal and Bt cotton

Q4A) Conservation tillage saves?
a) Soil b) Moisture
c) Time d) All of above

Q5A) Concentration of carbon dioxide in atmosphere is--
a) 330 ppm b) 350 ppm
c) 370 ppm d) 400 ppm

Q6A) Which of the following is not a fruit vegetable?
a) Tomato b) Chilli
c) Potato d) Brinjal

Q7A) Botanical name of Damask rose is----
a) Rosa chinensis b) Rosa damascena
c) Rosa moschata d) Rosa multiflora

Q8A) Central Institute for temperate horticulture is located at----
a) Pantnagar b) Srinagar
c) Lucknow d) Shimla

Q9A) Which of the following State/UT is highest producer of apple in India?
a) Himachal Pradesh b) Jammu & Kashmir
c) Uttarakhand d) Uttar Pradesh

Q10A) Which of the following vegetable crop is direct seeded?
a) Tomato b) Onion
c) Chilli d) Okra

Q11A) Biennial bearing is found in ----
a) Pomegranate b) Apple
c) Mango d) Grape

Q12A) Which of the following is not a leguminous vegetable?
a) Pea b) French bean
c) Cowpea d) Okra

Q13A) Central Potato Research Institute is located at-
a) Shimla b) Srinagar
c) Meerut d) Lucknow

Q14A) Saffron is grown mostly in the State/UT of --
a) Himachal Pradesh b) Jammu & Kashmir
c) Uttarakhand d) Uttar Pradesh

Q15A) Microbial digestion occur in----
a) Poultry b) Pig
c) Sheep d) Horse

Q16A) Osteomalacia a disease of adult is caused due to deficiency of----
a) Calcium b) Magnesium
c) Fluorine d) Iodine

Q17A) The average nitrogen content of protein is----
a) 15% b) 16%
c) 18% d) 17%

Q18A) More commonly used factor for converting nitrogen to crude protein is----
a) 5.25 b) 4.25
c) 6.75 d) 6.25

Q19A) The most appropriate ratio of calcium and phosphorous for efficient utilization is----
a) 2:1 b) 4:1
c) 1:2 d) 1:4

Q20A) Daily water requirement of a dairy cow is influenced by----
a) Composition of ration
b) Milk production
c) Environmental temperature
d) All the above factors

Q21A) Rabies is a fatal disease of animals, caused by
a) Virus b) Bacteria
c) Protozoa d) All of these

Q22A) The pH range of good silage is----
a) 3.8 to 4.4 b) 4.9 to 5.6
c) 6.0 to 7.0 d) None of these

Q23A) Price of a commodity and its demand has ----
a) Positive correlation
b) Negative correlation
c) Depends on the commodity
d) No relationship

Q24A) The net cultivated area in India is----
a) 150 mha b) 143 mha
c) 180 mha d) 328 mha

Q25A) IVLP stands for--
a) Institute Village Linkage Project
b) Integrated Village Linkage Programme
c) Integrated Village Linkage Project
d) Institute Village Linkage Programme

Q26A) Contribution of agriculture to GDP is--
a) 14% b) 20%
c) 24% d) 34%

Q27A) White revolution is related to----
a) Food grain production
b) Fish production
c) Egg production
d) Milk production

Q28A) Support price for crop produce is fixed based on the recommendations of ----
a) NAFED
b) CACP
c) Ministry of Agriculture
d) CCI

Q29A) The factors of production are----
a) Land and labour
b) Land, labour, capital
c) Land, labour, capital, management
d) Land, labour, money, machine

Q30A) ATMA stands for----
a) Agriculture Technology Management Agency
b) Agriculture Transfer Model Assessment
c) Agriculture Transfer Management Assessment
d) Agricultural Tourism and Management Agency

Q31A) AMUL is a ----
a) Cooperative b) Self-Help Group
c) Company d) Society

Q32A) Only one seller of product/service is ----
a) Oligopoly b) Perfect competition
c) Monopsony d) Monopoly

Q33A) For hard, dry and stony soil surface which kind of plough is suitable?
a) Mould Board Plough
b) Disc Plough
c) Chisel Plough
d) Rotary Plough

Q34A) Which is not a type of drought?
a) Hydrological b) Meteorological
c) Biological d) Socio-economic

Q35A) Conservation tillage leaves how much residue on the surface?
a) <10% b) 10-15%
c) 15-25% d) >30%

Q36A) What is percentage of carbon in wrought iron?
a) <1% b) 1-2%
c) 2-3% d) >4%

Q37A) Which is the largest producer of sugarcane in the world?
a) Australia b) India
c) Brazil d) China

Q38A) If driving (effort) wheel has 15 teeth and driven (load) wheel has 60 teeth what is gear ratio?
a) 1:4 b) 4:1
c) 2:3 d) 3:2

Q39A) Most common type of irrigation pumps are----
a) Centrifugal pump b) Mixed flow pump
c) Propeller pump d) Jet pump

Q40A) The metering device is part of which agricultural implement?
a) Paddy Thresher b) Mould Board Plough
c) Chaff Cutter d) Seed drill

Q41A) Which is not a manually operated weeding tool?
a) Hand Hoe b) Wheel Hoe
c) Hoe cum rake d) Rotary Cultivator

Q42A) Tillage operation does not include----------
a) Digging b) Flushing
c) Overturning d) Stirring

Q43A) Equipment used to apply insecticides/pesticides in dry form is known as-
a) Sprayer b) Injector
c) Duster d) Sprinkler

Q44A) Chaff cutter is used for----
a) Cutting fodder b) Grain grinding
c) Cane crushing d) Seed processing

Q45A) Mould board of a mould board plough is usually made of ----
a) Mild steel b) Forged steel
c) Soft steel d) Malleable steel

Q46A) The economy of Jammu and Kashmir UT predominantly dependent on---
a) Industries
b) Electricity generation
c) Agriculture
d) Tourism

Q47A) Major crops of Jammu division of J&K UT are
a) Wheat, rajmas and rice
b) Wheat, maize and rice
c) Rice, cowpea and wheat
d) Maize, rice and pearl millet

Q48A) Where first Agriculture University of India was established?
a) Srinagar b) Ludhiana
c) Kanpur d) Pantnagar

Q49A) IRRI is located in--
a) USA b) Australia
c) Philippines d) India

Q50A) Which of the following is a Green Manure Crop?
a) Daincha b) Potato
c) Barley d) Sesame

Q51A) For applying 100 kg of nitrogen, how much urea would one use?
a) 310 kg b) 218 kg
c) 100 kg d) 146 kg

