AIPMT - 2012
(Physics, Chemistry and Biology)
Mains (Code D)

Time: 3 hrs   **Total Marks: 480**

General Instructions:
1. The Answer sheet is inside this Text booklet. When you are directed to open the text booklet, take out the Answer Sheet and fill in the particulars on side – 1 and side – 2 carefully with blue/black ball point pen only.
2. The test is of 3 hours duration and consists of 120 questions. Each question carries 4 marks. For each correct response the candidate will get 4 marks. For each incorrect response, one mark will be deducted. The maximum marks are 480.
3. Use Blue / Black ball point pen only for writing particulars on this page / marking responses.
4. Rough work is to be done on the space provided for this purpose in the text booklet only.
5. On completion of the test, the candidate must handover the answer sheet to the invigilator in the room/ Hall. The candidates are allowed to take away this text booklet with them.
6. Make sure that the CODE printed on side – 2 of the answer sheet is the same as that on this booklet, In case of discrepancy, the candidate should immediately report the matter to the invigilator for the replacement of both the test Booklet and the Answer Sheet.
7. The candidates should ensure that the Answer sheet is not folded. Do not make any stray marks on the Answer sheet. Do not write your roll no. anywhere else except in the specified space in the Test booklet / Answer Sheet.
8. Use of white fluid for correction is not permissible on the Answer Sheet.

Physics

1. The instantaneous values of alternating current and voltages in a circuit are given

   as $i = \frac{1}{\sqrt{2}} \sin(100\pi t)$ ampere; $e = \frac{1}{\sqrt{2}} \sin(100\pi t + \frac{\pi}{3})$ Volt

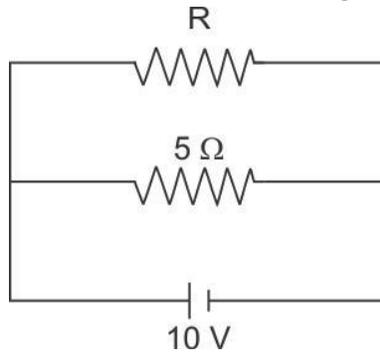   The average power in watts consumed in the circuit is:
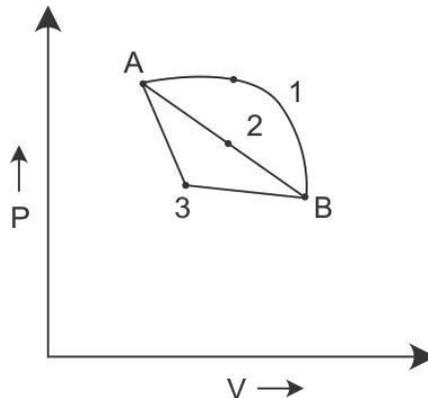
   (1) $\frac{\sqrt{3}}{4}$

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

   (3) $\frac{1}{8}$

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

2. The power dissipated in the circuit shown in the figure is 30 watts. The value of R is


R

5 Ω

10 V

(1) 15Ω

(2) 10 Ω

(3) 30 Ω

(4) 20 Ω

3. The dimensions of $(\mu_o \, \varepsilon_o)^{-1/2}$ are:

(1) $[L^{-1} \, T]$

(2) $[L \, T^{-1}]$

(3) $[L^{1/2} \, T^{1/2}]$

(4) $[L^{1/2} \, T^{-1/2}]$

4. An ideal gas goes from state A to state B via three different processes as indicated in the P – V diagram:

If Q_1, Q_2, Q_3 indicate the heat absorbed by the gas along the three processes and ΔU_1, ΔU_2, ΔU_3 indicate the change in internal energy along the three processes respectively, then:

(1) $Q_3 > Q_2 > Q_1$ and $\Delta U_1 = \Delta U_2 = \Delta U_3$

(2) $Q_1 = Q_2 = Q_3$ and $\Delta U_1 > \Delta U_2 > \Delta U_3$

(3) $Q_3 > Q_2 > Q_1$ and $\Delta U_1 > \Delta U_2 > \Delta U_3$

(4) $Q_1 > Q_2 > Q_3$ and $\Delta U_1 = \Delta U_2 = \Delta U_3$

5. To get an output Y = 1 in given circuit which of the following is correct:
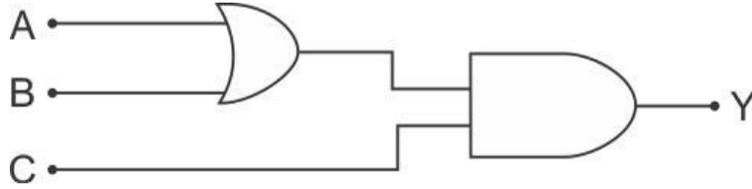
|	A	B	C
(1)	1	0	1
(2)	1	1	0
(3)	0	1	0
(4)	1	0	0

6. Two metallic spheres of radii 1 cm and 3 cm are given charges of -1×10^{-2} C and 5×10^{-2} C, respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is:

(1) 3×10^{-2} C

(2) 4×10^{-2} C

(3) 1×10^{-2} C

(4) 2×10^{-2} C

7. Two radiations of photons energies 1 eV and 2.5 eV, successively illuminate a photosensitive metallic surface of work function 0.5 eV. The ratio of the maximum speeds of the emitted electrons is:

(1) 1 : 2

(2) 1 : 1

(3) 1 : 5

(4) 1 : 4

8. The moment of inertia of a uniform circular disc is maximum about an axis perpendicular to the disc and passing through:
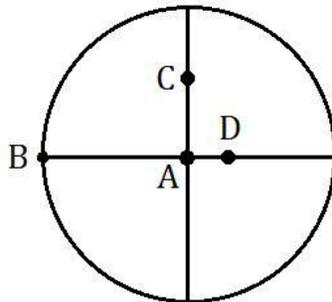
(1) C

(2) D

(3) A

(4) B

9. A train moving at a speed of 220 ms^{-1} towards a stationary object emits a sound of frequency 1000 Hz. Some of the sound reaching the object gets reflected back to the train as echo. The frequency of the echo as detected by the driver of the train is (Speed of sound in air is 330 ms^{-1})

