1.

Which of the following structure is not associated with protection and dehiscence of anther?

1. Tapetum
2. Epidermis
3. Endothecium
4. Middle layer

2.

Which of the following statement is not correct for pollen grain?

1. It represents male gametophyte.
2. It is a spherical structure, about 25-50 mm in diameter.
3. Pollen grains are rich in nutrients.
4. In family rosaceae, leguminoseae and solanaceae pollen lose viability in 30 minute.

3.

In biological world each organism has evolved its own mechanism of reproduction, which depends upon?

1. Habitat
2. Internal physiology
3. Size of organism
4. Both 1 and 2

4.

Which of the following is a recessive trait for a character chosen by Mendel in garden pea?

1. Violet flower colour
2. Yellow pod colour
3. Axial flower position
4. Tall stem height

5.

The F1 progeny in monohybrid crosses by Mendel resembled:

1. The parent exhibiting dominant trait completely
2. The parent exhibiting recessive trait completely
3. The parent exhibiting dominant trait partly
4. The parent exhibiting recessive trait partly

6.

Genes which code for a pair of contrasting traits or slightly different forms of the same gene are known as:

1.Alleles
2. Loci
3. Cistrons
4. Introns

7.

In a true breeding the allelic pair of genesare

1. Homologous
2. Linked
3. Stable
4. Homozygous

8.

In a strand of a nucleic acid. Two nucleotides are linked together by:

1. 3’ – 5’ phosphodiester bond
2. 5’ – 3’ phosphodiester bond
3. 2’ – 5’ phosphodiester bond
4. 3’ – 1’ phosphodiester bond

9.

What is another name for thymine?

1. 5 – bromouracil
2. 3 – bromouracil
3. 3 – methyl uracil
4. 5 – methyl uracil

10.

Watson and Crick based their model of DNA on X-ray diffraction data produced by:

1. Hershey and Chase
2. Marie Curie and Pierre Curie
3. Franklin and Wilkins
4. Meselson and Stahl

11.

According to Erwin Chargaff, for a double stranded DNA

1. The ratios between Adenine and Thymine, and , Guanine and Cytosine are constant and equals one.
2. The ratios between Adenine and Thymine, and , Guanine and Cytosine are constant but is not equal to one.
3. The ratios between Adenine and Guanine, and , Thymine and Cytosine are constant and equals one.
4. The ratios between Adenine and Guanine, and , Thymine and Cytosine are constant but is not equal to one.

12.

According to the Central Pollution Control Board, particles that are responsible for causing great harm to human health are of diameter

1. 2.50 µm
2. 5.00 µm
3. 10.00 µm
4. 7.5 µm

13.

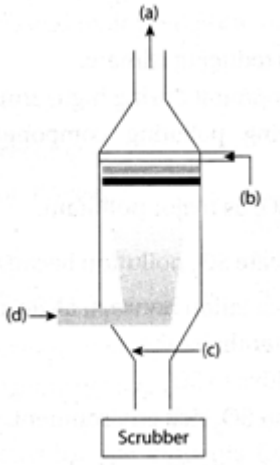
Catalytic converters are fitted into automobiles for reducing emission of poisonous gases. The converters are made up of metals namely

1. Fe, Cu and Rh

3. Pt, Pd and Rh
4. Al, Pd and Th
5. Fe, Cu and Pd

14.

Identify 1., 2., 3. and 4. in the diagram



1. 1.–Dirty air ; 2.– Water line spray ; 3.– Clean air; 4. – Particulate matter
2. 1.–Clean air ; 2.– Water line spray ; 3.– Particulate matter; 4. – Dirty air
3. 1.–Water line spray ; 2.– Particulate matter; 3.– Clean air; 4. – Dirty air
4. 1.–Particulate matter; 2.– Dirty air ; 3.– Clean air; 4. – Water line spray

15.

Which is incorrect about electrostatic precipitator (ESP)?

1. Corona produces electrons
2. Collecting plants are grounded, so use to attract the charged dust particle
3. Velocity of air between the plates must be low
4. Electrode wires that are maintained at hundred volts produces corona

16.

What is/are done by catalytic converters?

1. Unburnt hydrocarbons are converted to CO_2 and H_2O
2. CO is converted to CO_2
3. Nitric oxide is changed to N_2 gas
4. All of these

17.