Q52A) "Silviculture" refers to cultivation of --
a) Silkworm b) Trees
c) Medicinal plants d) Oilseed crops

Q53A) ADP to ATP change is called --
a) Respiration b) Transpiration
c) Photosynthesis d) Phosphorylation

Q54A) SRI is a technique used in--
a) Cotton b) Rice
c) Wheat d) Maize

Q55A) Pink bollworm is a pest of --
a) Sugarcane b) Gram
c) Cotton d) Jute

Q56A) Khaira disease of rice can be controlled by spraying—
a) Calcium bicarbonate
b) Calcium carbonate
c) Calcium sulphate
d) Zinc sulphate

Q57A) Which is a variety of Oat?
a) Kent b) Jaya
c) Pusa Giant d) Sonalika

Q58A) The relative proportion of sand, silt and clay is called ---
a) Soil taxonomy
b) Soil water holding capacity
c) Soil structure
d) Soil texture

Q59A) Soil mulch is useful for---
a) Minimizing evaporation loss
b) Improving fertility of soil
c) Improving drainage
d) Improving soil structure

Q60A) Growth of plants toward light is called--
a) Photoperiodism b) Photorespiration
c) Phototropism d) Photochromatism

SECTION-A MATHEMATICS(1B-60B)

Q1B) The coefficient of x^r in the expansion of $(1-x)^{-2}$ is
a) r b) $r+3$
c) $r+1$ d) $r-1$

Q2B) If $C_0, C_1, C_2, -----, C_n$ denote the bi-nomial coefficients in the expansion of $(1+x)^n$, then
$C_0 + \frac{C_1}{2} + \frac{C_2}{3} + ----+ \frac{C_n}{n+1} =$
a) $\frac{2^{n+1}-1}{n+1}$ b) $\frac{2^n-1}{n}$
c) $\frac{2^{n-1}-1}{n-1}$ d) $\frac{2^{n+1}-1}{n+2}$

Q3B) On a railway route there are 15 stations. The number of tickets required in order that it may be possible to book a passenger from every station to every other is
a) $\frac{15\,!}{2\,!}$ b) $15\,!$
c) $\frac{15\,!}{13\,!}$ d) $\frac{15\,!}{13\,!2\,!}$

Q4B) $If\ \ x\,sin\theta = y\,cos\theta = \frac{2\,Z\,tan\theta}{1-tan^2\theta}$, then
$4z^2(x^2+y^2) =$
a) $(x^2+y^2)^3$ b) $(x^2-y^2)^2$
c) $(x^2+y^2)^2$ d) $(x^2-y^2)^3$

Q5B) $tan25^0 + tan20^0 + tan25^0\ tan20^0 =$
a) 1 b) 2
c) 3 d) 4

Q6B) If $Cos\ x\ =\ 3\ cos\ y, then\ 2\tan\frac{y-x}{2} =$
a) $Cot\ \left(\frac{x+y}{2}\right)$ b) $Cot\ \left(\frac{x+y}{4}\right)$
c) $Cot\ \left(\frac{y-x}{2}\right)$ d) $Cot\ \left(\frac{y-x}{4}\right)$

Q7B) If $Cos\ x \neq -\frac{1}{2}$, then the solutions of $Cos\ x + Cos\ 2x + Cos\ 3x = 0\ are$
a) $2n\pi\ \pm\left(\frac{\pi}{4}\right), n \in Z$ b) $2n\pi\ \pm\ \left(\frac{\pi}{3}\right), n \in Z$
c) $2n\pi\ \pm\ \left(\frac{\pi}{6}\right), n \in Z$ d) $2n\pi\ \pm\ \left(\frac{\pi}{2}\right), n \in Z$

Q8B) $Tan^{-1}\frac{x}{\sqrt{a^2-x2}} =$
a) $2\ Sin^{-1}\frac{x}{a}$ b) $Sin^{-1}\frac{2x}{a}$
c) $Sin^{-1}\frac{x}{a}$ d) $Cos^{-1}\frac{x}{a}$

Q9B) The solution of $tan^{-1}\ 2\theta + tan^{-1}\ 3\theta = \frac{\pi}{4}\ is$
a) $\frac{1}{\sqrt{6}}$ b) $\frac{1}{\sqrt{3}}$
c) $\frac{1}{3}$ d) $\frac{1}{6}$

Q10B) $If\ \begin{bmatrix}1 & 1 & 0\\ 2 & 0 & 3\\ 5 & -6 & x\end{bmatrix} = 29,\ Then\ x\ is$
a) 4 b) 3
c) 2 d) 1

Q11B) $If\ A = \begin{bmatrix}0 & 1 & 0\\ 1 & 0 & 0\\ 0 & 0 & 1\end{bmatrix}\ then\ A^{-1} =$
a) $2A$ b) A
c) $-A$ d) 1

Q12B) $If\ x\begin{bmatrix}-3\\ 4\end{bmatrix} + y\begin{bmatrix}4\\ 3\end{bmatrix} = \begin{bmatrix}10\\ -5\end{bmatrix}, then$
a) $x = 2, y = -1$ b) $x = 22, y = 1$
c) $x = -9, y = 10$ d) $x = -2, y = 1$

Q13B) Let A be a square matrix and A^T be its transpose, then $A + A^T$ is
a) The identity matrix
b) A diagonal matrix
c) A symmetric matrix
d) A skew-symmetric matrix

Q14B) The systems of equations
$\left.\begin{matrix}3x - y + 4z = 3\\ x + 2y - 3z = -2\\ 6x + 5y + \lambda z = -3\end{matrix}\right]$ has at least one solution,if
a) $\lambda = 5$ b) $\lambda = -5$
c) $\lambda = 3$ d) $\lambda = -3$

Q15B) The value of $\begin{vmatrix}\log_5{}^{729} & \log_3{}^5\\ \log_5{}^{27} & \log_9{}^{25}\end{vmatrix} \cdot \begin{vmatrix}\log_3{}^5 & \log_{27}{}^5\\ \log_5{}^9 & \log_5{}^9\end{vmatrix}$ is
a) $\log_3{}^5 \cdot \log_5{}^{81}$ b) $\log_5{}^9$
c) 6 d) 0

Q16B) If n is an integer, then $lt_{x\to n}[x]$:
a) $n-1$ b) $n+1$
c) n d) does not exist

Q17B) If the function $f: R \to R\ is\ given\ by$ $f(x) = \begin{cases}x + a\ if\ x \leq 1\\ 3 - x^2\ if\ x > 1\end{cases}$ is continuous at $x = 1, then\ a =$
a) 1 b) 2
c) 3 d) 4