(1) 4000 Hz
(2) 5000 Hz
(3) 3000 Hz
(4) 3500 Hz

10. The half life of a radioactive nucleus is 50 days. The time interval $(t_2 - t_1)$ between the time t_2 when $\frac{2}{3}$ of it has decayed and the time t_1 when $\frac{1}{3}$ of it has decayed is:

(1) 50 days
(2) 60 days
(3) 15 days
(4) 30 days

11. A car of mass m is moving on a level circular track of radius R. if μ_s represents the static friction between the road and tyres of the car, the maximum speed of the car in circular motion is given by:

(1) $\sqrt{Rg/\mu_s}$

(2) $\sqrt{mRg/\mu_s}$

(3) $\sqrt{\mu_s Rg}$

(4) $\sqrt{\mu_s mRg}$

12. A circular platform is mounted on a frictionless vertical axle. Its radius R = 2 m and its moment of inertia about the axle is 200 kg m^2. It is initially at rest. A 50 kg man stands on the edge of the platform and begins to walk along the edge at the speed of 1 ms^{-1} relative to the ground. Time taken by the man to complete one revolution is:

(1) $\frac{3}{2}\pi$ s

(2) 2π s

(3) $\frac{\pi}{2}$ s

(4) π s

13. If the momentum of an electron is changed by P, then the de Broglie wavelength associated with it changes by 0.5%. The initial momentum of electrons will be:

(1) 400 P

(2) $\dfrac{P}{200}$

(3) 100 P

(4) 200 P

14. If v_e is the escape velocity and v_o is the orbital velocity of satellite of orbit close to the Earth's surface, then these are related by:

(1) $v_o = v_e$

(2) $v_e = \sqrt{2v_o}$

(3) $v_e = \sqrt{2}\, v_o$

(4) $v_o = \sqrt{2}\, v_e$

15. The equation of simple harmonic wave is given

by: $y = 3 \sin \dfrac{\pi}{2}(50t - x)$,

where x and y are in metres and t is in seconds.
The ratio of maximum particle velocity to the wave velocity is:

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

(2) 3π

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

(4) 2π

16. A proton carrying 1 MeV kinetic energy is moving in a circular path of radius R in uniform magnetic field. What should be the energy of an α - particle to describe a circle of same radius in the same field?

(1) 1 MeV

(2) 0.5 MeV

(3) 4 MeV

(4) 2 MeV

17. Three masses are placed on the x-axis: 300 g at origin, 500 g at x = 40 cm and 400 g at x = 70 cm. The distance of the centre of mass from the origin is:
(1) 45 cm
(2) 50 cm
(3) 30 cm
(4) 40 cm

18. In a coil of resistance 10 Ω, the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in Weber is
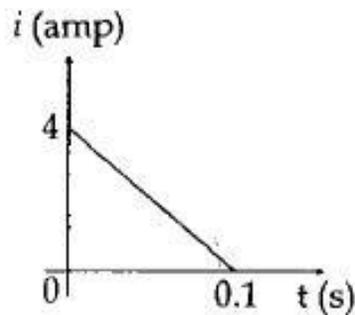

(1) 2
(2) 6
(3) 4
(4) 8

19. A parallel plate capacitor has a uniform electric field E in the space between the plates. If the distance between the plates is d and area of each plate is A, the energy stored in the capacitor is:
(1) $E^2 Ad/ \varepsilon_o$

(2) $\frac{1}{2}\varepsilon_o E^2\, Ad$

(3) $\varepsilon_o EAd\, t/\sqrt{m}$

(4) $\frac{1}{2}\varepsilon_o E^2$

20. A car of mass m starts from rest and accelerates so that the instantaneous power delivered to the car has a constant magnitude P_o. The instantaneous velocity of this car is proportional to:
(1) $t^{1/2}$
(2) $t^{-1/2}$
(3) $t/\sqrt{m}$
(4) $t^2 P_o$

21. Which one of the following plots represents the variation of gravitational field on a particle with distance r due to a thin spherical shell of radius R? (r is measured from the centre of the spherical shell)
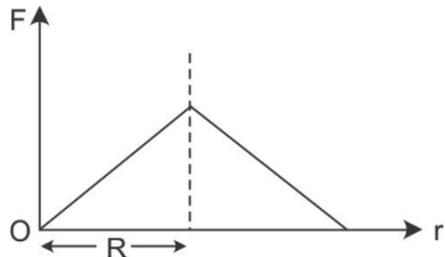
(1)
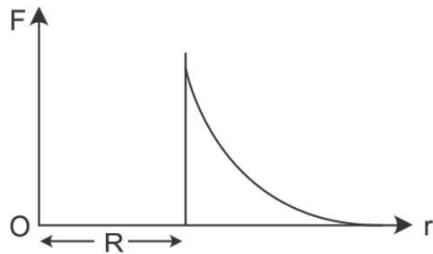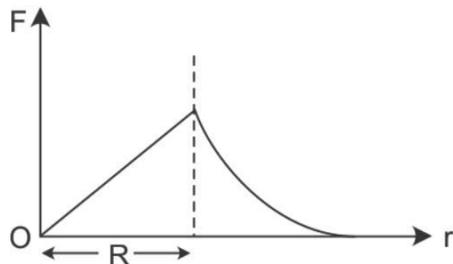

(2)
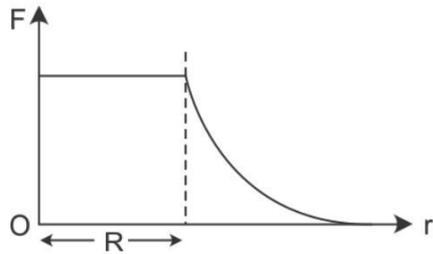
(3)

(4)

22. The input resistance of a silicon transistor is 100 Ω. Base current is changed by 40 μA which results in a change in collector current by 2 mA. This transistor is used as a common emitter amplifier with a load resistance of 4 kΩ. The voltage gain of the amplifier is:
(1) 3000
(2) 4000
(3) 1000
(4) 2000

23. For the angle of minimum deviation of a prism to be equal to its refracting angle, the prism must be made of a material whose refractive index:

(1) Lies between 2 and $\sqrt{2}$
(2) Is less than 1
(3) Is greater than 2
(4) Lies between $\sqrt{2}$ and 1

24. The transition from the state n = 3 to n = 1 in a hydrogen like atom results in ultraviolet radiation. Infrared radiation will be obtained in the transition from:

(1) $3 \rightarrow 2$
(2) $4 \rightarrow 2$
(3) $4 \rightarrow 3$
(4) $2 \rightarrow 1$

25. A rod of length 10 cm lies along the principal axis of a concave mirror of focal length 10 cm in such a way that its end closer to the pole is 20 cm away from the mirror. The length of the image is:

(1) 15 cm
(2) 2.5 cm
(3) 5 cm
(4) 10 cm

26. A slab of stone of area 0.36 m^2 and thickness 0.1 m is exposed on the lower surface to steam at 100 °C. A block of ice 0 °C rests on the upper surface of the slab. In one hour 4.8 kg of ice is melted. The thermal conductivity of slab is:

(Given latent heat of fusion of ice = 3.36×10^5 J kg^{-1})
(1) 1.29 J/m/s/°C
(2) 2.05 J/m/s/°C
(3) 1.02 J/m/s/°C
(4) 1.24 J/m/s/°C

27. A stone is dropped from a height h. It hits the ground with a certain momentum P. If the same stone is dropped from a height 100% more than previous height, the momentum when it hits the ground will change by:

(1) 41%
(2) 200%
(3) 100%
(4) 68%

28. A cell having an emf ε and internal resistance r is connected across a variable external resistance R. As the resistance R is increased, the plot of potential difference V across R is given by:

(1)
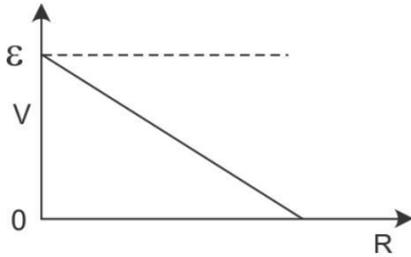
(2)
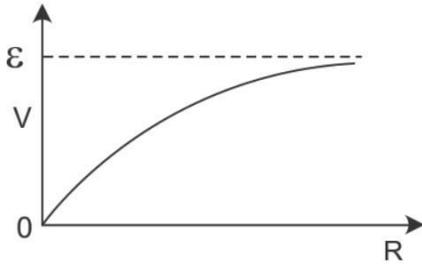
(3)
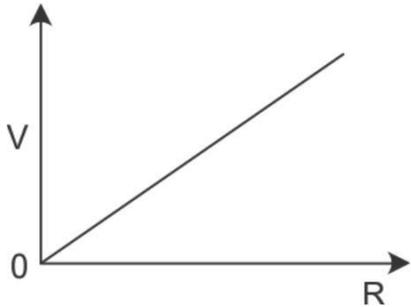
(4)
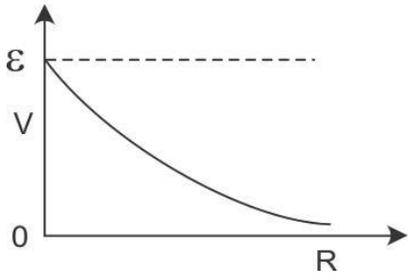
29. A magnetic needle suspended parallel to a magnetic field requires $\sqrt{3}$ J of work to turn it through 60°. The torque needed to maintain the needle in this position will be:

(1) 3 J

(2) $\sqrt{3}$ J

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

(4) $2\sqrt{3}$ J

30. The ratio of amplitude of magnetic field to the amplitude of electric field for an electromagnetic wave propagating in vacuum is equal to:
(1) Reciprocal of speed of light in vacuum
(2) The ratio of magnetic permeability to the electric susceptibility of vacuum
(3) Unity
(4) The speed of light in vacuum

Biology

31. Read the following four statements (A – D) :
    (A) In transcription adenosine pairs with uracil
    (B) Regulation of lac operon by repressor is referred to as positive regulation
    (C) The human genome has approximately 50,000 genes
    (D) Haemophilia is a sex – linked recessive disease.
    How many of the above statements are right?
    (1) Three
    (2) Four
    (3) One
    (4) Two

32. How man organisms in the list given below are autotrophs ?
    Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Sacharomyces, Trypanosoma, Porphyra, Wolffia
    (1) Five
    (2) Six
    (3) Three
    (4) Four

33. How many plants in the list given below have marginal placentation?
    Mustard, Gram, Tulip, Asparagus, arhar, Sun,nemp, Chilli, Colchicine, Onion, Moong, Pea, Tobacco
    (1) Five
    (2) Six
    (3) Three
    (4) Four

34. As compared to a dicot root, a monocot root has:
    (1) Many xylem bundles
    (2) Inconspicous annual rings
    (3) Relatively thicker periderm
    (4) More aboundant secondary xylem

35. A test cross is carried out to :
    (1) Predict whether two traits are linked
    (2) Asses the number of alleles of a gene
    (3) Determine whether two species or varieties will breed successfully
    (4) Determine the genotype of a plant at F_2

36. Which one of the following categories of animals is correctly described with no single exception in it?
    (1) All bony fishes have four pairs of gills and an operculum on each side
    (2) All sponges are marine and have collared cells
    (3) All mammals are viviparous and posses diaphragm for breathing
    (4) All reptiles posses scales, have a three chambered heart and are cold blooded (poikolothermal)

37. The rate of formation of new organic matter by rabbit in a grassland is called:
    (1) Secondary productivity
    (2) Net primary productivity
    (3) Gross primary productivity
    (4) Net productivity

38. In genetic engineering, the antibiotics are used:
    (1) To select healthy vectors
    (2) As sequences from where replication starts
    (3) To keep the cultures free of infection.
    (4) As selectable markers

39. The secretory phase in the human menstrual cycle is also called :
    (1) Follicular phase lasting for about 6 days
    (2) Luteal phase and lasts for about 13 days
    (3) Follicular phase and lasts for about 13 days
    (4) Luteal phase and lasts for about 6 days

40. In gobar gas, the maximum amount is that of:
    (1) Methane
    (2) Propane
    (3) Carbon dioxide
    (4) Butane

41. Through their effect on plant growth regulators, what do the temperature and light control in the plants?
    (1) Flowering
    (2) Closure of stoamata
    (3) Fruit elongation
    (4) Apical dominance

42. Which one of the following human organs is often called the '' Graveyard'' of RBC's?
    (1) Kidney
    (2) Spleen
    (3) Liver
    (4) Gall bladder

