SRI CHAITANYA EDUCATIONAL INSTITUTIONS,INDIA.

A.P,TELANGANA,KARNATAKA,TAMILNADU,MAHARASHTRA,DELHI,RANCHI, CHANDIGARH

SEC : SR AIIMS SUPER60 & NEET MPL **DATE: 16-04-20**

SUB: BIOLOGY **NEET CUMULATIVE TEST - 4** **Max. Marks :720**

IMPORTANT INSTRUCTIONS :

- **Pattern of the Entrance Examination**:-
  Paper containing 180 objective type questions ,from Biology, Physics and Chemistry
- **Use Blue/Black Ball Point Pen only** to darken the appropriate circle. Answers marked with pencil would not be evaluated.
- Each item carries **4marks**. For each correct response the candidate will get 4 marks. For each incorrect response **1mark** will be deducted from the total score

1. The point of eye where the visual acuity is the greatest
   (1) Blind spot
   (2) Macula densa
   (3) Ora serrata
   (4) Fovea
2. In *Pheretima*, the segment that contains spermathecae, pharyngeal nephrida and integumentary nephridia is
   (1) 5^{th}
   (2) 7^{th}
   (3) 6^{th}
   (4) 14^{th}
3. Which of the following is an ideal contraceptive for the females who want to delay pregnancy and/or space children ?
   (1) Barrier method
   (2) Intra Uterine Devices
   (3) Oral Contraceptive Pills
   (4) Surgical method
4. Government of India legalized MTP in the year
   (1) 1951
   (2) 1871
   (3) 1981
   (4) 1971
5. In assisted reproductive technology after in-vitro fertilization, which of the following is transferred into fallopian tube ?
   (1) Blastocyst
   (2) Only zygote
   (3) Morula in 8-32 celled stage
   (4) Embryo upto 8 blastomeres or zygote

6. Findout incorrect match about cell cycle
   (1) Anaphase II-seggregation of chromatids
   (2) S phase – DNA replication
   (3) Diplotene – visibility of chiasmata
   (4) Quiescent stage – DNA content is 4C
7. Findout correct statement
   (1) Formation enzyme substate complex is not obligatory for enzyme action
   (2) When the substrate is bound to the enzyme, a new structure of enzyme called transition state is formed
   (3) Substrate induces the enzyme to alter its shape, fitting more tightly around the substrate
   (4) There is only one altered structural state between stable substrate and product
8. Match the following

List-I	List-II
A. Ricin	I. Drug
B. Codein	II. Toxin
C. Curcumin	III. Lectin
D. Concanavalin A	IV. Alkaloid

	A	B	C	D
(1)	IV	II	I	III
(2)	II	IV	I	III
(3)	II	III	I	IV
(4)	II	I	III	IV

9. Correct statements of the following
   A. SER is extensive and continuous with outer membrane of nucleus
   B. RER is frequently observed in the cells actively involved in protein synthesis and secretion
   C. Ribosomes are attached with E.R through their 40S sub unit
   D. SER is the major site of lipid synthesis
   (1) A,D
   (2) B,C
   (3) B,D
   (4) A,C
10. Environmental heterophily is found in
   (1) Butter cup
   (2) Larkspur
   (3) Coriander
   (4) Cotton
11. Before origin of life on early earth, water and carbon dioxide were produced by the combination of oxygen with
   (1) Ammonia and methane
   (2) Complex organic molecules
   (3) Hydrogen sulphide
   (4) Sulphates and nitrates
12. Allelic frequencies of a population tends to remain stable if the population is large, without large scale mutations, without migration and with
   (1) Random matings
   (2) Selective matings
   (3) Natural selection
   (4) Differential reproductive success

13. The first human-like being was
    (1) *Homo sapiens fossilis*
    (2) *Australopithacus*
    (3) *Homo habilis*
    (4) *Homo erectus*
14. In India, we find mangoes with different flavours, colours, fibre content and sugar content. The large variation is due to
    (1) Genetic diversity
    (2) Species diversity
    (3) g-diversity
    (4) Ecosystem diversity
15. Jim Corbett National Park is known for
    (1) Lions
    (2) Tigers
    (3) Black buck
    (4) Rhino
16. Sequence of electron transport in complex IV of ETS.
    (1) $Cyta \rightarrow Cyta_3 \rightarrow CuA \rightarrow CuB$
    (2) $Cyta \rightarrow CuA \rightarrow Cyta_3 \rightarrow CuB$
    (3) $CuA \rightarrow Cyta \rightarrow CuB \rightarrow Cyta_3$
    (4) $CuA \rightarrow Cyta \rightarrow Cuta_3 \rightarrow CuB$
17. Assimilatory power utilesed in the reduction phase per one turn of calvin cycle
    (1) 3 ATP, 2 $NADPH+H^+$
    (2) 6 ATP, 3 $NADPH+H^+$
    (3) 2ATP,2$NADPH+H^+$
    (4) 12ATP, 12$NADPH+H^+$
18. Root nodules in Alnus are produced by
    (1) Anabaena, a cyanobacterium
    (2) Rhizobium, a bacterium
    (3) Frankia, an actinomycetes
    (4) Azato bacter, a bacterium
19. Incorrect statement of the following
    (1) Active transport is uphill transport
    (2) Different proteins in the membrane play a major role in both active as well as passive transport
    (3) Porins are found in the outer membrane of plastids, mitochondria and all bacteria
    (4) Facilitated diffusion occurs only when concentration gradient is present
20. Remnant of nucellus is persistant in the seeds of
    (1) Maize, barley
    (2) Castor, sunflower
    (3) Pea, bean
    (4) Black pepper, beet

21. A narrow finger like tubular projection which is a vestigial organ arises from
    (1) Rectum
    (2) Caecum
    (3) Colon
    (4) Ileum
22. The enamel of tooth is
    (1) Ectodermal in origin
    (2) Endodermal in origin
    (3) Mesodermal in origin
    (4) Meso and endodermal in origin
23. The duct of gall bladder is joined with
    (1) Cystic duct
    (2) Common hepatic duct
    (3) Pancreatic duct
    (4) Hepato-pancreatic duct
24. Which enzyme initiates protein digestion?
    (1) Pepsin
    (2) Trypsin
    (3) Aminopeptidase
    (4) Carboxypeptidase
25. The abnormal frequency of bowel movement and increased liquidity of faecal discharge is known as
    (1) Constipation
    (2) Indigestion
    (3) Diarrhoea
    (4) Vomiting
26. Vegetative propagation in water hyacinth takes place by
    (1) Offsets
    (2) Bubils
    (3) Leaf buds
    (4) Suckers
27. Meristems responsible for producing secondary tissues are
    A. Inter fascicular cambium
    B. Cork cambium
    C. Fascicular vascular cambium
    D. Intercalary meristem
    (1) A,B only
    (2) A,B,C,D
    (3) A,B,C
    (4) A,B,D
28. Which amino acids are abundant in histone proteins
    (1) Histidine, proline
    (2) Serine, Threonine
    (3) Valine, Leucine
    (4) Arginine, Lysine
29. Replicationof DNA is
    (1) Semiconservative and continous
    (2) Semiconservative and discontinuous
    (3) Conservative and semidiscontinous
    (4) Semi conservative and semidiscontinuous

30. Incorrect match regarding biofortification
    (1) Lab lab – protein enriched
    (2) Rice – iron fortified
    (3) Bathua – vitamin A enriched
    (4) Spinach – iron and calcium enriched

31. Total volume of air accommodated in the lungs at the end of a forced inspiration is called
    (1) RV
    (2) TLC
    (3) FRC
    (4) VC

32. Simultaneous origin of two or more species from the preexisting species is possible due to
    (1) Disruptive selection
    (2) Directional selection
    (3) Stabilising selection
    (4) Anagenesis