Q18B) Derivative of $log_{10}{}^x\ with\ respect\ to\ x^2\ is$
a) $2x^2 log_e{}^{10}$ b) $\frac{log_{10}{}^e}{2x^2}$
c) $\frac{log_e{}^{10}}{2x^2}$ d) $x^2 log_e{}^{10}$

Q19B) The greatest value of $Sin^3 x + Cos^3\ x\ is$
a) 1 b) 2
c) $\sqrt{2}$ d) $\sqrt{3}$

Q20B) $If\ f(x) = \frac{Sin\ x}{e^x}\ in\ [0, \pi], then\ f(x)$:
a) Satisfies Rolle's theorem but $f'\left(\frac{\pi}{4}\right) \neq 0$
b) Does not satisfy Rolle's theorem but $f'\left(\frac{\pi}{4}\right) > 0$
c) Satisfies Rolle's theorem and $C = \frac{\pi}{4}$ so that $f'\left(\frac{\pi}{4}\right) = 0$
d) Satisfies langranges mean value theorem but $f'\left(\frac{\pi}{4}\right) \neq 0$

Q21B) The function $f(x) = 1 - x^3$
a) Increases everywhere
b) Decreases in $(0, \infty)$
c) Increases in $(0, \infty)$
d) None of these

Q22B) $\int \frac{\log\ (\tan\ x)}{\sin\ x \cos\ x}\ dx =$
a) $[\log_e(\tan x)]^2 + C$ b) $\log(\log\tan x) + C$
c) $\frac{1}{2}\ [\log_e\ (\tan x)]^2 + C$ d) $\log(\tan x) + C$

Q23B) $\int_0^{\pi} Cos^3\ x\ dx =$
a) 0 b) 1
c) -1 d) $\frac{1}{2\sqrt{2}}$

Q24B) $\int_0^a \sqrt{a^2 - x^2}\, dx =$

a) $\frac{1}{3}\,\pi\, a^2$ b) $\frac{1}{4}\,\pi\, a^2$

c) $\frac{\pi\, a^2}{2}$ d) $\pi\, a^2$

Q25B) The area bounded by the curves $y = 3x \; and \; y = x^2$ (in square units) is

a) 10 b) 5

c) 4 d) None of these

Q26B) The order of the differential equation $\left[\frac{dy}{dx}\right]^3 + \left[\frac{dy}{dx}\right]^2 + \; y^4 = 0 \; is$

a) 4 b) 2

c) 1 d) 3

Q27B) The solution of $\frac{dy}{dx} + y = e^x \; is$

a) $2y = e^{2x} + C$ b) $2y\, e^x = e^x + C$

c) $2y\, e^x = \; e^{2x} + C$ d) None of these

Q28B) If the centriod of the triangle formed by the points $(0,0), (\cos\theta\,, \sin\theta)$and $(\sin\theta\,, -\cos\theta)$ lies on the line $y = 2x \; then \; \theta =$

a) $\tan^{-1}(2)$ b) $\tan^{-1}(-2)$

c) $\tan^{-1}(3)$ d) $\tan^{-1}(-3)$

Q29B) If 3,4 are intercepts of a line $L = 0$, Then the distance of $L = 0$ from the origin is

a) 5 b) $\frac{12}{5}$

c) $\frac{5}{12}$ d) 12

Q30B) The other end of the diameter through the point $(-1,1)$ on the circle $x^2 + y^2 - 6x + 4y - 12 = 0 \; is$

a) $(-7,5)$ b) $(-7,-5)$

c) $(7,-5)$ d) $(7,5)$

Q31B) If $x + y = \; k$ is a tangent to the parabola $y^2 = 12x \; then \; k =$

a) 9 b) -9

c) -3 d) 3

Q32B) If in a hyperbola, the distance between the foci is 10 and the transverse axis has length 8, then the length of its latusrectum is

a) 9 b) $\frac{9}{2}$

c) $\frac{32}{3}$ d) $\frac{64}{3}$

Q33B) A point P moves so that sum of its distances from $(-ae, 0)$ and $(ae, 0)$ is $2a$, then the locus of P is

a) $\frac{x^2}{a^2} - \frac{y^2}{a^2(1-e^2)} = 1$ b) $\frac{x^2}{a^2} + \frac{y^2}{a^2(1-e^2)} = 1$

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

Q34B) If $x_1, x_2, ------, x_{18} \; are \; observations$ such that $\sum_{j=1}^{18}(x_j - 8) = 9 \; and \; \sum_{j=1}^{18}(x_j - 8)^2 = 45,$ then the standard deviation of these observations is

a) $\frac{3}{2}$ b) 5

c) $\sqrt{5}$ d) $\sqrt{\frac{81}{34}}$

Q35B) Mean of 100 items is 49. It was discovered that three items which should have been $60, 70, 80$ were wrongly read as $40, 20, 50$ respectively. The correct mean is

a) 48 b) 50

c) 80 d) 40

Q36B) Which of the following is not a measure of central tendency

a) Mean b) Median

c) Mode d) Range

Q37B) A drawer contains 5 brown socks and 4 blue socks well mixed. A man reaches the drawer and pulls out 2 socks at random. The probability that they match is

a) $\frac{4}{9}$ b) $\frac{5}{9}$

c) $\frac{5}{8}$ d) $\frac{5}{12}$

Q38B) Events A, B, C are mutually exclusive events such that $P\,(A) = \frac{3x+1}{3}$, $P\,(B) = \frac{1-x}{4} \; and \; P(C) = \frac{1-2x}{2}$

The set of possible values of x are in the interval

a) $\left[\frac{1}{3}, \frac{1}{2}\right]$ b) $\left[\frac{1}{3}, \frac{2}{3}\right]$

c) $\left[\frac{1}{3}, \frac{13}{3}\right]$ d) $[0, 1]$

Q39B) The Mean and Variance of a random variable X having a Binomial distribution are 4 and 2 respectively then $P(x > 6) =$

a) $\frac{1}{256}$ b) $\frac{3}{256}$

c) $\frac{9}{256}$ d) $\frac{7}{256}$

Q40B) A, B, C, D, E, F in that order are the vertices of a regular hexagon with centre origin. If the position vector of vertices A and B are $4\,\hat{\imath} + 3\hat{\jmath} - \hat{k}$ and $-3\,\hat{\imath} + \hat{\jmath} + \hat{k}$ respectively, then $\overrightarrow{DE} =$

a) $7\,\hat{\imath} + 2\,\hat{\jmath} - 2\,\hat{k}$ b) $-7\,\hat{\imath} - 2\,\hat{\jmath} + 2\,\hat{k}$
c) $3\,\hat{\imath} - \hat{\jmath} - \hat{k}$ d) $-4\,\hat{\imath} - 3\,\hat{\jmath} + \hat{k}$