43. Which one of the following pairs of animals are similar to each other pertaining to the feature stated against them
    (1) Garden lizard and crocodile - Three chambered heart
    (2) Ascaris and Ancylostoma – Metameric segmentation
    (3) Sea horse and flying fish – Cold blooded (poikilothermal)
    (4) Pteropus and ornithorhynus – Viviparity

44. The idea of mutations was brought forth by :
    (1) Gregor Mendal, who worked on *Pisum sativum*
    (2) Hardy Weinberg, who worked on allel frequencies in a population
    (3) Charles Darwin, who observed a wide variety of organism during sea voyage
    (4) Hugo do varies, who worked on evening primrose

45. Select the correct statements about biodiversity:
    (1) Large scale planting of Bt cotton has no adverse effect on biodiversity
    (2) Western Ghats have a very high degree of species richness and endemism
    (3) Conservation of biodiversity is just a fad pursued by the developed countries
    (4) The desert areas of Rajasthan and Gujarat have a very high level of desert animal species as well as numerous rare animals

46. Plants with ovaries having only one or a few ovules, are generally pollinated by :
    (1) Butterflies
    (2) Birds
    (3) Wind
    (4) Bees

47. Consider the following four statements (a-d) and select the option which includes all the correct ones only
    (a) Single cell spirulina can produce large quantities of food rich in protein, minerals, vitamins etc.
    (b) Body weight-wise the microorganism Methylophilus methylotrophus may be able to produce several times more proteins than the cows per day
    (c) Common button mushrooms are very rich source of vitamin C
    (d) A rice variety has been developed which is very rich in calcium
    Options:
    (1) Statements (a),(c) and (d)
    (2) Statements (b),(c) and (d)
    (3) Statements (a),(b)
    (4) Statements (c),(d)

48. Which one of the following biomolecules is correctly charactrised ?
    (1) Palmitic acid – An unsaturated fatty acid with 18 carbon atoms
    (2) Adenylic acid – Adenosine with a glucose phosphate molecule
    (3) Alanine amino acid – Contains an amino group and an acidic group anywhere in the molecule
    (4) Lecithin – a phosphorylated glyceride found in cell membrane

49. For its action, nitrogenase requires
    (1) Light
    (2) Mn^{2+}
    (3) Super oxygen radicals
    (4) High input of energy

50. Tobacco plants resistance to a nematode have been developed by tge introduction of DNA that produced (in the host cells).
    (1) A particular hormone
    (2) An antifeedant
    (3) A toxic protein
    (4) Both sense and anti-sense RNA

51. Where do certain symbiotic microorganisms normally occur in human body?
    (1) Oral lining and tongue surface
    (2) Vermiform appendix and return
    (3) Duoenum
    (4) Caecum

52. Identify the meiotic stage in which the homologus chromosomes separate while the sister chromatids remain associated at their centromeres:
(1) Metaphase II
(2) Anaphase I
(3) Anaphase II
(4) Metaphase I

53. Which one of the folllwing cellular parts is correctly described?
(1) Centrioles – sites for active RNA synthesis
(2) Ribosomes – those on chloroplasts are larger (80s) While those in the cytoplasm are smaller (70s)
(3) Lysosomes – optimally active at a pH of about 8.5
(4) Thylakoids – Flattened membranous sacs forming the grana of chloroplasts

54. Cuscuta is an example of :
(1) Brood parasitism
(2) Predation
(3) Endoparasitism
(4) Ectoparasitism

55. The supportive skeletal structures in the human external ears and in the nose tip are examples of :
(1) Areolar tissue
(2) Bone
(3) Cartilage
(4) Ligament

56. Read the following five statements (A-B) and answer as asked next to them
(a) In Equisetum the female gametophyte is retained on the parent sporophyte
(b) In Ginkgo male gametophyte is not independent
(c) The sporophyte in Riccia is more developed than that in Polytrichum
(d) Sexual reprocution in volvox is ispgamous
(e) The spors of slime molds lack cell walls.
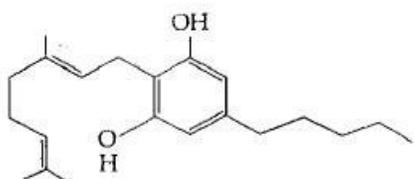How many of the above statements are correct?
(1) Three
(2) Four
(3) One
(4) Two

57. Identify the molecules (A) and (b) shown below and select the right option giving their source and use

(a)
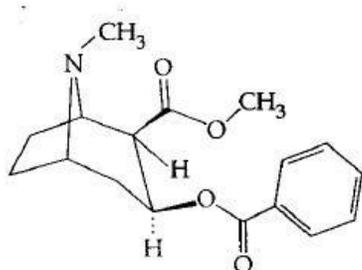
(b)

	Molecule	Source	Use
(1)	(b) Heroin	Cannabis Sativa	Depressant and slows down body functions
(2)	(b)Cannabinoid	Atropa belladonna	Produces hallucinations
(3)	(a) Morphine	Papaver somniferum	Sedative and pain killer
(4)	(a) Cocaine	Erythroxylum coca	Acclerates the transport of dopamine

58. The figure below shows three steps (A,B,C) of polymerase chain reaction (PCR) select the options giving correct identification together with what it represents ?

Region to be amplified
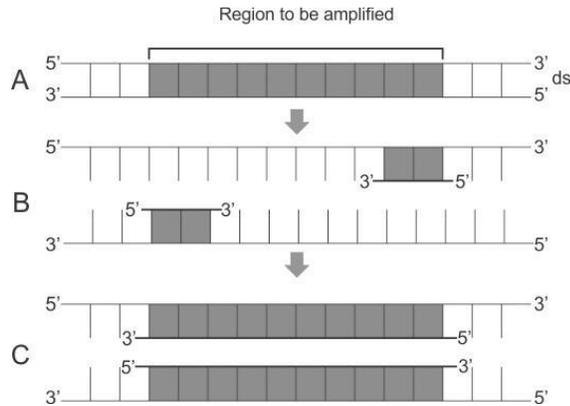
(1) A – Denaturtaion at a temperature of about $50^{o}C$
(2) C- Extension in the presence of heat stable DNA polymerse
(3) A – Annealing with two sets of primers
(4) B – Denaturation at a temperature of about $98^{o}C$ separating the two DNA strands