According to Euro-III norms, sulphur should be controlled at _____ in diesel and _____ in petrol

1. 350 ppm ; 50 ppm
2. 50 ppm ; 150 ppm
4. 50 ppm ; 50 ppm
5. 350 ppm ; 150 ppm

18.

Select the incorrect statement

1. India has more than 50,000 genetically different strains of rice
2. India has 100 varieties of mango
3. The genetic variation in Rauwolfia vomitoria can be in terms of concentration and potency of reserpine
4. The tropical rainforest initially covered 14% of the land surface of earth, but now they cover only 6% of the land area

19.

Identify 1., 2., 3. and 4. in the given figure.

The pie-chart for number of species of major taxa of invertebrates represent respectively

1. a – Insects ;b – Crustaceans ; c. – Molluscs ; d – Other animal groups
2. a – Other animal group; b – Molluscs; c – Crustaceans; d –Insects
3. a –Molluscs; b – Insects ;c – Other animal groups; d – Crustaceans
4. a – Insects; b – Molluscs; c – Crustaceans; d – Other animal groups

20.

Which of the following rainforest is home to more than 40,000 species of plants, 3000 of fishes, 1300 of birds, 427 of mammals, 427 of amphibians, 378 of reptiles and more than 1,25,000 invertebrates?

1. Amazonian
2. Tropical
3. Arctic tundra
4. Temperate

21.

Match the items in Column 'A' and Column 'B' and choose correct answer:

Column A **Column B**

(i) Lady bird	(A) Methanobacterium
(ii) Mycorrhiza	(B) Trichoderma
(iii) Biological control	(C) Aphids
(iv) Biogas	(D) Glomus

The correct answer is:

1. i B, ii D, iii C, iv A
2. i C, ii D, iii B, iv A
3. i D, ii A, iii B, iv C
4. i C, ii D, iii A, iv A

22.

Mycorrhiza does not help the host plant in:
1. Enhancing its phosphorus uptake capacity
2. Increasing its tolerance to drought
3. Enhancing its resistance to root pathogens
4. Increasing its resistance to insects

23.

Pusa komal is disease resistance variety of?
1. Cauliflower
2. Brassica
3. Cow Pea
4. Chilli

24.

Triangular age pyramid represents
1. Expanding population.
2. Declining population.
3. Mature population.
4. Both 1. and 3.

25.

Choose the incorrect match

1	Vertical distribution of different species occupying different levels	-	Stratification
2	The most productive ecosystem	-	Sugarcane field
3	The most limiting nutrient of marine ecosystem	-	Nitrogen
4	Release of inorganic nutrients from humus during the process of decomposition	-	Mineralisation

26.

Each tropic level has certain mass of living material at a particular time called
1. Standing crop
2. Standing state
3. GPP
4. NPP

27.

If 'N' is the population density at time t, then its density at time 't+1' will be
1. $N_{t+1} = N_t \times [(B + I) - (D + E)]$
2. $N_{t+1} = N_t + [(B + I) - (D + E)]$
3. $N_{t+1} = N_t + [(B + I) + (D + E)]$
4. $N_{t+1} = N_t \times [(B + I) + (D + E)]$

28.

Choose the incorrect match regarding population interactions.

	Species A	Species B
1. Amensalism	–	–
2. Parasitism	+	–
3. Commensalism	+	0
4. Mutualism	+	+

29.

Which of the following statements is/are correct?
(a) The entire sequence of communities that successively change in a given area is called sere.
(b) The natural reservoir of phosphorus is rock.
(c) Ecological pyramids do not accommodate food web.
1. Only statement (a) is correct.
2. Only statement (b) is correct.
3. All (a), (b) and (c) are correct.
4. All (a), (b) and (c) are incorrect.

30.

Read the following statements :-

(A) Desert lizard lack physiological ability that mammals have to deal with high temperature of their habitat.
(B) Kangaroo rat has the ability to concentrate its urine.

1. Only (A) is correct
2. Both statements are incorrect
3. Only (B) is correct
4. Both statements are correct

31.

A selectable marker is used to

1. help in eliminating the non- transformants, so that the transformants can be regenerated

2. identify the gene for a desired trait in an alien organism

3. select a suitable vector for transformation in a specific crop

4. mark a gene on a chromosome for isolation using restriction enzyme

32.