Q41B) If $4|\vec{a}| = 12|\vec{b}| = 3|\vec{c}| = 12$ and $\vec{a} + \vec{b} + \vec{c} = 0$, then $\vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{c} + \vec{c}\cdot\vec{a} =$

a) -8 b) 8
c) 13 d) -13

Q42B) If $\hat{\imath} - \hat{k}$, $\lambda\,\hat{\imath} + \hat{\jmath} + (1-\lambda)\hat{k}$ and $\mu\hat{\imath} + \lambda\,\hat{\jmath} + (1+\lambda-\mu)\hat{k}$ are three co-terminal edges of a parallelepiped, then its volume depend on

a) $Only\ \lambda$ b) $Only\ \mu$
c) $Both\ \lambda\ and\ \mu$ d) $Neither\ \lambda\ nor\ \mu$

Q43B) The angle between the lines with direction ratios $(4,-3,5)$ and $(3,4,5)$ is

a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$
c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$

Q44B) If the foot of the perpendicular from $(0,0,0)$ to a plane is $(1,2,2)$, then the equation of the plane is

a) $-x + 2y + 8z - 9 = 0$
b) $x + 2y + 2z - 9 = 0$
c) $x + y + z - 5 = 0$
d) $x + 2y - 3z + 1 = 0$

Q45B) The line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ meets the plane $2x + 3y - z = -4$ in the point

a) $(1,2,3)$ b) $(-1,-1,-1)$
c) $(2,1,3)$ d) $(1,1,1)$

Q46B) Which of the following sets is empty set?

a) $A = \{x : x^2 - 2 = 0\ and\ x\ is\ rational\}$
b) $B = \{x : x\ is\ an\ even\ prime\ number\}$
c) $C = \{x : 3x < 5, x \in N\}$
d) $D = \{x : x^2 = 25\ and\ x\ is\ an\ odd\ integer\}$

Q47B) In a group of 600 persons, 550 can speak Hindi and 250 can speak English, then the number of persons who can speak both Hindi and English is

a) 100 b) 200
c) 300 d) 350

Q48B) Let R be a relation on the set N of natural numbers defined by $R = \{(x,y) : x + 2y = 8,\ x \in N, y \in N\}$ then Range of R is

a) $\{2,4,6\}$ b) $\{2,4,1\}$
c) $\{3,2,1\}$ d) None of these

Q49B) Let $A = \{1,2,3\}$ and let $R_1 = \{(1,1),(1,3),(3,1),(2,2),(2,1),(3,3)\}$
$R_2 = \{(2,2),(3,1),(1,3)\}$ and
$R_3 = \{(1,3),(3,3)\}$
Then for the relations R_1, R_2 and R_3 which is true?

a) R_1 is reflexive but neither symmetric nor transitive.
b) R_2 is reflexive, symmetric but not transitive.
c) R_3 is symmetric and transitive
d) None of these

Q50B) Let $f : R \to R$ given by $f(x) = x^2 + 4$ then the pre-images of 40 under f are

a) ± 5 b) ± 6
c) ± 7 d) None of these

Q51B) Let $f : R \to R$ and $g : R \to R$ be two functions s.t $fog(x) = Sin\,x^2$ and $gof(x) = Sin^2 x$ then $g(x) =$

a) $Sinx$ b) $Sin^2 x$
c) $Sin\,x^2$ d) x^2

Q52B) If $\frac{(1+i)^2}{2-i} = x + iy$ then $x + y =$

a) $-\frac{2}{5}$ b) $\frac{6}{5}$
c) $\frac{2}{5}$ d) $-\frac{6}{5}$

Q53B) If $1, \omega, \omega^2$ are the cube roots of unity, then $(1-\omega+\omega^2)(1-\omega^2-\omega^4)(1-\omega^4+\omega^8)(1-\omega^8+\omega^{16}) - - - -$ to $2n$ factors is

a) $2n$ b) 2^{2n}
c) 1 d) -2^{2n}

Q54B) Let "r" be a positive real number and "a" be a fixed real number, then $|x-a| \le r \Leftrightarrow$

a) $x \in (a-r, a+r)$
b) $x \in [a-r, a+r]$
c) $x > a + r$
d) $x \ge a + r$

Q55B) The solution set of the inequation $\left|\frac{2}{x-4}\right| > 1, x \neq 4$ is

a) $2 < x < 6$ b) $2 > x > 6$
c) $[2,6]$ d) $(2,4) \cup (4,6)$

Q56B) The solution set of the inequation $2x + y > 5$ *is*

a) Half plane that contains the origin.

b) Open half plane not containing the origin.

c) Whole xy-plane except the points lying on the line $2x + y = 5$

d) None of these

Q57B) The point at which the maximum value of $z = x + y$, subject to the constraints $x + 2y \leq 70, 2x + y \leq 95, x, y \geq 0$ is obtained, is

a) $(30, 25)$ b) $(35, 20)$

c) $(40, 15)$ d) $(20, 35)$

Q58B) In a geometric progression (G.P) the ratio of the sum of the first three terms and first six terms is 125 : 152, then common ratio is

a) $\frac{1}{5}$ b) $\frac{2}{5}$

c) $\frac{3}{5}$ d) $\frac{4}{5}$

Q59B) If P^{th} term of an A.P is q and the q^{th} term is P, then the 10^{th} term is

a) $P - q + 10$ b) $P + q + 11$

c) $P + q - 9$ d) $P + q - 10$

Q60B) The number of permutations of 4 letters that can be made out of the letters of the word "EXAMINATION" is

a) 2454 b) 2452

c) 2450 d) 2448

SECTION-B PHYSICS (61-120)

Q61) Which of the following is true about light?

I It is electromagnetic wave

II It does not propagate in vacuum

III Its maximum speed is approximately 3×10^8 m/s

a) I only b) I and II only

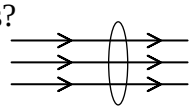
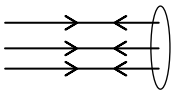
c) I and III only d) I, II, and III

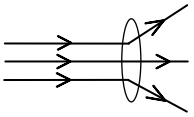
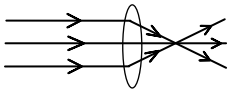
Q62) The speed of light in a certain material is 50% of its speed in vacuum. What is the refractive index of the material?

a) 1.5 b) 0.5

c) 6.0 d) 2

Q63) Parallel rays of light strike a convex lens. Which of the following diagrams show what happens to the rays when they strike the lens?

a)  b) 

c)  d) 

Q64) An object of height 10 cm is placed 50 cm in front of a bi-convex lens with a focal length of 20 cm. Which of the following is true about the image?