59. Identify the likely organisms (a),(b),(c) and (d) in the food web shown below :
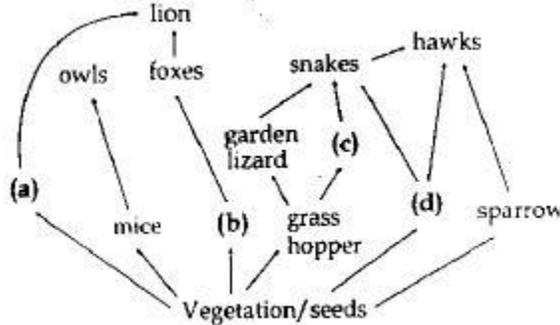
	(a)	(b)	(c)	(d)
(1)	Dog	Squirrel	Bat	Deer
(2)	Rat	Dog	Tortoise	Crow
(3)	Squirrel	Cat	Rat	Pigeon
(4)	Deer	Rabbit	Frog	rat

60. Which one of the following pairs of chemical substances, is correctly catgorised?
(1) Pepsin and prolactin- Two digestive enzymes secreted in stomach
(2) Troponin and mypson – complex proteins in striated muscles
(3) Secretin and rhodopsin – Polupeptide hormones
(4) Calcitonin and thymosin – Thyroid hormones

61. Vernalisation stimulates flowering in :
   (1) Turmeric
   (2) Carrot
   (3) Ginger
   (4) Zamikand

62. Green revolution in india occurred during :
   (1) 1970's
   (2) 1980's
   (3) 1950's
   (4) 1960's

63. A fall in glomerular filtration rate (GFR) activities :
   (1) Adrenal cortex to release aldosteone
   (2) Adrenal medulla to release adrenaline
   (3) Posterior pitutaory to release vasopressin
   (4) Juxta glomerular cells to release rennin

64. What is the function of germ pore?
   (1) Absorption of water for seed germination
   (2) Intiation of pollen tube
   (3) Release of male gametes
   (4) Emergence of radical

65. Which one of the following options gives the correct catagorisation of six animals according to the type of nitrogenous wastes (A,B,C), they give out ?

	A AMMONOTELIC	B UREOTELIC	C URICOTELIC
(1)	Frog, Lizards	Aquatic,Amphibia, Humans	Cockroach Pigeon
(2)	Aquatic Amphibia	Frog,Humans	Pigeon,Lizards Cockroach
(3)	Aquatic	Cockroach Humans	Frog,Pigeon Lizards
(4)	Pigeon Humans	Aquatic Amphibia Lizards	Cockroach Frog

66. Which one of the following of items in the options 1 – 4 are correctly categorized with one exception in it?

	ITEMS	CATEGORY	EXCEPTION
(1)	Kangaroo, Koala Wombat	Australian Marsupials	wombat
(2)	Plasmodium Cuscuta Trypanasoma	Protozoan Parasites	Cuscuta
(3)	Typhoid Pneumonia Diphtheria	Bacterial disease	Diphtheria
(4)	UAA,UAG,UGA	Stop Condons	UAG

67. Which one of the following generally acts as an antagonist to gibberllins ?
    (1) Ethylene
    (2) ABA
    (3) IAA
    (4) Zeatin

68. Which one of the following organisms is scientifically correctly named, correctly printed according to the international Rules of Nomenclature and correctly described?
    (1) Plasmodium falciparum – A protozoan pathogen causing the most serious type of malaria
    (2) Felis tigiris - The Indian tiger, well protected in gir forests
    (3) E.coli- full name, Entamoeba coli, a commonly occurring bacterium in human intestine
    (4) Musca domestic – The common house lizard a reptile

69. Read the following four statements (A-D)
    (A) Colosturm is recommended for the new born because it is rich in antigens
    (B) Chickengunya is caused by a gram negative bacterium
    (C) Tissue culture has proved useful in obtaining virus – free plants
    (D) Beer is manufactured by distillation of fermented grape juice How many of the above statements are wrong ?
    (1) Three
    (2) Four
    (3) One
    (4) Two

70. Which one of the following organisms is correctly matched with its three characteristics ?
    (1) Tomato : wisted aestivation, Axile placentation, Berry
    (2) Onion : bulb, Imbricate aestivation, Axile placentation
    (3) Maize : C_3 pathway, closed vascular bundles
    (4) Pea : C_3Pathway, Ebdospermic seed, vexillary aestivation

71. The second stage of hydrosere is occupied by plants like :
    (1) Typha
    (2) Salix
    (3) Vallisneria
    (4) Azollo

72. Which one of the following statements is correct with respect to immunity?
    (1) The antibodies against small pox pathogen are produced by T-lymphocytes
    (2) Antibodies are protein molecules, each of which has four light chains
    (3) Rejection of a kidney graft is the function of B-lymphocytes
    (4) Preformed antibodies need to be injected to treat the bite y a viper snake

73. Which one of the following reprsents a palindromic sequence in DNA?
    (1) 5' - CCAATG – 3'
        3' – GAATCC – 5'
    (2) 5' – CATTAG – 3'
        3' – GATAAC – 5'
    (3) 5'- GATACC- 3' 3'
        – CCTAAG – 5'
    (4) 5' – GAATTC – 3'
        3'- CTTAAG – 5'

74. For its activity, Carboxypeptidase requires
    (1) Iron
    (2) Niacin
    (3) Copper
    (4) Zinc

75. Given below is the diagrammatic sketch of certain type of connective tissue. Identify the parts lebelled A,B,C and D, and select the right option about them.
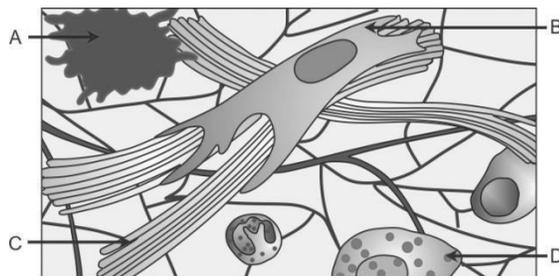
	Part – A	Part – B	Part –C	Part –D
(1)	Mast cell	Macro – phage	Fibroblast	Collagen Fibreso
(2)	Macro – phage	Collagen fibres	Fibroblast	Mast Cell
(3)	Mast Cell	Collagen fibres	Fibroblast	Macro phage
(4)	Macro phage	Fibroblast	Collagen fibres	Mast cell