The first recombinant DNA was constructed by linking an antibiotic resistant gene with the native plasmid of
1. Escherichia coli
2. Salmonella typhimurium
3. Clostridium butylicum
4. Acetobacter aceti

33.

Plasmids are suitable vectors for gene cloning because
1. these are small circular DNA molecules, which can integrate with host chromosomal DNA
2. these are small circular DNA molecules with their own replication origin site
3. these can shuttle between prokaryotic and eukaryotic cells
4. these often carry antibiotic resistance genes

34.

Given below are four statements pertaining to separation of DNA fragments using gel electrophoresis. Identify the incorrect statements.
I. DNA is negatively charged molecule and so it is loaded on gel towards the anode terminal.
II. DNA fragments travel along the surface of the gel whose concentration does not affect movement of DNA.
III. Smaller the size of DNA fragment larger is the distance it travels through it.
IV. Pure DNA can be visualised directly by exposing UV- radiation.
Select the correct option from the following

1. I,III and IV
2. I,II and III
3. II,III and IV
4. I, II and IV

35.

Find the incorrect statement.
1. Gene therapy is a genetic engineering technique used to treat disease at molecular level by replacing defective genes with normal genes
2. Calcitonin is a medically useful recombinant product in the treatment of infertility
3. Bt toxin is biodegradable insecticide obtained from Bacillus thuringiensis
4. Trichoderma sp. is a biocontrol agent for fungal diseases of plants

36.

Exploration of molecular , genetic and species level diversity for novel products of economic importance is known as
1. biopiracy
2. bioenergetics
3. bioremediation
4. bioprospecting

37.

Genetic engineering has been successfully used for producing
1. transgenic mice for testing safety of polio vaccine before use in humans
2. transgenic models for studying new treatments for certain cardiac diseases
3. transgenic cow Rosie, which produces high fat milk for making ghee
4. animals like bulls for farm work as they have super power

38.

Select the correct sequence for transport of sperm cells in male reproductive system.
1. Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus
2. Seminiferous tubules → Vasa efferentia → Epidiymis → Inguinal canal → Urethra
3. Testis → Epididymis → Vasa efferntia → Vas deferens → Ejaculatory duct → Inguinal canal → Urethra → Urethral meatus
4. Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra

39.

If for some reason, the vasa efferentia in the human reproductive system get blocked , the gametes will not be transported from
1. epidiymis to vas deferens

2. ovary to uterus
3. vagina to uterus
4. testes to epididymis

40.

Identify the correct statemnt on ‘ inhibin’.
1. Is produced by granulosa cells in ovary and inhibits the secretion of FSH
2. Is produced by granulosa cells in ovary and inhibits the secretion of LH
3. Is produced by nurse cells in testes and inhibits the secretion of LH
4. Inhibits the secretion of LH, FSH and prolactin

41.

Which one of the following statements about human sperm is correct ?
1. Acrosome has a conical pointed structure used for piercing and penetrating the egg, resulting in fertilisation
2. The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilisation
3. Acrosome serves as a sensory structure leading the sperm towards the ovum
4. Acrosome serves no particular function

42.

In humans, at the end of the first meiotic division, the male germ cells differentiate into the
1. primary spermatocytes
2. secondary spermatocytes
3. spermatids
4. spermatogonia

43.

At the end of spermatogenesis, sperms heads become embedded in the sertoli and finally released from the seminiferous tubules by the process called

1. Spermiogenesis

2. Spermateliosis

3. Spermiation

4. Androgenesis

44.

Which of the following is removed during maturation of insulin ?

1. A chain

2. B chain

3. C chain

4. Disulphide bond

45.

Basmati rice is distinct for its unique aroma and flavour. How many documented varieties of Basmati are grown in India ?

1. 27

2. 270

3. 13

4. 230

46.

Cocaine, commonly called as coke or crack is obtained from

1. *Papaver somniferum*

2. *Erythroxylon*

3. *Cannabis sativa*

4. *Claviceps purpura*

47.

Cancer cells differ from normal cells by the

1. Breakdown of regulatory mechanism

2. Loss of the property of contact inhibition

3. Attaining the property of contact inhibition

4. Both (1) & (2)

48.