I The image is virtual

II The image is situated on the opposite side as the object

III The image is inverted

a) I only b) I and II only

c) II and III only d) II only

Q65) For an object in front of a plane mirror, which of the following about its images is (are) true?

I The image is real

II The image is upright

III The height of the image is twice the image of the object

a) I, II and III b) I and II only

c) II only d) I and III only

Q66) What is the de Broglie wavelength of an electron which is accelerated through a potential difference of 10 kV.

a) 0.1227 A b) 3.88 A

c) 0.388 A d) 1.227 A

Q67) The radius of the 5th orbit of hydrogen atom is 13.25 Å. Calculate the wavelength of the electron in the 5th orbit.

a) 83.21 A b) 16.64 A

c) 20.8 A d) 3.33 A

Q68) Find the (i) angular momentum (ii) velocity of the electron in the 5th orbit of hydrogen atom. ($h = 6.6 \times 10^{-34}$ Js, $m = 9.1 \times 10^{-31}$ kg)

a) Angular momentum = 10.5×10^{-34} kg $m^2 s^{-1}$, velocity = 4.4×10^5 ms^{-1}

b) Angular momentum = 10.5×10^{-34} kg $m^2 s^{-1}$, velocity = 2.2×10^5 ms^{-1}

c) Angular momentum = 5.25×10^{-34} kg $m^2 s^{-1}$, velocity = 4.4×10^5 ms^{-1}

d) Angular momentum = 5.25×10^{-34} kg $m^2 s^{-1}$, velocity = 2.2×10^5 ms^{-1}

Q69) Calculate the number of nuclei of carbon-14 undecayed after 22,920 years if the initial number of carbon-14 atoms is 10,000. The half-life of carbon-14 is 5730 years.
a) 1432 b) 358
c) 1074 d) 625

Q70) A hydrogen atom is excited by radiation of wavelength 97.5 nm. Find the principal quantum number of the excited state.
a) 4 b) 3
c) 5 d) 2

Q71) Half-lives of two radioactive elements A and B are 20 minutes and 40 minutes respectively. Initially, the samples have equal number of nuclei. Calculate the ratio of decayed numbers of A and B nuclei after 80 minutes.
a) 4/5 b) 5/4
c) 2/3 d) 3/2

Q72) When a PN junction is forward biased
a) Depletion region decreases
b) Minority carriers are not affected
c) Holes and electrons move away from junction
d) All of above

Q73) Which type of special purpose diode is formed by a metal and semiconductor?
a) Varactor b) Tunnel
c) Zener d) Schottky

Q74) A semiconductor in its purest form is known as_
a) Superconductor
b) Insulator
c) Intrinsic semiconductor
d) Extrinsic semiconductor

Q75) On which principle optical fiber works?
a) Scattering of light
b) Total internal reflection
c) Total internal absorption
d) Optical rotation

Q76) An object of mass 3kg at rest. Now a force of $\vec{F} = 6t^2\hat{\imath} + 4t\hat{\jmath}$ is applied on the object, then velocity of object at t= 3s is: $18\hat{\imath} + 6\hat{\jmath}$
a) $18\hat{\imath} + 3\hat{\jmath}$ b) $18\hat{\imath} + 6\hat{\jmath}$
c) $3\hat{\imath} + 18\hat{\jmath}$ d) $18\hat{\imath} + 4\hat{\jmath}$

Q77) A mass of 1Kg is thrown up with a velocity of 100m/s. After 5 sec, it explodes into two parts. One part of mass 400mg comes down with a velocity of 25 m/s. The velocity of other part is: (Take g =10m/s^2)
a) 40m/s b) 80m/s
c) 100m/s d) 60m/s

Q78) A block of mass 10kg placed on rough horizontal surface having coefficient of friction μ=0.5, if the horizontal force of 100N acting on it, then acceleration of the block will be
a) 10m/s^2 b) 5m/s^2
c) 15m/s^2 d) 0.5m/s^2

Q79) A shell of mass 200gm is ejected from a gun of mass 4 Kg by an explosion that generates 1.05KJ of energy. The initial velocity of shell is:
a) 40m/s b) 120m/s
c) 100m/s d) 80m/s

Q80) The potential energy of a long spring when stretched by 2 cm is U. If the spring is stretched by 8 cm, the potential energy stored in it is:
a) U/4 b) 4U
c) 8U d) 16U

Q81) Two identical balls A and B having velocities of 0.5m/s and 0.3m/s respectively collide elastically in one dimension. The velocities of B and A after the collision respectively will be
a) -0.5m/s and 0.3m/s
b) 0.5m/s and -0.3m/s
c) -0.3m/s and 0.5m/s
d) 0.3m/s and 0.5m/s

Q82) If the magnitude of sum of two vectors is equal to the magnitude of difference of two vectors, the angle between these vectors is:
a) 45˚ b) 180˚
c) 0˚ d) 90˚

Q83) The particle has initial velocity $(3\hat{\imath} + 4\hat{\jmath})$ and has acceleration $(0.4\hat{\imath} + 0.3\hat{\jmath})$. Its speed after 10 sec is:
a) 7 units b) 7√2 units
c) 8.5 units d) 10 units

Q84) The horizontal range and the maximum height of the projectile are equal. The angle of projection of projectile is:
a) $\theta = \tan^{-1}(1/4)$ b) $\theta = \tan^{-1}(4)$
c) $\theta = \tan^{-1}(2)$ d) $\theta = 45^\circ$

Q85) $\vec{A}$ and $\vec{B}$ are two vectors and θ is the angle between them, if $|\vec{A} \times \vec{B}| = \sqrt{3}\ (\vec{A}.\vec{B})$, the value of θ is
a) 45° b) 30°
c) 90° d) 60°

Q86) A rod of length 3cm and its mass per unit length is directly proportional to the distance x from one of its ends then its centre of gravity from that end will be
a) 1.5m b) 2m
c) 2.5m d) 3m

Q87) The moment of Inertia of a disc of mass M and radius R about an axis, which is tangential to the circumference of the disc and parallel to its diameter is:
a) $\frac{5}{4}MR^2$ b) $\frac{1}{2}MR^2$
c) $\frac{3}{2}MR^2$ d) $\frac{4}{5}MR^2$

Q88) Which of the following have the same dimensions as planks constant?
a) Moment of Momentum
b) Moment of force
c) Momentum/distance
d) Force/distance