76. In the five – kingdom classification, chlamydomonas and chlorella have been included in:
   (1) Algae
   (2) Plantae
   (3) Monera
   (4) Protista

77. Read the following four statements (A-D) :
   (A) Both, photophosphorylation and oxidative phosphorylation involve uphill transport of protons across the membrane
   (B) In dicot stems, a new cambium originates from cells of pericycle at the time of secondary growth
   (C) Stamens in flowers of Gloriosa and Petunia are polyandrous
   (D) Symbiotic nitrogen – fixers occur in free – living state also in soil. How many of the above statements are right?
   (1) Three
   (2) Four
   (3) One
   (4) Two

78. The domestic sewage in large cities :
    (1) Is processed by aerobic and then anaerobic bacteria in the secondary treatment in sewage treatment plants (STPs)
    (2) When treated in STPs does not really require the aeration step as the sewage contains adequate oxygen
    (3) has very high amounts of suspended solids and dissolved salts
    (4) has a high BOD as it contains both aerobic and anaerobic bacteria

79. Which one of the following pairs is wrongely matched ?
    (1) Salvinia – Prothallus
    (2) Viroids – RNA
   (3) Mustard – Synergids
    (4) Ginkgo – Archegonia

80. What is it that forms the basis of DNA fingerprinting?
    (1) The relative difference in the DNA occurrence in blood, skin and saliva
    (2) The relative amount of DNA in the ridges and grooves of the fingerprints
    (3) Satelite DNA occurring as highlt repeated short DNA segments
    (4) The relative proportions of purines of pyrimidines in DNA

81. Which one of the following characteristics is common both in humans and adult frogs?
    (1) Internal fertilization
    (2) Nucleated RBC's
   (3) Ureotelic mode of excretion
    (4) Four – Chambered heart

82. Represented below is the inheritance pattern of certain type of traits in humans. Which one of the following conditions could be an example of this pattern?
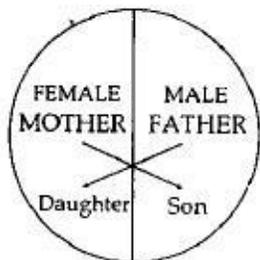
    (1) Sickle cell anaemia
    (2) Haemophillia
    (3) Thalassemia
    (4) Phenylketonuria

83. The four sketches (A,B,C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given along with its correct location and function?

(A)
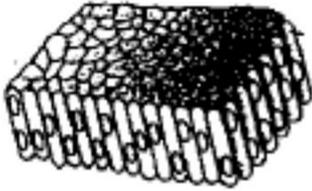
(B)

(C)

(D)

		Tissue	Location	Function
(1)	(C)	Collagen Fibres	Cartilage	Attach Skeletal Muscles to Bones
(2)	(D)	Smooth Muscle Tissue	Heart	Heart Contraction
(3)	(A)	Columnar Epithelium	Nephron	Secretion and Absorption
(4)	(B)	Glandular Epithelium	Intestine	Secretion

84. Which one of the following structure is an organelle within an organelle?
    (1) Peroxisome
    (2) ER
    (3) Mesosome
    (4) Ribosome

85. The first clinical gene therpy was given for treating
    (1) Chicken pox
    (2) Rheumatoid arthirits
    (3) Adenosine deaminase deficiency
    (4) Diabates mellitus

86. Sacred groves are specially useful in:
    (1) Preventing soil erosion
    (2) Year - round flow of water in rivers
    (3) Conserving rare and threaterned species
    (4) Generating environmental awareness

87. Which one of the following is a wrong statement regarding mutuations?
    (1) Cancer cells commonly show chromosomal aberrations
    (2) UV and Gamma rays are mutagens
    (3) Change in a single base pair of DNA does not cause mutation
   (4) Deletio and insertion of base pairs cause frame – shift mutations

88. Biolistics (gene-gun) is suitable for :
    (1) Transformation of plant cells
    (2) Constructing recombinant DNA by joining with vectors
    (3) DNA finger printing
    (4) Disarming pathogen vectors

89. Which one of the following statements is wrong ?
    (1) Vegetative cell is larger than generative cell
    (2) Pollen grains in some plants remain visible for months
    (3) Intine is made up of cellulose and pectin
    (4) When pollen is shed at two-celled stag, double fertilization does not take place

90. Identify the human development stage shown below as well as the related right place of its occurrence in a normal pregnant woman, and select the right option for the two together.
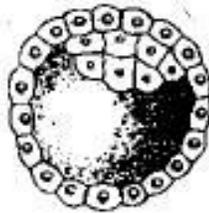

	Developmental Stage	Site of occurrence
(1)	Blastula	End part of Fallopian tube
(2)	Blastocyst	Uterine wall
(3)	8 – Celled morula	Starting point of fallopian tube
(4)	Late morula	Middle part of Fallopian tube

Chemistry

91. Red precipitate is obtained when ethanol solution of dimethylglyoxime is added to ammoniacal Ni (II). Which of the following statements is not true?
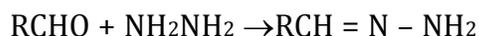   (1) Complex has symmetrical H – Bonding
    (2) Red Complex has a tetrahedral geometry
    (3) Dimethylglyoxime functions as bidentate ligand
    (4) Red complex has a square planar geometry

    $$\left[\text{dimethylglyoxime} = \begin{array}{l} H_3C - C = N \diagup OH \\ H_3C - C = N \diagdown OH \end{array} \right]$$
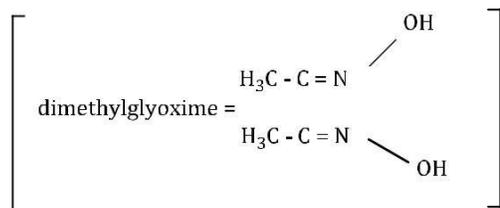
92. During change of O_2 to O_2^- ion, the electron adds on which one of the following orbitals
    (1) π orbital
    (2) σ^* orbital
    (3) σ orbital
    (4) π^* orbital