33. Gasses diffuse over the respiratory surface because of
    (1) pO_2 is more in alveoli than in blood
    (2) pO_2 is more in blood than in tissues
    (3) pCO_2 is more in alveoli than in blood
    (4) pCO_2 is more in blood than in tissues

34. Pick the correct statement
    (1) Contraction of internal intercostal muscles lifts up the ribs and sternum
    (2) RBCs transport oxygen only
    (3) Thoracic cavity is anatomically an air tight chamber
    (4) Healthy man can inspire approximately 500 mL of air per minute

35. Statement-I : RBCs contain a very high concentration of the enzyme, carbonic anhydrase and minute quantities of the same is present in the plasma.
    Statement-II : Carbonic anhydrase catalyses the formation of carbonic acid from H_2O and CO_2 at lungs.
    (1) Both S I and S II are correct
    (2) Both S I and S II are wrong
    (3) S I is correct but S II is wrong
    (4) S I is wrong but S II is correct

36. Events that occur in the root tip cells of onion in the S-phase of cell cycle
    A. 2C content of DNA becomes 4 C
    B. Centrioles duplicate in the cytoplasm
    C. 16 chromosomes become 32
    D. DNA replication occurs in the nucleus
    (1) A,C,D
    (2) A,B,C
    (3) A,C,D
    (4) A,D

37. Alpha – helix and Beta-plated structure of protein represent
    (1) Secondary structure
    (2) Teritairy structure
    (3) Primary structure
    (4) Quaternary structure
38. The sticky layer present on the cell wall of bacteria is called
    (1) Capsid
    (2) Pellicle
    (3) Cuticle
    (4) Glycocalyx
39. Incorrect match of the following
    (1) Breaking seed and bud dormancy – ethylene
    (2) Lateral shoot growth and adventitious shoot formation – cyto-kinins
    (3) Prevent fruit and leaf fall at early stages – Auxins
    (4) Promoting rosette habit – Gibberellins
40. One turn of Krebs cycle will result in the production of
    (1) $3CO_2 + 4NADH + 4H^+ + FADH_2 + ATP$
    (2) $2CO_2 + 4NADH + 4H^+ + FADH_2 + ATP$
    (3) $2CO_2 + 3NADH + 3H^+ + FADH_2 + ATP$
    (4) $2CO_2 + 2NADH + 2H^+ + FADH_2 + ATP$
41. A sample of blood shows clumping with antiserum A. The blood group can not be
    (1) AB
    (2) B and AB
    (3) A and B
    (4) O and B
42. Conversion of fibrinogen to fibrin is catalysed by
    (1) Heparin
    (2) Thromboplastin
    (3) Thrombin
    (4) Prothrombinase
43. Which is correct about joint diastole ?
    (a) Bicuspid and tricuspid valves are opened
    (b) Bicuspid and tricuspid valves are closed for about 0.4 sec
    (c) Semilunar valves are opened
    (d) Semilunar valves are closed
    (1) a and c
    (2) b and d
    (3) a and d
    (4) b and c
44. A unique vascular connection between the digestive tract and liver is called
    (1) Hepatic veins
    (2) Coronary veins
    (3) Hypophyseal portal veins
    (4) Hepatic portal vein

45. Neural signals through parasympathetic division can
    (a) Increase the rate of heart beat
    (b) Decrease the rate of heart beat
    (c) Increase the strength of ventricular contraction
    (d) Decrease the speed of conduction of action potential
    (e) Increase cardiac output
    (f) Decrease cardiac output
    (1) b, c and e
    (2) a, d and f
    (3) b, d and f
    (4) a, c and e

46. Correct statement of the following
    (1) C_4 platns reach CO_2 saturation only beyond 450 ml L^{-1}
    (2) Both C_3 and C_4 plants can respond to high CO_2 conditions at low light intensities
    (3) C_3 plants show CO_2 saturation at about 360 ml L^{-1}
    (4) Higher productivity can be achieved in tomatoes and bell pepper at higher CO_2 concentration

47. Nitrogenase is a
    (1) Iron sulphur protein
    (2) Iron protein
    (3) Iron molybdenum protein
    (4) Copper protein

48. A and B are contiguous cells. A has O.P = 10 atm, T.P = 7 atm. B has O.P = 8 atm, T.P = 3 atm. Hence the movement of water is
    (1) No movement of water
    (2) A to B
    (3) Cells are at equilibrium
    (4) B to A

49. The ploidy of PEN, secondary nucleus, micropsore respectively
    (1) 3n, 2n, n
    (2) 3n, n, n
    (3) 3n, 2n, 2n
    (4) 3n, n, 2n

50. Correct match of the following
    (1) Gemmae – sponges
    (2) Sporulation – Amoeba
    (3) Sporangiospores – Penicillium
    (3) Binary fission – Hydra

51. Excretion of dilute urine is due to
    (1) More secretion of aldosterone
    (2) Less secretion of vasopressin
    (3) Less secretion of glucagon
    (4) More secretion of insulin

52. Urine formed by the nephrons is ultimately carried to the urinary bladder where it is stored till a voluntary signal is given by the
    (1) CNS for contraction of urethral sphincter
    (2) ANS for relaxation of urinary bladder muscles
    (3) ANS for contraction of urethral sphincter
    (4) CNS for contraction of urinary bladder muscles

53. *Hisardale* has been developed by
(1) Out-crossing
(2) Interspecific hybridisation
(3) Cross breeding
(4) Inbreeding

54. During summer season, which hormone concentration is maintained at high level ?
(1) Glucagon
(2) Vasopressin
(3) Oxytocin
(4) ANP

55. Malpighian tubules remove excretory products from
(1) Kidney
(2) Blastocoelome
(3) Gut
(4) Haemolymph

56. Main function of Lenticels is
(1) Transpiration
(2) Guttation
(3) Gaseous exchange
(4) Secretion

57. Which of the following are termination codons
(1) UAA, UGA, UAC
(2) AUG, UGA, UAG
(3) UGA, GGA, UGG
(4) UGA, UAG, UAA

58. In eukaryotic m-RNA, UTRs are present
(1) Before and after start codon at 5' end
(2) Before start codon at 3' end and after stop codon at 5' end
(3) Before and after stop codons at 3' end
(4) Before start codon at 5' end and after stop codon at 3' end

59. Better yielding, semidwarf varieties of rice are
(1) Sonalika, Kalyan sona
(2) Jaya, Ratna
(3) Laxmi, Bhagya
(4) Surabhi, Vikram

60. Incorrect match of the following with reference to lac operon
(1) Lac operon- prototype operon in bacteria
(2) Repressor protein – constitutive
(3) z,y and a – structural genes
(4) i gene- inducer

61. Muscle cells with characteristic striations and involuntary are
(1) Present in the wall of alimentary canal
(2) Branched
(3) Assisting locomotion
(4) Present inside the eye ball

62. Components of thin filament of a sarcomere are
    (1) Myosin and troponin
    (2) Troponin and actin
    (3) Actin and myosin
    (4) Myosin and tropomyosin
63. Which of the following decrease in its length during contraction of skeletal muscle ?
    (1) I – band and myofilaments
    (2) H – zone and myofilaments
    (3) A – band and I – band
    (4) Sarcomere and H-zone
64. Find the number of movable bones in human skull
    (1) 12
    (2) 4
    (3) 7
    (4) 1
65. Match the following and mark the correct option.