Q89) A body under the action of a force $\vec{F} = 6\hat{\imath} - 8\hat{\jmath} + 10\hat{k}$ acquires an acceleration of 1m/s^2. The mass of this body must be:
a) 10 Kg b) 20 Kg
c) $10\sqrt{2}$ Kg d) $2\sqrt{10}$ Kg

Q90) If Energy (E), Velocity (V), and Time (T) are chosen as the fundamental quantities. The dimensional formula of Surface Tension is:
a) [E V^{-2} T^{-1}] b) [E V^{-1} T^{-2}]
c) [E V^{-2} T^{-2}] d) [E^{-2} V^{-1} T^{-3}]

Q91) The force between the two charges is 240N. If the distance between the charges is doubled, the force will be
a) 60N b) 90N
c) 120N d) 160N

Q92) What will be the flux coming out of any surface a cube, if a change QμC is placed at the centre of the cube?
a) $\frac{Q}{6\varepsilon_0}.10^{-3}$ b) $\frac{Q}{24\varepsilon_0}$
c) $\frac{Q}{8\varepsilon_0}$ d) $\frac{Q}{6\varepsilon_0}.10^{-6}$

Q93) What does an electric dipole experience when it is kept in the non-uniform electric field?
a) Only a force
b) Only torque
c) Force and torque both
d) Neither force nor torque

Q94) The capacitance of the capacitor is independent of
a) The charges present on the plate
b) The distance of separation between the plates
c) The shape of the plates
d) The size of the plates

Q95) Consider two capacitances of capacity C_1 and C_2 which are connected in series and have potential difference V. What is the potential difference across C_1?
a) $(\frac{C_1}{C_1+C_2}).V$ b) $(\frac{C_1+C_2}{C_1}).V$
c) $(\frac{C_2}{C_1}).V$ d) $(\frac{C_2}{C_1+C_2}).V$

Q96) The resistivity of certain metals or alloys drops to zero when they are cooled below a certain temperature, this phenomenon is known as _____.
a) Conductivity
b) Partial conductivity
c) Superconductivity
d) Non-conductivity

Q97) In a Wheatstone bridge if the battery and galvanometer are interchanged then the deflection in galvanometer will
a) change in previous direction
b) not change
c) change in opposite direction
d) none of these.

Q98) When a straight conductor is carrying current:
a) There are circular magnetic field lines around it
b) There are magnetic field lines parallel to the conductor
c) There are no magnetic field lines
d) None of the above

Q99) The magnetic field inside a long straight solenoid carrying current:
a) Is zero
b) Decrease as we move towards its end
c) Is same at all points
d) Increase as we move towards its end

Q100) For which of the following is magnetic susceptibility negative?
a) Paramagnetic and Ferromagnetic materials
b) Paramagnetic Materials only
c) Ferromagnetic Materials only
d) Diamagnetic Materials

Q101) What is the need for laminating the core of a transformer?
a) To reduce the resistance in the winding
b) To reduce the eddy currents
c) To reduce the hysteresis
d) None of the above

Q102) A magnet is moved towards a coil (i) quickly (ii) slowly, then the induced e.m.f. is
a) larger in case (i)
b) smaller in case (i)
c) equal to both the cases
d) larger or smaller depending upon the radius of the coil

Q103) Electromagnetic waves are produced by
a) A static charge
b) An accelerated charge
c) A moving charge
d) Charged particles

Q104) The direction in which electromagnetic waves propagate is the same as that of
a) $\vec{E} \times \vec{B}$ b) $\vec{B} \times \vec{E}$
c) $\vec{E}$ d) $\vec{B}$

Q105) The ratio of the amplitude of the magnetic field to the amplitude of the electric field for electromagnetic wave propagation in a vacuum is equal to
a) Unity
b) Speed of light in vacuum
c) Reciprocal of the speed of light in vacuum
d) The ratio of magnetic permeability to electrical susceptibility in a vacuum.

Q106) A missile is launched with a velocity less than the escape velocity. The sum of its kinetic and potential energy is
a) Positive
b) Negative
c) Zero
d) may be positive or negative

Q107) The point at which the gravitational force acting on any mass is zero due to the Earth and the Moon system is (The mass of the Earth is approximately 81 times the mass of the Moon and the distance between the Earth and the Moon is 3,85,000km.)
a) 36,000 km from the moon.
b) 38,500 km from the moon.
c) 34,500 km from the moon.
d) 30,000 km from the moon.

Q108) If a body of mass m is taken out from a point below the surface of earth equal to half the radius of earth, R, to a height R above the earth's surface, then work done on it will be
a) (5/6) mgR b) (6/7) mgR
c) (7/8) mgR d) (8/9) mgR

Q109) A body of mass 1 kg is attached to one end of a wire and rotated in horizontal circle of diameter 40 cm with a constant speed of 2 m/s. what is the area of cross-section of the wire if the stress developed in the wire is 5×106 N/m²?
a) 2 mm² b) 3 mm²
c) 4 mm² d) 5 mm²

Q110) In a wire, when elongation is 2 cm energy stored is E. if it is stretched by 10 cm, then the energy stored will be
a) E b) 2 E
c) 20 E d) 25 E

Q111) A rocket is fired from the earth to the moon. The distance between the earth and the moon is r and the mass of the earth is 81 times the mass of the moon. The gravitational force on the rocket will be zero, when its distance from the moon is
a) r/5 b) r/10
c) r/15 d) r/20

Q112) A body has weight W on the ground. The work which must be done to lift it to a height equal to the radius of earth R is
a) Equal to W X R
b) Greater than W X R
c) Less than W X R
d) Cannot be estimated

Q113) A Carnot engine uses first an ideal monoatomic gas (γ=5/3) and then an ideal diatomic gas (γ=7/5) as its working substance. The source and sink temperatures are 411 °C and 69 °C respectively and the engine extract 1000 J of heat from the source in each cycle. Then,

a) the efficiencies in the two engines are in the ratio 21:25.
b) the area enclosed by the P-V diagram in the first case only is 500J.
c) the area enclosed by the P-V diagram in the both cases is 500J.
d) the heat energy rejected by the engine in the first case is 600J while in the second case is 714.3J.

Q114) Heat is absorbed by a body but its temperature does not rise. Which of the following statement explains the phenomenon

a) Only K.E. of vibration increases.
b) Only P.E. on inter molecular force changes
c) No increase in internal energy takes place
d) Increase in Kinetic energy is balanced by decrease in potential energy.