93. Consider the reaction :
    $RCHO + NH_2NH_2 \rightarrow RCH = N – NH_2$
   What sort of reaction is it?
    (1) Free radical addition – elimination reaction
    (2) Electrophilic substitution elimination reaction
    (3) Nucleophilic addition – elimination reaction
    (4) Electrophilic addition – elimination reaction

94. In which of the following arrangements the given sequence is not strictly according to the property indicated against it
    (1) $H_2O < H_2S < H_2Se < H_2Te$: increasing pK_a values
    (2) $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing acidic character
    (3) $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidizing power
    (4) $HF < HCl < HBr < HI$: Increasing acidic strength

95. The Gibbs energy for the decomposition of Al_2O_3 at 500°C is as fo

$$3\frac{2}{3} Al_2O_3 \rightarrow 3\frac{4}{3} Al + O_2 \ ;$$
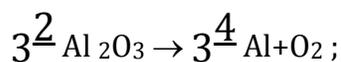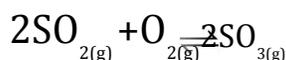
$\Delta_rG = + 960 \text{ kJ mol}^{-1}$

The potential difference needed for the electrolytic reduction of aluminium oxide (Al_2O_3) at 500°C is at least:
(1) 3.0 V
(2) 2.5 V
(3) 5.0 V
(4) 4.5 V

96. Given that the equilibrium constant for the reaction

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$$

has a value of 278 at a particular temperature. What is the value of the equilibrium constant for the following reaction at the same temperature?

$$SO_{3(g)} \rightleftharpoons SO_{2(g)} + \frac{1}{2}O_{2(g)}$$

(1) 3.6×10^{-3}
(2) 6.0×10^{-2}
(3) 1.3×10^{-5}
(4) 1.8×10^{-3}

97. Which of the following compounds can be used as antifreeze in automobile radiators?
(1) Glycol
(2) Nirophenol
(3) Ethyl alcohol
(4) Methyl alcohol

98. Molar conductivities $\left(\Lambda^o_m\right)$ at infinite dilution of NaCl, HCl and CH_3COONa are 126.4, 425.9 and 91.0 s cm^2 mol^{-1} respectively. Λ^o_m for CH_3COOH will be :
(1) 180.5 S cm^2 mol^{-1}
(2) 290.8 S cm^2 mol^{-1}
(3) 390.5 S cm^2 mol^{-1}
(4) 425.5 S cm^2 mol^{-1}

99. Vapour pressure of chloroform ($CHCl_3$) and dichloromethane (CH_2Cl_2) at 25^{0}C are 200 mmHg and 41.5 mmHg respectively. Vapour pressure of the solution obtained by mixing 25.5 g of $CHCl_3$ and 40 g of CH_2Cl at the same temperature will be :
(Molecular mass of $CHCl_3$ = 119.5 u and molecular mass of CH_2Cl_2 = 85 u)
   (1) 615.0 mmHg
   (2) 347.9 mmHg
   (3) 285.5 mmHg
   (4) 173.9 mmHg

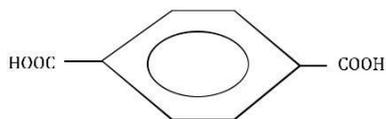**100.** A certain gas takes three times as long to effuse out as helium. Its molecular mass will be :
   (1) 36 u
   (2) 64 u
   (3) 9 u
   (4) 27 u

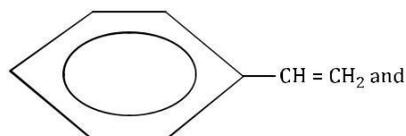**101.** Which one of the following sets forms the biodegradable polymer?
   (1) $H_2N – CH_2 – COOH$ and
       $H_2N – (CH_2)_5 – COOH$
   (2) $HO – CH_2 – CH_2 – OH$ and

HOOC ⬡ COOH

   (3)

⬡ CH = CH_2 and

       $CH_2 = CH – CH = CH_2$
   (4) $CH_2 = CH – CN$ and
       $CH_2 = CH - CH = CH_2$

102. The catalytic activity of transition metals and their compounds is ascribed mainly to:
   (1) Their unfilled d – orbitals
   (2) Their ability to adopt variable oxidation states
   (3) Their chemical reactivity
   (4) Their magnetic behavior

103. Given the reaction between 2 gases represented by A_2 and B_2 to give the compound $AB_{(g)}$

$A_{2(g)} + B_{2(g)} \rightleftharpoons 2\, AB_{(g)}$
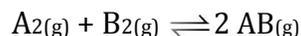
At equilibrium, the concentration

of $A_2 = 3.0 \times 10^{-3}$ M

of $B_2 = 4.2 \times 10^{-3}$ M

of $AB = 2.8 \times 10^{-3}$ M

If the reaction takes place in a sealed vessel at $527\,^{0}C$, then the value of K_c will be :

(1) 1.9

(2) 0.62

(3) 4.5

(4) 2.0

104. Standard reduction potentials of the half reactions are given

below: $F_{2(g)} + 2e^- \rightarrow 2F^-_{(aq)}$; $E^0 = +2.85$ V

$Cl_{2(g)} + 2e^- \rightarrow 2Cl^-_{(aq)}$; $E^0 = 1.36$ V

$Br_{2(l)} + 2e^- \rightarrow 2Br^-_{(aq)}$; $E^0 = +1.06$ V

$I_{2(s)} + 2e^- \rightarrow 2I^-_{(aq)}$; $E^0 = +0.53$ V
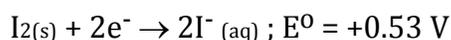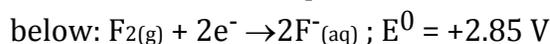
The strongest oxidizing and reducing agents respectively are:

(1) Br_2 and Cl^-

(2) Cl_2 and Br^-

(3) Cl_2 and I_2

(4) F_2 and I^-

105. For diatomic species are listed below.identify the correct order in which the bond order is increasing in them :

(1) $O_2^- < NO < C_2^{2-} < He_2^+$

(2) $C^2_2{}^- < He_2^+ < O_2^- < NO$

(3) $He_2^+ < O_2^- < NO < C^2_2{}^-$

(4) $NO < O_2^- < C^2_2{}^- < He_2^+$

106. Low spin complex of d^6 – cation in an octahedral field will have the following energy:

(1) $\dfrac{-12}{5}\Delta_o + 3P$

(2) $\dfrac{-2}{5}\Delta_o + 2P$

(3) $\dfrac{-2}{5}\Delta_o + P$

(4) $\dfrac{-12}{5}\Delta_o + P$

(Δ_o = Crystal field splitting energy in an octahedral field, P = Electron pairing energy)