Column-I	Column-II
A) Ischium	i) Synovial fluid
B) Glenoid Cavity	ii) Intervertebral disc
C) Freely movable joint	iii) Pectoral girdle
D) Cartilaginous joint	iv) Pelvic girdle

	A	B	C	D
(1)	ii	i	iii	iv
(2)	iv	iii	i	ii
(3)	ii	i	iv	iii
(4)	iv	i	ii	iii

66. Select an option with all correct statements
    A. In human cell two meters long thread of DNA is distributed among its forty six chromosomes
    B. Nucleolus is the site of active ribosomal protein synthesis
    C. Chromatin is made up of DNA, RNA, histone and non histone proteins
    D. Telocentric chromosome has a terminal cenromere
    (1) A,B,C
    (2) B,C,D
    (3) A,C,D
    (4) B,C,D
67. The arrangement of axonemal microtubules is referred as
    (1) 9+0 array
    (2) 9+2 array
    (3) 18+2 array
    (4) 27+0 array
68. Incorrect match of the following
    (1) Phellogen – dedifferentiation
    (2) Phellem – redifferentiation
    (3) Primary cortex – differentiation
    (4) Fascicular vascular cambium – dedifferentiation
69. Chemicals used to remove the effect of inhibitory substances and promote germination are
    (1) Gibberellic acid and nitrates
    (2) ABA and phenolic acid
    (3) Para – ascorbic acid and coumarin
    (4) ABA and Gibberellic acid

70. Incorrect statement about 'Kranz' anatomy
    (1) Present in the leaves and stems of C_4 plants
    (2) Wreath like arrangement of cells around vascular bundle
    (3) Several layers of thick walled cells arranged without intercellular spaces
    (4) Impervious to gaseous exchange
71. In human brain, visual area is present in
    (1) Occipital lobe
    (2) Temporal lobe
    (3) Frontal lobe
    (4) Parietal lobe
72. The new potential developed in the post-synaptic membrane is
    (1) Excitatory
    (2) Inhibitory
    (3) Either excitatory or inhibitory
    (4) Neither excitatory nor inhibitory
73. A polarized neuron is the one that is
    (1) Conducting impulses
    (2) At resting potential
    (3) Having action potential
    (4) Having axolemma which is more permeable to Na^+
74. Spermatogenesis starts at the age of puberty due to significant increase in the secretion of
    (1) Somatotropin from hypothalamus
    (2) GnRH from hypothalamus
    (3) GnRH from anterior pituitary
    (4) GnRH from posterior pituitary
75. Egg is liberated from ovary in
    (1) Secondary oocyte stage
    (2) Primary oocyte stage
    (3) Oogonial stage
    (4) Mature ovum stage
76. R.Q value of tripalmitin is
    (1) 0.8
    (2) 1
    (3) 1.6
    (4) 0.7
77. How many redox equivalents are removed during oxidation reaction in Glycolysis per glucose molecule
    (1) two
    (2) four
    (3) six
    (4) eight
78. Correct statements of the following
    A. Xylem transport of water and minerals is unidirectional
    B. Chief sinks of photosynthates are young leaves, developing flowers, fruits and seeds
    C. The translocation in phloem is bidirectional, the source sink relation is variable
    D. Excess water is removed through tips of leaves by guttation
    (1) A,B,C
    (2) B,C,D
    (3) A,C,D
    (4) A,B

79. Epihydrophily is found in
    (1) Water lily
    (2) Lotus
    (3) Zostera
    (4) Vallisneria
80. How many genomes are involved in double fertilization
    (1) three
    (2) two
    (3) five
    (4) six
81. In male cockroach, genital pouch is bounded by
    (1) 7^{th}, 8^{th} and 9^{th} sterna
    (2) 7^{th} sternum and 8^{th} and 9^{th} terga
    (3) 9^{th} and 10^{th} terga, and 9^{th} sternum
    (4) 8^{th} and 9^{th} sterna, and 10^{th} tergum
82. Read the following statements and find out the incorrect statement.
    (1) Solids are relatively easy to remove from domestic sewage
    (2) Dissolved salts such as nitrates and phosphates, and toxic metal ions and organic compounds are most difficult to remove
    (3) Presence of large amounts of nutrients in waters causes excessive growth of fishes and other aquatic creatures
    (4) Algal blooms cause deterioration of the water quality
83. In human eye, cornea absorb UV-B radiation, and a high dose of UV-B causes
    (1) Inflammation of cornea
    (2) Cataract
    (3) Permanently damage to cornea
    (4) All of the above
84. Function of Sertoli cells is controlled by
    (1) Estrogen
    (2) FSH
    (3) Testosterone
    (4) LH
85. In ECG, which of the following indicates bradycardia ?
    (1) Shortened Q-T interval
    (2) Prolonged P-R interval
    (3) Shortened QRS complex duration
    (4) Shortened P-R interval
86. During the secondary growth of Dicot root vascular cambium arises from
    (1) Partly from intrafascicular cambium, remaining from medullary rays
    (2) Completely from pericycle
    (3) Partly from pericycle remaining from conjunctive tissue above pholoem
    (4) Tissues located below phloem bundles, and a portion of pericycle tissue above protoxylem

87. Match the following

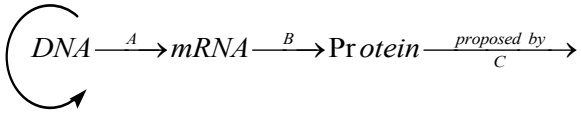
List-I	List-II
A. Pusa Gaurav	I. Cauliflower
B. Pusa A-4	II. Brassica
C. Pusa snow ball-KI	III. Flat bean
D. Pusa sem 2	IV Okra

	A	B	C	D
(1)	III	I	IV	II
(2)	II	IV	I	III
(3)	II	IV	III	I
(4)	II	III	IV	I

88. Recovery of healthy plants from virus infected plants can be made by
(1) Culture of apical meristem
(2) Leaf culture
(3) Culture axillary meristem
(4) Both 1 and 3

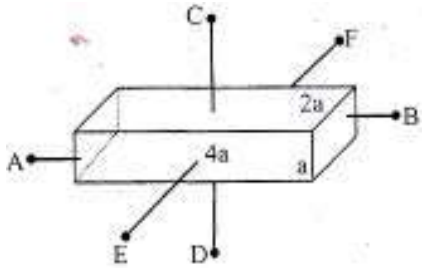
89. Frame shift mutation are caused due
(1) Substitution
(2) Transition
(3) Transversion
(4) Addition or deletion of one or two nucleotides

90. The diagram shows important concept in the ganetic implication of DNA. Fill in the blanks A to C



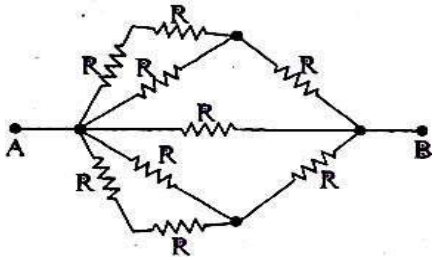
	A	B	C
(1)	Transcription	Translation	James Watson
(2)	Transcription	Translation	Francis Crick
(3)	Transcription	Translation	Watrson and Crick
(4)	Transcription	Replication	Rosalind Franklin

91. A conductor with rectangular cross section has dimensions ($a \times 2a \times 4a$) as shown in figure. Resistance across AB is x, across CD is y and across EF is z. Then:



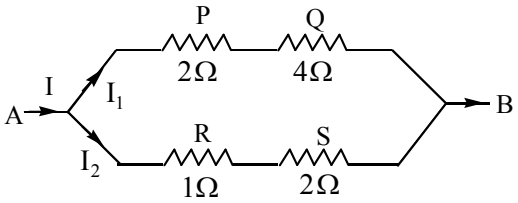
(1) x = y = z
(2) x > y > x
(3) y > z > x
(4) x > z > y

92. Figure show a network of 9 identical resistors. The resistance of the whole circuit between A & B is 1.5Ω. The resistance R is