MALT (Mucosa associated lymphoid tissue) constitute

1. 25 percent of the lymphoid tissue in human body

2. 50 percent of the lymphoid tissue in human body

3. 75 percent of the lymphoid tissue in human body

4. 90 percent of the lymphoid tissue in human body

49.

Mark the incorrect statement w.r.t AIDS

1. AIDS is not spread by mere touch

2. Time lag between infection and appearence of AIDS symptoms is just 5-6 months only

3. It is caused by retro virus

4. HIV enters body cells by receptor mediated endocytosis

50.

Infertility due to very low sperm count in the ejaculates should opt for which of the following assisted reproductive technologies ?

1. GIFT

2. IUI

3. Testicular sperm extraction

4. Microsurgical epidymal sperm aspiration

51.

Which of the following cross often helps to overcome interbredding depression ?

1. Inbreeding

2. Outcrossing

3. Cross breeding

4. Interspecific hybridisation

52.

Mark the hormone releasing IUDs which supress endometrial changes and cervical mucus causes anovulation and insufficient luteal activity

1. Lippers Loop

2. Multiload Cu T 375

3. LNG - 20

4. Vaults Cap

53.

Transverse binary fission is exemplified by

1. *Euglena*

2. *Ceratium*

3. *Paramecium*

4. *Plasmodium*

54.

In case of natural method of contraception, like Lactational Amenorrhoea, it serves for a maximum period of

1. One week

2. One month

3. Upto the initiation of menstrual flow

4. 6 months

55.

The reason to legalise conditional MTPs by the government of India is

1. To decrease the population growth rate

2. To check indiscriminate and illegal male foeticide

3. To check illegal female foeticides which are reported too high in India

4. To check pregnancies

56.

Which organisation in India deals with the safety of introducing GM- organisms for public services ?

1. GEAC

2. CFTRF

3. NII

4. CDRI

57.

In hydrarch succession pioneer is phytoplankton and climax is forest (mesic). Given below is name of seral stages, arrange them in accordance with their appearance.

A. Submerged free floating plants

B. Reed – swamp stage

C. Marsh meadow stage

D. Submerged plant stage

E. Scrub stage
Option

1. A, B, C, D & E

2. B, A, C, D & E

3. D, A, C, B & E

4. D, A, B, C & E

58.

All organisms have to reach a certain stage of maturity and growth, before they can reproduce sexually". How many of the following is true for above statement?

(I) It is known as juvenile phase.

(II) It is known as vegetative phase in plants.

(III) It is of different duration in different organisms.

(IV) It is of same duration in different organisms.

Options :

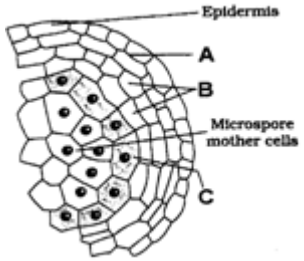
1. 4

2. 3

3. 2

4. 1

59.



The above given diagram is an enlarged view of one microsporangium of a matured anther. Identify A, Band C

1. A - Middle layer, B - Endothecium, C – Tapetum

2. A - Endothecium, B - Tapetum, C - Middle layer

3. A - Endothecium, B - Middle layer, C – Tapetum

4. A- Tapetum, B - Middle layer, C – Endothecium

60.

The inner wall of pollen grain:

1. Is thin, continuous and pecto cellulosic and is called intine

2. Comes out in the form of pollen tube through germpore

3. Is thick and consists of sporopollenin

4. (1) and (2)

61.

Which of the following statements is false about filiform apparatus?

1. The synergids have special cellular thickenings at the micropylar tip called filiform apparatus

2. It plays an important role in guiding the pollen tubes into the synergid

3. Both (1) and (2)

4. Pollen tube stimulates the formation of filiform apparatus

62.

Which of the following plants produce(s) chasmogamous and cleistogamous flowers?

1. *Viola* (Commonpansy)

2. *Oxalis*

3. *Commelina*

4. All of the above

63.

. Match the columns with respect to the process of translation:

Column-I	**Column-II**
a. UTR	(i) Catalyst
b. rRNA	(ii) Template
c. mRNA	(iii) Reads the genetic code
d. tRNA	(iv) For efficiency

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

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

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

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

64.