Q115) Two chambers, one containing m1 gm of a gas at P1 pressure and other containing m2 gm of a gas at P2 pressure, are put in communication with each other. If temperature remains constant, the common pressure reached will be

a) $\frac{P1\ P2\ (m1+m2)}{P2\ m1+P1\ m2}$ b) $\frac{m1\ m2\ (P1+P2)}{P2\ m1+P1\ m2}$

c) $\frac{P1\ P2\ m1}{P2\ m1+P1\ m2}$ d) $\frac{P2\ m1\ m2}{P2\ m1+P1\ m2}$

Q116) At a given temperature and pressure 64 gm of Oxygen and X gm of H_2 occupy the same volume. Then X= .....gm

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

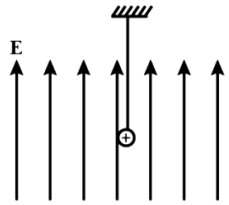
Q117) A closed hollow insulated cylinder is filled with gas at 0^0C and also contains an insulated piston of negligible weight and negligible thickness at the middle point. The gas at one side of the piston is heated to 100^0C. If the piston moves 5cm, the length of the hollow cylinder is

a) 13.65 cm b) 27.3 cm
c) 64.6 cm d) 54.6 cm

Q118) Two simple Harmonic Motions of angular frequency 100 and 1000 rad S^{-1} have the same displacement amplitude. The ratio of their maximum accelerations is :

a) $1:10^3$ b) $1:10^4$
c) 1:10 d) $1:10^2$

Q119) If a positively charged pendulum is oscillating in a uniform electric field as shown in figure. Its time period of SHM as compared to that when it was uncharged.



a) Will increase
b) Will decrease
c) Will not change
d) Will first increase then decrease

Q120) Three waves of equal frequency having amplitudes 10 mm, 4 mm and 7 mm arrive at a given point with successive phase difference $\frac{\pi}{2}$. The amplitude of the resulting wave (in mm) is given by:

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

SECTION-C CHEMISTRY(121-180)

Q121) Oxidation number of P in PO_4^{3-}, of S in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$ are respectively:

a) +3, +6 and +5 b) +5, +3 and +6
c) +3, +6 and +6 d) +5, +6 and +6

Q122) What is the number of electrons transferred in an equation if the Nernst equation is $E\ (cell) = E°(cell) - 9.83 \times 10^{-3} \times \log_{10}$ (Anode/Cathode)?

a) 2 b) 6
c) 4 d) 1

Q123) Which of the following is a specific conductivity reagent?

a) *KCl* b) *HCl*
c) *NaCl* d) $MgCl_2$

Q124) Schottky defect in a crystal is observed when

a) The ion leaves its normal position and occupies an interstitial location
b) The unequal number of cations and anions are missing from the lattice
c) The density of the crystal increases
d) An equal number of cations and anions are missing from the lattice

Q125) What is the process of producing electric dipoles inside the dielectric by an external electric field
a) Polarisation b) Dipole moment
c) Susceptibility d) Magnetisation

Q126) Which of the following metals would have the highest packing efficiency
a) Copper b) Potassium
c) Chromium d) Polonium

Q127) How the crystal classified
a) According to place of origin
b) According to the position of the unit cell
c) According to the symmetry of the unit cell
d) According to the purity of the unit cell

Q128) Which of the following isotherm is applicable to physical adsorption?
a) Langmuir b) BET
c) Freundlich d) Kisluik

Q129) Polymers are not classified on the basis of which of the following
a) Source
b) Number of monomers
c) Method of preparation
d) Structure

Q130) Which one will have the highest 2nd ionisation energy?
a) $1s^2\ 2s^2\ 2p^6\ 3s^1$ b) $1s^2\ 2s^2\ 2p^4$
c) $1s^2\ 2s^2\ 2p^6$ d) $1s^2\ 2s^2\ 2p^6\ 3s^2$

Q131) Atomic radii _____ along the periods
a) Increases b) Decreases
c) Remains constant d) Irregular

Q132) Molecular orbitals are filled according to
a) Aufbau's principle
b) Hund's rule
c) Pauli's Exclusion Principle
d) All these

Q133) The maximum number of 90° angles between bond pair-bond pair of electrons is observed in
a) dsp^2 hybridisation b) sp^3d hybridisation
c) dsp^3 hybridisation d) sp^3d^2 hybridisation

Q134) In BrF_3, lone pairs are present at the equatorial positions. This is to minimise
a) bp-bp repulsion only b) lp-lp repulsion only
c) lp-bp repulsion only d) both (B) and (C)

Q135) O-O bond length is minimum in
a) O_2^- b) O_2
c) O_2^+ d) O_2^{2-}

Q136) The flame of caesium is in the colour_____
a) White b) Red violet
c) Yellow d) Blue

Q137) The correct order of thermal stability of following carbonates is:
a) $BaCO_3 > CaCO_3 > SrCO_3 > MgCO_3$
b) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$
c) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
d) $MgCO_3 > CaCO_3 > BaCO_3 > SrCO_3$

Q138) What is the range of oxidation states shown by nitrogen in its oxides?
a) +1 to +3 b) +2 to +4
c) +1 to +2 d) +1 to +5

Q139) Which of the following is the correct order of oxidising power of perhalates
a) $BrO_4^- > ClO_4^- > IO_4^-$
b) $IO_4^- > BrO_4^- > ClO_4^-$
c) $IO_4^- > ClO_4^- > BrO_4^-$
d) $BrO_4^- > IO_4^- > ClO_4^-$

Q140) The common oxidation state of Lanthanide is
a) +1 b) +2
c) +3 d) +4

Q141) The colour of transition metal is due to
a) presence of unpaired d-electron
b) d-d transition
c) nature of ligands at geometry of complex
d) All of the above

Q142) Which of the following is an alloy of iron?
a) Vitallium b) Brass
c) Invar d) Solder

Q143) Werner postulated that octahedral, tetrahedral and square planer geometrical shapes are more common in coordination compounds of
a) Alkali metals b) Lanthanides
c) Actinides d) Transition metals

Q144) Which of the following is not a subdivision of structural isomerism?
a) Geometrical isomerism
b) Linkage isomerism
c) Coordination isomerism
d) Ionisation isomerism

Q145) Which of the following is not considered as an organometallic compound?
a) Ferrocene b) Cis-platin
c) Ziese's salt d) Grignard reagent

Q146) ---------- and ---------- are ores of copper
a) Dolomite, bornite
b) Bornite, chalcopyrite
c) Chalcopyrite, dolomite
d) Bornite, magnesite

Q147) The product from blast furnace is called
a) Cast iron b) Wrought iron
c) Pig iron d) Steel

Q148) IUPAC name of the $(CH_3)_2CHCH(CH_3)_2$ is
a) 1, 1, 2, 3-tetramethylethane
b) 1, 2-di-isopropylethane
c) 2, 3-dimethylbutane
d) 2, 3, 3-trimethylbutane