(1) 1.1Ω
(2) 3.3Ω
(3) 1.4Ω
(4) 1.8Ω

93. Which of the four resistances P,Q,R and S generate the greatest amount of heat in a given time, where a current I flows from A to B



(1) $P = 2\Omega$

(2) $Q = 4\Omega$

(3) $R = 1\Omega$

(4) $S = 2\Omega$

94. Two resistances are connected in the two gaps of a meter bridge and the balance point obtained is 20cm from zero end. A resistance of 15 ohm is connected in series with smaller resistance of the two. Then the balance points shifts to 40 cm. The value of larger resistance is

(1) 9Ω

(2) 36Ω

(3) 12Ω

(4) 6Ω

95 A cell develops the same power across two resistances R_1 and R_2 individually. The internal resistance of the cell is

(1) $R_1 R_2$

(2) $\sqrt{R_1 R_2}$

(3) $\sqrt{\frac{R_1 R_2}{2}}$

(4) $\sqrt{R_1 + R_2}$

96. A potentiometer wire has uniform potential gradient. The specific resistance of the material of the wire is 10^{-7}ohm-m and the current passing through it is 0.1 A. If the cross sectional area of the wire is 10^{-6} m^2, the potential gradient of the wire is

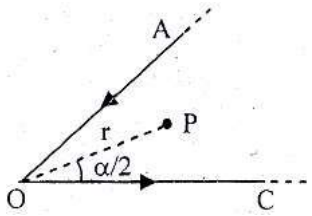
(1) 10^{-4} V/m

(2) 10^{-6} V/m

(3) 10^{-2} V/m

(4) 10^{-8} V/m

97. Two wires AO and OC carry equal currents i as shown in figure. One end of both the wires extends to infinity. Angle AOC is α. The magnitude of magnetic field at a point P on the bisector of these two wires at a distance r from point O is



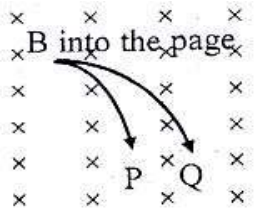
(1) $\frac{\mu_0}{2\pi}\frac{i}{r}\cot\left(\frac{\alpha}{2}\right)$

(2) $\frac{\mu_0}{4\pi}\frac{i}{r}\cot\left(\frac{\alpha}{2}\right)$

(3) $\frac{\mu_0}{2\pi}\frac{i}{r}\frac{\left(1+\cos\frac{\alpha}{2}\right)}{\sin\left(\frac{\alpha}{2}\right)}$

(4) $\frac{\mu_0}{4\pi}\frac{i}{r}\sin\left(\frac{\alpha}{2}\right)$

98. Two charged particles P and Q enter a uniform magnetic field normally with the same speed. Their paths in the field are as shown in the figure. It can be concluded that



(1) The specific charge of P is greater than that of Q
(2) The specific charge of P is less than that of Q
(3) Both P and Q are positively charged
(4) Both P and Q are neutral

99. If the flux of magnetic induction through each turn of a coil of resistance R and having N turns changes from ϕ_1 to ϕ_2 then the magnitude of the charge that passes through the coil is

(1) $\frac{\phi_2 - \phi_1}{R}$
(2) $\frac{N(\phi_2 - \phi_1)}{R}$
(3) $\frac{\phi_2 - \phi_1}{NR}$
(4) $\frac{NR}{\phi_2 - \phi_1}$

100. The current is flowing in two coaxial coils in the same direction. On increasing the distance between the two, the electric current in each coil will
(1) Increase
(2) Decrease
(3) Remain uncharged
(4) The information is incomplete

101. A long horizontally fixed wire carries a current of 100 ampere. Directly above and parallel to it there is a fine wire that carries a current of 20 ampere and weighs 0.04 newton per metre. The distance between the two wires for which the upper wire is just supported by magnetic repulsion is
(1) 10^{-2} decimetre
(2) 10^{-2} mm
(3) 10^{-2} m
(4) 10^{-2} cm

102. A galvanometer of 50 ohm resistance has 25 divisions. A current of 4×10^{-4} ampere gives a deflection of one division. To convert this galvanometer having a range of 25 volts, it should be connected with a resistance of
(1) $2500\,\Omega$ as a shunt
(2) $2450\,\Omega$ as a shunt
(3) $2550\,\Omega$ in series
(4) $2450\,\Omega$ in series

103. 2 kg of ice at – 20^0C is mixed with 5 kg of water at 20^0C in an insulating vessel having a negligible heat capacity. Calculate the final mass of water remaining in the container. It is given that the specific heats of water and ice are 1 kcal/kg/^{0}C and 0.5 kcal/kg/^{0}C while the latent heat of fusion of ice is 80 kcal/kg
(1) 7 kg
(2) 6 kg
(3) 4 kg
(4) 2 kg

104. 50 gm of copper is heated to increase its temperature by 10^0C. If the same quantity of heat is given to 10 gm water, the rise in its temperature is (Specific heat of copper = 420 Joule-kg^{-1}^{0}C^{-1})
(1) 5^0C
(2) 6^0C
(3) 7^0C
(4) 8^0C

105. A beaker contains 200 gm of water. The heat capacity of the beaker is equal to that of 20 gm of Water. The initial temperature of water in the beaker is 20^0C. If 440 gm of hot water at 92^0C is poured in it, the final temperature (neglecting radiation loss) will be
(1) 58^0C
(2) 68^0C
(3) 73^0C
(4) 78^0C

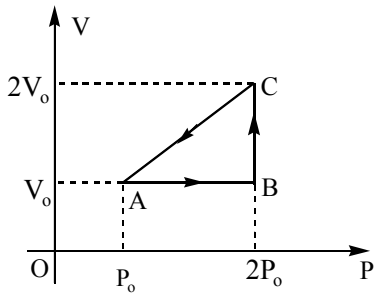
106. One standard calorie is defined as the amount of heat required to raise the temperature of 1g of water by 1^0C and it is defines under which of the following condition
(1) From 14.5^0C to 15.5^0C at 760 mm of Hg
(2) From 98.5^0C to 99.5^0C at 760 mm of Hg
(3) From 13.5^0C to 14.5^0C at 76 mm of Hg
(4) From 3.5^0C to 4.5^0C at 76 mm of Hg

107. A gas mixture consists of 2 moles of oxygen and 4 moles of organ at a temperatre T. Neglecting all vibrational modes, the total internal energy of the system is
(1) 4RT
(2) 5RT
(3) 15RT
(4) 11RT

108. During adiabatic compression of a gas its temperature will
(1) remain constant
(2) become zero
(3) rise
(4) fall

109. A gas does 4.5 J of external work during adiabatic expansion. Its temperature falls by 2K. Its internal energy
(1) Increase by 4.5 J
(2) Decrease by 4.5 J
(3) Decrease by 2.25 J
(4) Increase by 2.25 J

110. A thermodynamic process of one mole ideal monoatomic gas is shown. The efficiency of cyclic process ABCA will be



(1) 25%
(2) 12.5%
(3) 50%
(4) $\frac{100}{13}$%

111. Which of the following combination of properties would be most desirable for a cooking vessels
(1) High specific heat and low thermal conductivity
(2) Low specific heat and high thermal conductivity
(3) High specific heat and high thermal conductivity
(4) Low specific heat and low thermal conductivity

112. A wall is made of two equally thick layer A and B of different materials. The thermal conductivity of A is twice that of B. In the steady state, the temperature difference across the wall is 36^0C. The temperature difference across the layer A will be
(1) 6^0C
(2) 12^0C
(3) 18^0C
(4) 24^0C