Consider the following statements regarding DNA fingerprinting:

i. The technique was initially developed by Alec Jeffreys.

ii. Hybridisation using labelled VNTR probe.

iii. Sensitivity of the technique has been increased by the use of PCR.

iv. Sequences used for DNA fingerprinting generally code for many proteins.

v. Monozygotic twins have identical DNA fingerprints.

1. All statements are correct

2. Only '4' is incorrect

3. 4 and 5 are incorrect

4. 1, 3, 4 and 5 are correct

65.

Test cross is:

1. between two homozygous genotype for different traits of same character

2. Cross between two heterozygous genotype of different character

3. Cross between one homozygous and one heterozygous genotype for different traits of same character

4. Cross between one heterozygous and homozygous of similar traits of same character

66.

Which of the following scientist is responsible for the synthesis of protein in cell-free system?

1. Har Gobind Khorana

2. Marshall Nirenberg

3. Severo Ochoa

4. Frederic Sanger

67.

How many of the following statements is / are correct for polygenic inheritance?

(1) They show uniformity.

(2) Controlled by three or more genes

(3) It is not influenced by environment.

(4) In polygenic inheritance phenotype reflects the contribution of dominant allele only.

Options :

1. 1 and 2

2. 2, 3 and 4

3. 1, 3 and 4

4. only 2

68.

Which is not true for haplodiploid sex determination?

1. It is reported in honey bee.

2. In this male produces sperms by meiosis.

3. They do not have father and thus cannot have sons.

4. In this unfertilized egg develops as a male by means of parthenogenesis.

69.

Conditions of a karyotype $2n \pm 1$ is observed in all except

1. Down syndrome

2. Turner's syndrome

3. Phenyl ketonuria

4. Klinefelter's syndrome

70.

Choose the correct statement about recombination and linkage

1. Complete linkage results in higher non-parental gene combinations than parental type

2. Recombination results in generation of parental gene combinations

3. Genetic maps are constructed by using the frequency of recombination between gene pairs

4. T.H. Morgan constructed the first chromosome map

71.

Which of the following is not the property of a molecule that can act as genetic material.

1. Able to replicate
2. Able to mutate
3. Chemically and structurally stable
4. Should express as dominant characters.

72.

Distribution of newly synthesized DNA in the chromosomes is by semi-conservative means is experimentally shown by Taylor et al by using

1. Radioactive adenosine

2. Radioactive thymidine

3. Radioactive guanosine

4. Radioactive cytidine

73.

During DNA replication, two strands of DNA cannot be separated in its entire length in one step because?

1. Due to high energy requirement
2. Due to complementary base pairing
3. Due to antiparallel nature of DNA strand
4. Due to absence of enzyme DNA polymerase

74.

If due to mutation both the strands of DNA starts transcribing. Which of the following will not be the consequence of this?

1. Complicate the genetic information transfer machinery
2. One segment of DNA would code for two different protein
3. Will prevent translation
4. Will result in polyploidy

75.

In nature, a given habitat has enough resources to support a maximum possible number, beyond which no further growth is possible. The limit is known as

1. Environmental resistance

2. Intrinsic rate of natural increase

3. Carrying capacity

4. Exponentially growth

76.

Which the following pairs is wrongly matched while remaining three are correct

1. Allen's rule – Mammals with shorter ears and limbs in colder area

2. Expanding population – High number of individual

at pre-reproductive stage

3. Population density increasing – (B + I) < (D + E)

4. Carrying capacity – Logistic growth.

77.

Consider the following four statements (A–D), select the correct option stating which ones are true (T) and which ones are false (F)

(A) Organism at each trophic level depends on those at higher trophic level for their energy demands.

(B) Each trophic level has a certain mass of living material at a particular time called standing crop.

(C) Each trophic level has a certain mass of non-living material at a particular time called standing state.

(D) The number of trophic levels in a grazing food chain is not restricted

A B C D

1. T T F F
2. F T F T
3. T F T F
4. F T T F

78.

In any ecological pyramid, an organism can occupy how many trophic level.

1. Only one trophic level

2. More than one trophic level simultaneously

3. Can occupy more than one trophic level but not simultaneously

4. It can not be defined

79.