Q149) Baker-Nathan effect is also known as
a) Hyperconjugation b) Inductive effect
c) Mesomeric effect d) Electromeric effect

Q150) Identify the incorrect statement regarding aromaticity.
a) It is the extra stability possessed by a molecule
b) p-orbitals must be planar and overlap
c) Cyclic delocalization takes place
d) It does not follow Huckel's rule

Q151) An activating substituent group activates
a) Ortho position
b) Para position
c) Ortho and para positions
d) Meta position

Q152) Which among the following does not exhibit geometric isomerism
a) 1-hexene b) 2-hexene
c) 3-hexene d) 4-hexene

Q153) Alkanes undergo halogenation. It is example of
a) Nucleophilic substitution
b) Elimination
c) Free-radical substitution
d) Electrophilic substitution

Q154) Select the incorrect statement
a) The addition reaction occur more frequently in the alkenes than the alkynes
b) The pi system of the alkynes gets weakened when they lose the pi atom
c) Alkynes readily undergo oligomerization
d) Alkynes do not undergo polymerization

Q155) When phenol is treated with excess bromine water it gives
a) m-bromophenol
b) o-and p-bromophenol
c) 2,4-dibromophenol
d) 2,4,6 tribromephenol

Q156) How are alcohols prepared from haloalkanes?
a) By treating with concentrated H_2SO_4
b) By heating with aqueous NaOH
c) By treating with a strong reducing agent
d) By treating with Mg metal

Q157) Iodoform can be prepared from all except:
a) isopropyl alcohol b) 3-methyl-2-butanone
c) isobutyl alcohol d) ethyl methyl ketone

Q158) Aqueous NaOH solution is added to a mixture of benzaldehyde and formaldehyde to produce
a) Benzyl alcohol + sodium formate
b) Sodium benzoate + methanol
c) Benzyl alcohol + methanol
d) Sodium benzoate+sodium formate

Q159) Carboxylic acid on reduction with HI/ phosphorous yields
a) Alkane b) Alcohols
c) Aldehydes d) Ketones

Q160) What will be the reactivity order of the following with water?
a)Acid halide > ester > acid anhydride > amide
b) Acid anhydride > amide > acid halide > ester
c) Amide > ester > acid anhydride > acid halide
d) Acid halide > acid anhydride > ester > amide

Q161) Which of the following is used as a reactant for the nitration of benzene to form nitrobenzene?
a) HNO_2
b) HNO_3
c) Mixture of HNO_2 and HNO_3
d) Mixture of HNO_3 and H_2SO_4

Q162) Which of the following statements concerning methylamine is correct?
a) Methyl amine is stronger base than NH_3
b) Methyl amine is less basic than NH_3
c) Methyl amine is slightly acidic
d) Methyl amine forms salts with alkali

Q163) Glucose will show mutarotation when solvent is
a) Acidic b) Basic
c) Amphoteric d) Neutral

Q164) Beriberi is caused due by the deficiency of-
a) Vitamin C b) Vitamin B2
c) Vitamin B d) Vitamin B1

Q165) Which of the following Greenhouse Gases is Present in Very High Quantities?
a) Carbon dioxide b) Ethane
c) Propane d) Methane

Q166) Which of the following is not a law of chemical combination?
a) Law of Multiple Proportions
b) Avogadro's Law
c) Law of Definite Proportion
d) Law of Conservation of volume

Q167) According to Bohr model of hydrogen atom, relation between principal quantum number n and radius r of stable orbit:
a) $r \alpha \frac{1}{n}$ b) $r \alpha n$
c) $r \alpha \frac{1}{n^2}$ d) $r \alpha n^2$

Q168) The position and velocity of small particle like electron cannot be simultaneously determined. This statement is for
a) Heisenberg uncertainty principle
b) Principle of de Broglie's wave nature of electron
c) Pauli's exclusion principle
d) Aufbau's principle

Q169) Le Chatelier Principle is applicable to
a) Heterogeneous reaction
b) Homogeneous reaction
c) Irreversible reactions
d) System in equilibrium

Q170) Ostwald's dilution law is applicable to
a) Strong electrolytes only
b) Weak electrolytes only
c) Non-electrolytes
d) Strong as well as weak electrolytes

Q171) What is the pH of 0.0001molar *HCl* solution
a) 1 b) 2
c) 3 d) 4

Q172) Which of the following is not a type of Basic buffer mixture?
a) NH_4OH
b) NH_4Cl
c) $H_2CO_3 + Na_2CO_3$
d) Glycine + Glycine hydrochloride

Q173) What effect does temperature have on the half-life of a first-order reaction?
a) It increases
b) It decreases
c) It remains the same
d) Both increases as well as decrease

Q174) The unit of rate constant for second order reaction is
a) litre $mole^{-2}$ sec^{-2} b) litre $mole^{-2}$ sec^{-1}
c) litre d) litre $mole^{-1}$ sec^{-1}

Q175) Which condition holds for the ideal solution?
a) Change in volume is zero
b) Change in volume is non-zero
c) Change in enthalpy is non-zero
d) None of the above

Q176) The van't Hoff factor for a compound that undergoes dissociation and association in a solvent is respectively
a) Less than one and less than one
b) Greater than one and less than one
c) Greater than one and greater than one
d) Less than one and Greater than one

Q177) What will be the value of ΔH, if the forward and reverse reactions have the same energy of activation?
a) $\Delta H = \Delta G = \Delta S = 0$ b) $\Delta S = 0$
c) $\Delta G = 0$ d) $\Delta H = 0$

Q178) Hess's law states that a chemical reaction is independent of the route by which chemical reaction takes place while keeping the same
a) Initial conditions only
b) Final conditions only
c) Mid-conditions
d) Initial and final conditions

Q179) The enthalpy of formation of $CO_2(g)$, $H_2O(l)$ and Propene(g) are -395.5, -285.8 and 20.42KJ mol^{-1} respectively. The enthalpy change for the combustion of cyclopropane at 298K will be(The enthalpy of isomerisation of cyclopropane to propane is -33.0KJ mol^{-1})
a) -1021.32 KJ mol^{-1} b) -20911.32 KJ mol^{-1}
c) -5021.32 KJ mol^{-1} d) -3141.32 KJ mol^{-1}

Q180) The correct relationship between free energy change in a reaction and the corresponding equilibrium constant K_C is
a) $-\Delta G = RT \ln K_C$ b) $\Delta G° = RT \ln K_C$
c) $-\Delta G° = RT \ln K_C$ d) $\Delta G = RT \ln K_C$