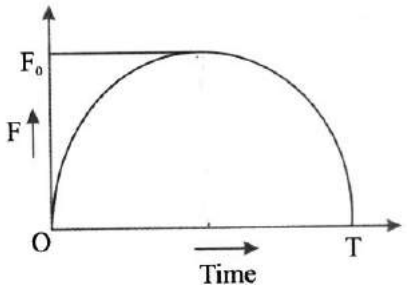
113. Two spheres of different materials one with double the radius and one-fourth wall thickness of the other are completely filled with ice at 0^0C. If the time taken for complete melting of ice in the larger sphere is 25 minutes and for smaller one is 16 minutes, the ratio of thermal conductivities of the materials of larger sphere to that of smaller sphere is (outside temperature for each sphere is 100^0C)
(1) 4 : 5
(2) 5 : 4
(3) 25 : 8
(4) 8 : 25

114. A sphere and a cube of same material and same total surface area are placed in the same evacuated chamber turn by turn after they are heated to the same temperature. Find the ratio of their initial rates of cooling in the enclosure
(1) $\sqrt{\frac{\pi}{6}}:1$
(2) $\sqrt{\frac{\pi}{3}}:1$
(3) $\frac{\pi}{\sqrt{6}}:1$
(4) $\frac{\pi}{\sqrt{3}}:1$

115. A body of mass 5 kg starts from the origin with an initial velocity of $\bar{u}=(30i+40j)m/s$. A constant force of $F=\left(-\hat{i}-5\hat{j}\right)N$ acts on the body. Find the time in which the y-component of the velocity becomes zero.
(1) 20 s
(2) 30 s
(3) 40 s
(4) 60 s

116. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle, the motion of the particle takes place in a plane. It follows that
(1) its velocity is constant
(2) it moves in a straight line
(3) its kinetic energy is constant
(4) its acceleration is constant

117. A particle of mass m, initially at rest is acted upon by a variable force F for a brief interval of time T. It begins to move with a velocity u after the force stops acting. F is shown in the graph as a function of time. If the curve is a semicircle then



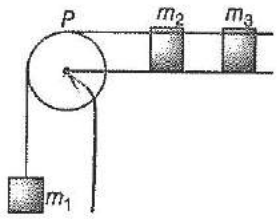
(1) $u = \frac{\pi F_0^2}{2m}$

(2) $u = \frac{\pi T^2}{8m}$

(3) $u = \frac{\pi F_0 T}{4m}$

(4) $u = \frac{\pi F_0 T}{2m}$

118. A system consists of three masses m_1, m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on a rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is (Assume, $m_1 = m_2 = m_3 = m$)



(1) $\frac{g(1-g\mu)}{9}$

(2) $\frac{2g\mu}{3}$

(3) $\frac{g(1-2\mu)}{3}$

(4) $\frac{g(1-2\mu)}{2}$

119. The upper half of an inclined plane of inclination θ is perfectly smooth while lower half is rough. A block starting from rest at the top of the plane will again come to rest at the bottom, The coefficient of friction between the block and lower half of the plane is given by

(1) $\mu = \frac{1}{\tan\theta}$

(2) $\mu = \frac{2}{\tan\theta}$

(3) $\mu = 2\tan\theta$

(4) $\mu = \tan\theta$

120. The small bob of a pendulum of length *L* just describes a vertical circle with the point of suspension as centre. The maximum angular velocity of the bob during the motion is (*g* is acceleration due to gravity)

(1) $\sqrt{3g/L}$

(2) $\sqrt{6g/L}$

(3) $\sqrt{5g/L}$

(4) $\sqrt{g/L}$

121. A particle of mass m is moving in a circular path of constant radius r such that its centripetal acceleration a_c is varying with time t as $a_c = k^2rt^2$ where k is a constant. The power delivered to the particle by the forces acting on it, is

(1) zero

(2) $mk^2r^2t^2$

(3) mk^2r^2t

(4) mk^2rt

122. A pendulum consists of a wooden bob of mass m and of length *l*. A bullet of mass m_1 is fired towards the pendulum with a speed v_1. The bullet emerges out of the bob with a speed $v_1/3$ and the bob just completes motion along a vertical circle. Then v_1 is

(1) $\left(\frac{m}{m_1}\right)\sqrt{5gl}$

(2) $\frac{3}{2}\left(\frac{m}{m_1}\right)\sqrt{5gl}$

(3) $\frac{2}{3}\left(\frac{m_1}{m}\right)\sqrt{5gl}$

(4) $\left(\frac{m_1}{m}\right)\sqrt{gl}$

123. A simple pendulum performs simple harmonic motion about x = 0 with an amplitude a and time period T. The speed of the pendulum $x=\frac{a}{2}$ at will be

(1) $\frac{\pi a\sqrt{3}}{2T}$

(2) $\frac{\pi a}{T}$

(3) $\frac{3\pi^2 a}{T}$

(4) $\frac{\pi a\sqrt{3}}{T}$

124. A U-tube of uniform bore of cross-sectional area A is set up vertically with open ends up. A liquid of mass M and density d is poured into it. The liquid column will oscillate with a period

(1) $2\pi\sqrt{\frac{M}{g}}$

(2) $2\pi\sqrt{\frac{MA}{dg}}$

(3) $2\pi\sqrt{\frac{M}{Adg}}$

(4) $2\pi\sqrt{\frac{M}{2Adg}}$

125. A disc of radius R and mass M is pivoted at the rim and is set for small oscillations . If simple pendulum has to have the same period as that of the disc, the length of the simple pendulum should be

(1) $\frac{5R}{4}$

(2) $\frac{2R}{3}$

(3) $\frac{3R}{4}$

(4) $\frac{3R}{2}$

126. For the harmonic travelling wave $Y = 2\cos 2\pi(10t - 0.0080x + 3.5)$ where x and y are in cm and t in second. What is the phase difference between the oscillations of a particle located at x = 100 cm, at t = 1s and t = 5s

(1) $20\ \pi$ rad

(2) $40\ \pi$ rad

(3) $80\ \pi$ rad

(4) $160\ \pi$ rad

127. A particle is in SHM. The time taken for $\frac{3}{8}$ of oscillation from extreme position is X. Then the time taken for the particle to complete $\frac{5}{8}$ of oscillation from mean position is

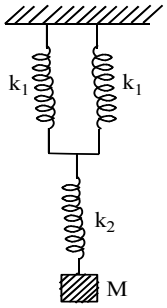
(1) $\frac{21X}{24}$

(2) 21X

(3) $\frac{7X}{12}$

(4) $\frac{7X}{4}$

128. What will be the force constant of the spring system shown in the figure?



(1) $\frac{k_1}{2}+k_2$

(2) $\left[\frac{1}{2k_1}+\frac{1}{k_2}\right]^{-1}$

(3) $\frac{1}{2k_1}+\frac{1}{k_2}$

(4) $\left[\frac{2}{k_1}+\frac{1}{k_2}\right]^{-1}$

129. A simple pendulum of length ℓ rotating in vertical circle, the velocity of bob at bottom of circle such that kinetic energy and potential energy of body are equal at top of circle

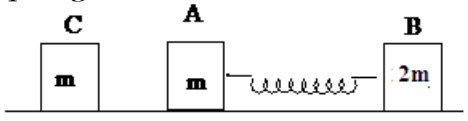
(1) $\sqrt{4g\ell}$

(2) $\sqrt{8g\ell}$

(3) $\sqrt{6g\ell}$

(4) $\sqrt{5g\ell}$

130. Two bodies A and B of mass m and 2m respectively are placed on a smooth floor. They are connected by a mass less spring. A third body C of mass m is placed on the floor. The body C moves with a velocity υ_0 along the line joining A and B and collides elastically with A. At a certain time after the collision it is found that the maximum compression of the spring is x_0. The spring constant K will be