107. Which of the following compounds will give yellow precipitate with iodine and alkali?
  (1) Methyl acetate
  (2) Acetamide
  (3) 2 – Hydroxypropane
  (4) Acetophenone

108. The orbital angular momentum of a p – electron is given as :

  (1) $\sqrt{3}\, 2\dfrac{h}{\pi}$

  (2) $\sqrt{\dfrac{3}{2}}\dfrac{h}{\pi}$

  (3) $\sqrt{6}\, 2\dfrac{h}{\pi}$

  (4) $\dfrac{h}{\sqrt{}}2\pi$

109. Which one of the following does not correctly represent the order of the property indicated against it ?
  (1) $Ti^{3+} < V^{3+} < Cr^{3+} < Mn^{3+}$ increasing magnetic moment
  (2) Ti < V < Cr < Mn increasing melting points
  (3) Ti < V < Mn < Cr increasing 2nd ionization enthalpy
  (4) Ti < V < Cr < Mn increasing number of oxidation states

110. Chloroamphenicol is an:
  (1) Antihistaminic
  (2) Antiseptic and disinfectant
  (3) Antibiotic – broad spectrum
  (4) Antifertility drug

111. Consider the following reaction:

$$\xrightarrow[\text{Pd - BaSO}_4]{\text{H}_2} \quad A$$
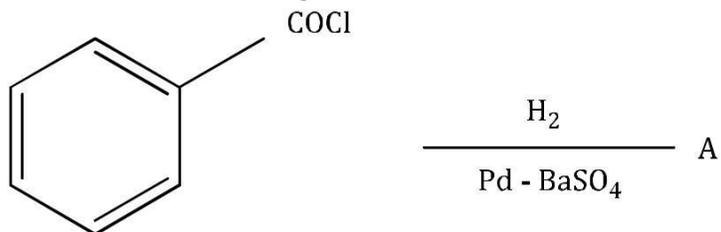
The product 'A' is:
  (1) C_6H_5OH
  (2) $C_6H_5COOH_3$

(3) C_6H_5Cl

(4) C_6H_5CHO

112. Which one of the following reagents will be able to distinguish between 1 – butyne and 2 – butyne ?

(1) HCl

(2) O_2

(3) Br_2

(4) $NaNH_2$

113. For real gases van der Waals equation is written as

$$\left(p + \frac{an^2}{V^2} \right)(V-nb)=nRT$$

Where 'a' and 'b' are van der Waals constants.

Two sets of gases are:

(I) O_2, CO_2, H_2 and He

(II) CH_4, O_2 and H_2

The gases given in set – I in increasing order of 'b' and gases given in set – II in decreasing order of 'a' are arranged below. Select the correct order from the following:

(1) (I) $O_2 <$ He $< H_2 < CO_2$ (II) $H_2 > O_2 > CH_4$

(2) (I) $H_2 <$ He $< O_2 < CO_2$ (II) $CH_4 > O_2 > H_2$

(3) (I) $H_2 < O_2 <$ He $< CO_2$ (II) $O_2 > CH_4 > H_2$

(4) (I) He $< H_2 < CO < O_2$ (II) $CH_4 > H_2 > O_2$

114. Activation energy (E_a) and rate constants (k_1 and k_2) of a chemical reaction at two different temperatures (T_1 and T_2) related by :

(1) $\ln \dfrac{k_2}{k_1} = -\dfrac{E_a}{R}\left(\dfrac{1}{T_2} - \dfrac{1}{T_1} \right)$

(2) $\ln \dfrac{k_2}{k_1} = -\dfrac{E_a}{R}\left(\dfrac{1}{T_2} + \dfrac{1}{T_1} \right)$

(3) $\ln \dfrac{k_2}{k_1} = \dfrac{E_a}{R}\left(\dfrac{1}{T_1} - \dfrac{1}{T_2} \right)$

(4) $\ln \dfrac{k_2}{k_1} = -\dfrac{E_a}{R}\left(\dfrac{1}{T_1} - \dfrac{1}{T_2} \right)$

115. Which of the following exhibits only +3 oxidation state?
- (1) Th
- (2) Ac
- (3) Pa
- (4) U

116. Equal volumes of two monoatomic gases A and B ,at same temperature and pressure are mixed. The ratio of specific heats (C_p/C_v) of the mixture will be:
- (1) 1.50
- (2) 3.3
- (3) 1.67
- (4) 0.83

117. Structure of a mixed oxide is cubic close – packed (c.c.p) The cubic unit cell of mixed oxide is composed of oxide ions. One fourth of the tetrahedral voids are occupied by divalent metal A and the octahedral voids are occupied by a monovalent metal B. The formula of the oxide is :
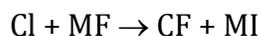- (1) A_2BO_2
- (2) $A_2B_3O_4$
- (3) AB_2O_2
- (4) ABO_2

118. Four successive members of the first series of the transition metals are listed below.

For which one of the standard potential $\left(E^o{}_{M^{2+}/M} \right)$ value has a positive sign?
- (1) Ni (Z = 28)
- (2) Cu (Z = 29)
- (3) Fe (Z = 26)
- (4) Co (Z = 27)

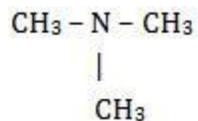**119.** In the replacement reaction
Cl + MF → CF + MI
The reaction will be most favourable if M happens to be
- (1) K
- (2) Rb
- (3) Li
- (4) Na

120. An organic compound (C_3H_9N) (A), when treated with nitrous acid, gave an alcohol and N_2 gas was evolved.(A) on warming with $CHCl_3$ and caustic potash gave (C) which on reduction gave isopropylmethylmine. Predict the structure of (A)

(1) $CH_3CH_2 – NH – CH_3$

(2)
$$CH_3 – \underset{\underset{CH_3}{|}}{N} – CH_3$$

(3) $CH_3CH_2CH_2 – NH_2$

(4)
$$\underset{CH_3}{\overset{CH_3}{>}} CH - NH_2$$