(1) $\frac{m\upsilon a^2}{x_0^2}$

(2) $\frac{m\upsilon a}{2x_0}$

(3) $\frac{2m\upsilon a}{x_0}$

(4) $\frac{2m}{3}\left(\frac{\upsilon_0}{x_0}\right)^2$

131. A simple pendulum has time period 'T_1'. The point of suspension is now moved upwards according to the relation $y=kt^2$, $(k=1m/\sec^2)$ where y is the vertical displacement. The time period now becomes 'T_2' then find the ratio of $\frac{T_1^2}{T_2^2}$ $(g=10m/\sec^2)$

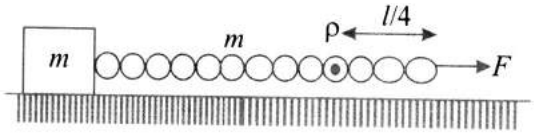
(1) $\frac{5}{6}$

(2) $\frac{6}{5}$

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

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

132. A block of mass m is pulled by a uniform chain of mass m tied to it by applying a force F at the other end of the chain. The tension at a point P which is at a distance of quarter of the length of the chain from the free end, will be



(1) $\frac{3F}{4}$

(2) $\frac{7F}{8}$

(3) $\frac{6F}{7}$

(4) $\frac{4F}{5}$

133. A car has to move on a level turn of radius 4.5m. If the coefficient of static friction between the tyre and the road is $\mu_s = 0.2$ then the maximum speed of the car so that it can take without skidding is (g = 10 ms^{-2})
(1) 1.8 ms^{-1}
(2) 4 ms^{-1}
(3) 3.6 ms^{-1}
(4) 3 ms^{-1}

134. It is easier to pull a lawn roller than to push it because pulling
(1) involves sliding friction
(2) involves dry friction
(3) increases the effective weight
(4) decreases normal reaction

135. A ball falls vertically onto a floor, with momentum p, and then bounces repeatedly. The coefficient of restitution is e. The total change of momentum imparted by the ball to the floor is
(1) $p(1+e)$
(2) $\frac{p}{1-e}$
(3) $p\left(1+\frac{1}{e}\right)$
(4) $p\left(\frac{1+e}{1-e}\right)$

136. Dalton's Law is not applicable to
(1) N_2+O_2
(2) CO_2+O_2
(3) N_2+H_2
(4) H_2+F_2

137. Which among the following is incorrect combination of polymers and its monomers ?
(1) Dacron : Adipic acid & Hexamethylene diammine
(2) Nylon-6 : Caprolactum
(3) Buna-S:Vinyl benzene & 1,3-butadiene
(4) Bakelite : Phenol & formaldehyde

138. Which one of the following is an intensive property
(1) enthalpy
(2) specific heat
(3) internal energy
(4) volume

139. For a given reaction, $\Delta H = 35.5 kJ\ Mol^{-1}$ and $\Delta S = 83.6 Jk^{-1}\ Mol^{-1}$. The reaction is spontaneous at (Assume ΔH and ΔS do not vary with temperature)
(1) $T < 425K$
(2) $T > 425K$
(3) $T > 298K$
(4) All temperature

140. Which of the following is electron deficient?
(1) $(CH_3)_2$
(2) $(SiH_3)_2$
(3) $(BH_3)_2$
(4) $(PH_3)_2$

141. Which among the following acts as chain initiator in cationic polymerisation?
(1) $AlCl_3$
(2) R-Li
(3) KNH_2
(4) RMgX

142 Which among the following is a colligative property ?

(1) Osmotic pressure

(2) Boiling point

(3) Freezing point

(4) Vapour pressure

143. Polarity in a molecule is the measure of the dipolemoment which depends primarily on electronegativity of the constituent atoms and shape of a molecule. Which of the following has highest dipole moment ?

(1) CO_2

(2) XeF_2

(3) NH_3

(4) NF_3

144. The pair of species with the same bond order is

(1) O_2^{2-}, B_2

(2) O_2^{+}, NO^{+}

(3) NO, CO

(4) N_2, O_2

145. IP_2 is highest for

(1) Carbon

(2) Nitrogen

(3) Flourine

(4) Oxygen

146. Pseudo-I order (Pseudo unimolecular) reaction is

(1) Radioactive disintegration

(2) Inversion of cane sugar

(3) Decomposition of SO_2Cl_2

(4) Decomposition of ozone

147. For a chemical reaction, $A \rightarrow products$, it is found that the rate increases by a factor of 6.25, when the concentration of A is increased by a factor of 2.5. The order of reaction with respect to A is

(1) 2

(2) 0.5

(3) 1

(4) 2.5

148. The $E^0_{M^{3+}/M^{2+}}$ values of Cr, Mn, Fe and Co are -0.41, +1.57, +0.77 and +1.97 V respectively. For which one of the following metal, the change in oxidation state for +2 to +3 is easiest ?

(1) Co

(2) Mn

(3) Cr

(4) Fe

149. Certain quantity of current deposits 54g of silver at cathode. Weight of oxygen liberated at anode would be

(1) 4g

(2) 16g

(3) 8g

(4) 32g

150. Lactose is formed by the condensation of

(1) Alpha galactose and alpha glucose

(2) Beta galactose and beta glucose

(3) Alpha galactose and beta glucose

(4) Beta galactose and alpha glucose

151. Which among the following is incorrect statement?
(1) Trans form of rubber is called Gutta Percha
(2) PHBV is a biodegradable polymer
(3) Nylon-6 is a condensation polymer
(4) Nylon-6,6 is an elastomer

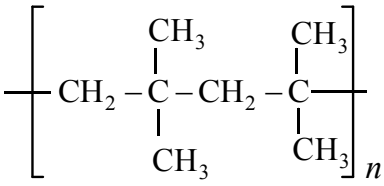
152. A cupric salt can be precipitated as CuS in qualitative analysis using
(1) Na_2S
(2) $(NH_4)_2S$
(3) $HCl + H_2S$
(4) Ag_2S

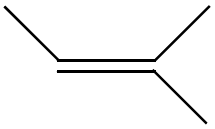
153. Which is the incorrect statement ?
(1) $FeO_{0.98}$ has non-stoichiometric metal deficiency defect
(2) Density decrease in case of crystals with Schottky's defect
(3) Quartz is piezoelectric crystal
(4) $AgBr$ has both Schottky and Frenkel defects

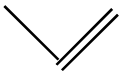
154. At a given temperature, total vapour pressure in torr of a mixture of a volatile components A and B is given by $p = 120 - 75x_B$ hence, vapour pressures of pure A and B respectively (in torr) are
(1) 120,75
(2) 120,195
(3) 120,45
(4) 75,45

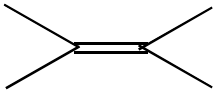
155. Aluminium phosphate is 100% ionized in 0.01 molal aqueous solution. Hence , $\frac{\Delta T_b}{K_b}$ is
(1) 0.01
(2) 0.015
(3) 0.0175
(4) 0.02

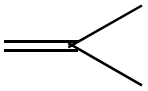
156. Which of the following forms cationic micelles above certain concentrations?
(1) Sodium ethyl sulphate
(2) Sodium acetate
(3) Urea
(4) Cetyltrimethyl ammonium bromide

157.  is a polymer having monomer units

(1) 

(2) 

(3) 

(4) 

158. Ellingham diagram represents
(1) Change of ΔG with temperature
(2) Change of ΔH with temperature
(3) Change of ΔG with pressure
(4) Change of $(\Delta G - T\Delta S)$ with temperature

159. Which of the following is the best protective colloid
(1) Heamoglobin
(2) Gelatin
(3) Gum arabic
(4) Potato starch

160. Which of the following is used in mercerizing cotton
(1) Na_2O_2
(2) Na_2CO_3
(3) $NaOH$
(4) Na_2O

161. Which of the following are arranged in correct increasing order of solubilities ?
(1) $CaCO_3 < KHCO_3 < NaHCO_3$
(2) $NaHCO_3 < KHCO_3 < CaCO_3$
(3) $KHCO_3 < NaHCO_3 < CaCO_3$
(4) $CaCO_3 < NaHCO_3 < KHCO_3$

162. Name the type of the structure of silicates in which one oxygen atom $[SiO_4]^{4-}$ is shared ?
(1) Sheet silicate
(2) Pyrosilicate
(3) Three dimensional silicate
(4) Linear chain silicate

163. In borax bead test which compound is formed ?
(1) Otho borate
(2) Meta borate
(3) Double oxide
(4) Tetra borate

164. Which of the following does not give oxygen on heating ?
(1) Ag_2O
(2) $KMnO_4$
(3) $(NH_4)_2Cr_2O_7$
(4) $KClO_3$

165. Strong reducing behavour of H_3PO_2 is due to
(1) Presence of two P-H bonds
(2) High electron gain enthalpy of phosphorus
(3) High oxidation state of phosphorus
(4) Presence of two -OH groups

166. HCl reacts with iron to give
(1) $FeCl_3$
(2) $FeCl_3 + FeCl_2$
(3) $FeCl_6^{-3}$
(4) $FeCl_2$

167. Which of the following does not give acetic acid as the product
(1) Hydrolysis of methyl cyanide
(2) Reaction of methyl magnecium iodide with dry ice followed by hydrolysis
(3) Reaction of Toulene with CrO_2Cl_2+CS_2 followed by hydrolysis
(4) Reaction of ethyl benzene with alkaline $KMnO_4$ followed acedification

168. PKa is highest for
(1) Para nitro benzoic acid
(2) Benzoic acid
(3) Parachloro benzoic acid
(4) Para toulic acid

169. Which of the following reactions is appropriate for converting acetamide to methanamine ?
(1) Carbylamine reaction
(2) Hofmann bromamide reaction
(3) Stephen's reaction
(4) Gabriel phthalimide synthesis

170. Nitration of aniline involves three steps. The correct sequence is
(1) Nitration, hydrolysis, acylation
(2) Acylation,hydrolysis, nitration
(3) Hydrolysis, nitration, acylation
(4) Acylation, nitration, hydrolysis

171. Compound which does not exist

(1) $PbCl_2$

(2) SiF_6^{-2}

(3) CCl_6^{-2}

(4) Pb_3O_4

172. Most stable carbanion is

(1) $\bar{C}H_2 - NO_2$

(2) $\bar{C}H_3$

(3) $\bar{C}H_2 - CH_3$

(4) $\bar{C}H_2 - Cl$

173. Which of the following does not undergo HVZ reaction

(1) Ethanoic acid

(2) 2-methyl propanoic acid

(3) 2,2-dimethyl propanoic acid

(4) Phenyl acetic acid

174. Which of the following is most stable

(1) 

(2) $(C_6H_5)_3C^{\bullet}$

(3) 

(4) 

175. Which of the following does not exhibit resonance

(1) Vinyl chloride

(2) Benzyl chloride

(3) Chloro benzene

(4) 2-propenal

176. $CH_3NH_2 \xrightarrow{C_6H_5SO_2Cl} A.$ Incorrect about A is

(1) it is insoluble alkali

(2) it contains acidic hydrogen

(3) it is a sulphonamide

(4) it is less basic than methanamine

177. How many isomers (structural and stereo) are possible by monochlorination 2-methyl butane?

(1) 8

(2) 6

(3) 3

(4) 4

178. Number of geometrical isomers possible for acetylene dichloride

(1) 2

(2) 4

(3) 8

(4) 6

179. 0.59 g of organic substance in Dumas method gave 112 ml of nitrogen at STP, calculate percentage of Nitrogen in the compound?

(1) 11.8

(2) 20

(3) 47.5

(4) 23.7

180. Which of the following is not an amphoteric oxide

(1) ZnO

(2) Cr_2O_3

(3) N_2O

(4) AS_4O_6

SRI CHAITANYA EDUCATIONAL INSTITUTIONS,INDIA

A.P,TELANGANA,KARNATAKA,TAMILNADU,MAHARASHTRA,DELHI,RANCHI, CHANDIGARH

SR AIIMS S60 & NEET MPL **NEET CUMULATIVE TEST – 4 KEY** **Date : 16-04-20**

BOT: 6-10, 16-20, 26-30, 36-40, 46-50, 56-60, 66-70, 76-80, 86-90

ZOO: 1-5, 11-15, 21-25, 31-35, 41-45, 51-55, 61-65, 71-75, 81-85

BIOLOGY

1) 4	2) 3	3) 2	4) 4	5) 4	6) 4	7) 3	8) 2	9) 3	10) 1
11) 1	12) 1	13) 3	14) 1	15) 2	16) 4	17) 3	18) 3	19) 3	20) 4
21) 2	22) 1	23) 2	24) 1	25) 3	26) 1	27) 3	28) 4	29) 4	30) 3
31) 2	32) 1	33) 1	34) 3	35) 3	36) 4	37) 1	38) 4	39) 4	40) 3
41) 4	42) 3	43) 3	44) 4	45) 3	46) 4	47) 3	48) 2	49) 1	50) 2
51) 2	52) 4	53) 3	54) 2	55) 4	56) 3	57) 4	58) 4	59) 2	60) 4
61) 2	62) 2	63) 4	64) 3	65) 2	66) 3	67) 2	68) 4	69) 1	70) 1
71) 1	72) 3	73) 2	74) 2	75) 1	76) 4	77) 2	78) 3	79) 4	80) 3
81) 3	82) 3	83) 4	84) 2	85) 2	86) 4	87) 2	88) 4	89) 4	90) 2

PHYSICS

91) 4	92) 2	93) 4	94) 2	95) 2	96) 3	97) 3	98) 1	99) 2	100) 1
101) 3	102) 4	103) 2	104) 1	105) 2	106) 1	107) 4	108) 3	109) 2	110) 4
111) 2	112) 2	113) 4	114) 1	115) 3	116) 3	117) 3	118) 3	119) 3	120) 3
121) 3	122) 2	123) 4	124) 4	125) 4	126) 3	127) 4	128) 2	129) 2	130) 4
131) 2	132) 2	133) 4	134) 4	135) 4					

CHEMISTRY

46) 4	47) 1	48) 2	49) 2	50) 3	51) 1	52) 1	53) 3	54) 1	55) 4
56) 2	57) 1	58) 3	59) 1	60) 2	61) 4	62) 3	63) 1	64) 3	65) 4
66) 4	67) 4	68) 1	69) 2	70) 3	71) 4	72) 2	73) 2	74) 3	75) 1
76) 4	77) 3	78) 4	79) 2	80) 4	81) 3	82) 1	83) 3	84) 2	85) 2
86) 1	87) 2	88) 1	89) 4	90) 3					

SOLUTIONS

PHYSICS

91. $R = \dfrac{\rho l}{A}$

$\therefore x = \rho\dfrac{(4a)}{(2a)(a)} = \dfrac{2\rho}{a}$

$y = \rho\dfrac{(a)}{(4a)(2a)} = \dfrac{\rho}{8a}$

and $z = \rho\dfrac{(2a)}{(4a)(a)} = \dfrac{\rho}{2a}$

$\therefore x > z > y$

92. Equivalent of the given network is as under:

Combination of 2R and R gives $\dfrac{2R^2}{3R}$

or $\dfrac{2R}{3}$. The series combination of $\dfrac{2R}{3}$ and

R gives $\dfrac{5R}{3}$ So, the network reduces to a

parallel combination of $\dfrac{5R}{3}$, R and $\dfrac{5R}{3}$.

$\dfrac{1}{R_P} = \dfrac{3}{5R} + \dfrac{1}{R} + \dfrac{3}{5R} = \dfrac{3+5+3}{5R}$

$R_P = \dfrac{5R}{11}$ or $\dfrac{3}{2} = \dfrac{5R}{11}$

10 R = 33 or $R = \dfrac{33}{10}\Omega = 3.3\Omega$

93. $I_2 = 2I_1$

$H_4 = i^2Rt = I_1^2 \times 4t$

$H_2 = i^2Rt = 4i_1^2 \times 2 \times t$

H_2(i.e) Heat is S = 2u is more

94. $\dfrac{R_1}{R_2} = \dfrac{20}{80}$ and $\dfrac{R_1 + 15}{R_2} = \dfrac{40}{60}$

Solving $R_1 = 9\Omega$ and $R_2 = 36\Omega$

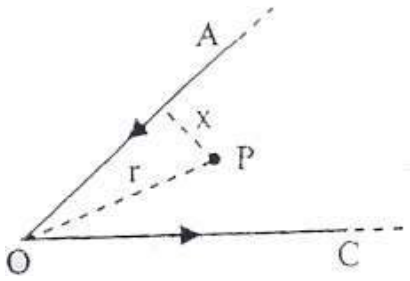
95. Power $= C^2R = \left(\dfrac{E}{R+r}\right)^2 R$

$\left(\dfrac{E}{R_1+r}\right)^2 R_1 = \left(\dfrac{E}{R_2+r}\right)^2 R_2$ solving, $r = \sqrt{R_1R_2}$

96. Potential gradient $= \dfrac{is}{A} = \dfrac{0.1\times10^{-7}}{10^{-6}}$

$= 10^{-2}$ V/m

97. $x = r\sin\dfrac{\alpha}{2}$



$\therefore B_\rho = \left(\dfrac{\mu_0}{4\pi}\right)\left(\dfrac{i}{x}\right)\left[\sin\left(90^0 - \dfrac{\alpha}{2}\right) + \sin 90^0\right]$

$= \dfrac{\mu_0}{2\pi r}\dfrac{i}{r}\dfrac{\left(1+\cos\dfrac{\alpha}{2}\right)}{\sin\dfrac{\alpha}{2}}$

98. $r = \dfrac{mv}{qB} = \dfrac{v}{sB}$

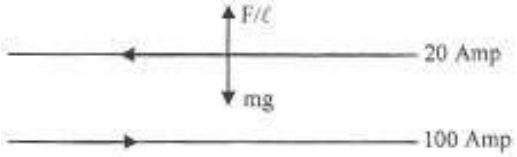
Where s is specific charge

$r_P < r_Q \Rightarrow S_P > S_Q$

By Fleming's Left Hand Rule the positive charge moving in such a field must have been deflected upwards the deflection indicates the both charges are of negative nature.

100. Conceptual

101. For equilibrium, $\dfrac{F}{l}$ = mg



But $\dfrac{F}{l} = \dfrac{\mu_0}{4\pi} \times \dfrac{2I_1I_2}{r} = mg$

or $\dfrac{10^{-7} \times 2 \times 20 \times 100}{r} = 0.04$

solving, we get ; r = 10^{-2} metre

102. $G = 50\Omega$

I_g = Current for full scale deflection

= Current per division total no. of divisions

$= 4\times10^{-4}\times25$

$= 10^{-2}$ amp

Given V = 25 volts

Hence, required resistance,

$R = \frac{V}{I_g} - G = \frac{25}{10^{-2}} - 50 = 2500 - 50 = 2450\,\Omega$

103. Initially ice will absorb heat to raise it's temperature to 0^0C then it's melting takes place

If m_1 = Initial mass of ice,

m_1' = Mass of ice that melts and

m_W = Initial mass of water

By Law of mixture

Heat gained by ice = Heat lost by water

$\Rightarrow m_1\times(20) + m_1'\times L = m_W c_W[20]$

$\Rightarrow 2\times0.5(20) + m_1'\times80 = 5\times1\times20$

$\Rightarrow m_1' = 1\text{kg}$

So, final mass of water = Initial mass of water + Mass of ice that melts

= 5 + 1 = 6 kg

104. Same amount of heat is supplied to copper and water so $m_c c_c \Delta\theta_c = m_W c_W \Delta\theta_W$

$\Rightarrow \Delta\theta_W = \frac{m_c c_c (\Delta\theta)_c}{m_W c_W} = \frac{50\times10^{-3}\times420\times10}{10\times10^{-3}\times4200} = 5^0\text{C}$

105. Heat lot by hot water = Heat gained by cold water in beaker + Heat absorbed by beaker

$\Rightarrow 440(92-\theta) = 200\times(\theta-20) + 20\times(\theta-20) \Rightarrow \theta = 68^0\text{C}$

106. Conceptual

107. $U = \left(2\times\frac{5}{2}\times RT\right) + \left(4\times\frac{3}{2}\times RT\right) = 11RT$

108. Conceptual

109. $d\theta = d\theta + d\omega$

Here $d\theta = 0$; $dv = -d\omega = -4.5\text{J}$

110. $W = \frac{1}{2}P_0V_0 = \frac{1}{2}RT_0$

Heat supplied $= Q_{AB} + Q_{BC} = C_V T_0 + C_P\times2T_0$

$Q = \frac{3}{2}RT_0 + \frac{5}{2}R\times2T_0 = \frac{13}{2}RT_0$

$\therefore \eta = \frac{W}{Q} = \frac{1}{13}\times100 = 7.7\%$

111. Conceptual

112. $K\Delta\theta$ = constant

$\therefore \frac{\Delta\theta_A}{\Delta\theta_B} = \frac{K}{2K} = \frac{1}{2}$

$\therefore \Delta\theta_A = \left(\frac{1}{2+1}\right)36 = 12^0\text{C}$

113. For bigger sphere:

$\frac{K_1 4\pi(2r)^2\times100}{\frac{t}{4}} = \frac{\frac{4}{3}\pi(2r)^3\rho L}{25\times60}$

For smaller sphere:

$\frac{K_2\times4\pi r^2\times100}{t} = \frac{\frac{4}{3}\pi r^3\rho L}{16\times60} \Rightarrow \frac{K_1}{K_2} = \frac{8}{25}$

114. For sphere $\sigma T^4 S = m_1 C\left(\frac{d\theta}{dt}\right)_c$ … (1)

For cube $\sigma T^4 S = m_2 C\left(\frac{d\theta}{dt}\right)_c$ .... (2)

For equation (1) and (2),

$\frac{\left(\frac{d\theta}{dt}\right)_s}{\left(\frac{d\theta}{dt}\right)_c} = \frac{m_2}{m_1} = \frac{R_s}{R_c}$

or $\frac{a^3\rho}{\left(\frac{4}{3}\right)\pi r^3\rho} = \frac{R_s}{R_c}$

where a is the side of cube and r is the radius of sphere ρ, is the density

$\therefore \frac{R_s}{R_c} = \frac{3a^3}{4\pi r^3}$

But since S is the same, so

$6a^2 = 4\pi r^2$

or $a^2 = \left(\frac{2}{3}\right)\pi r^2$

$\therefore \frac{R_s}{R_c} = \frac{3\left(\frac{2\pi r^2}{3}\right)^{3/2}}{4\pi r^3} = \frac{2\pi\sqrt{2\pi}}{\sqrt{3}(4\pi)} = \sqrt{\frac{2\pi}{12}} = \sqrt{\frac{\pi}{6}}$