Which of the following is not correct with respect of control of vehicular air pollution in India?

1. Use of CNG as fuel

2. Not phasing out of old vehicles as they have better technology

3. Use of unleaded petrol, low-sulphur petrol and diesel

4. Use of catalytic converter

80.

Which one of the following pairs is wrongly matched remaining three are correct?

Legislation	Year
1. Environment (Protection) Act	1986
2. Air (Prevention and control of pollution)Act	1981
3. Noise as on air pollutant	1987
4. Water (Prevention and control of pollution) Act	1984

81.

World Summit on sustainable development held in 2002 in

1. Rio de Janeiro

2. Japan

3. Johannesburg

4. London

82.

The theory of spontaneous generation says that

1. Life originated from the decaying and rottinh matter like straw , mud etc

2. Life came on the earth from outerspace

3. Life comes from pre-existing life only

4. Life started with the replication of self replicating metabolic capsules

83.

_____ is a thermophilic bacterium that can survive temperatures upto 95˚C. Select the option which fills the blank correctly.

1. Thermus aquaticus

2. Salmonella typhi

3. E.coli

4. Lactobacillus

84.

Choose the nematode which infects the roots of tobacco plants causing a great reduction in yield.

1. A. tumefaciens

2. M. incognita

3. S. typhimurium

4. B. thuringiensis

85.

Select the two core techniques that enabled birth of modern biotechnology.

1. Genetic engineering and bioprocess engineering

2. Genetic engineering and biolistics

3. Chemical engineering and biopiracy

4. Downstream processing and bioprocess engineering

86.

According to Hardy - weinberg principle, the frequency of homozygous recessive (aa) individuals in a population is denoted by

1. p^2
2. 2pq
3. q^2
4. p + q

87.

Match column I and column II w.r.t cranial capacity

Column I	Column II
a. Homo erectus	(i) 650 - 800 cc
b. Homo sapiens	(ii) 1650 cc
c. Cro-Magnon man	(iii) 1400 cc
d. Homo habilis	(iv) 900 cc

Choose the correct option

1. a(i), b(ii), c(iii), d(iv)
2. a(ii), b(iii), c(iv), d(i)
3. a(iv), b(iii), c(ii), d(i)
4. a(iii), b(iv), c(i), d(ii)

88.

Hardy-Weinberg equation is used to check

1. Size of population
2. Whether evolution is occuring in a population or not
3. Average lifespan of a population
4. Maximum life expectancy of a population

89.

Adaptive radiation can be observed in all cases except

1. marsupial radiation
2. Variety of beaks in Darwin's finches
3. Placental diversification in North American
4. Wing structure of butterfly, bat and bird

90.

Which type of natural selection is illustrated by industrial melanism?

1. Directional selection
2. Balancing selection
3. Disruptive selection
4. stabilising selection

91.

Equivalent conductances of NaCl, HCl and C_2H_5COONa at infinite dilution are 126.45, 426.16 and $91\Omega^{-1}\,cm^2$. The equivalent conductance of C_2H_5COOH is

1. $201.28\ \Omega^{-1}\,cm^2$
2. $390.71\ \Omega^{-1}\,cm^2$
3. $698.28\ \Omega^{-1}\,cm^2$
4. $540.48\ \Omega^{-1}\,cm^2$

92.

Aqueous solutions of 0.004 M Na_2SO_4 and 0.01 M Glucose are isotonic. The degree of dissociation of Na_2SO_4 is

1. 25%
2. 60%
3. 75%
4. 85%

93.

When 20 g of naphthoic acid ($C_{11}H_8O_2$) is dissolved in 50g of benzene (K_f = 1.72 K kg mol^{-1}), a freezing point depression of 2K is observed. The van't Hoff factor (i) is–

1. 0.5
2. 1
3. 2
4. 3

94.

The Henry's law constant for the solubility of N_2 gas in water at 298 K is 1.0×10^5 atm. The mole fraction of N_2 in air is 0.8. The number of moles of N_2 from air dissolved in 10 moles of water at 298 K and 5 atm pressure is-

1. 4.0×10^{-4}
2. 4.0×10^{-5}
3. 5.0×10^{-4}
4. 4.0×10^{-6}

95.

Ionic radii of Mg^{2+} and O^{2-} ions are 66 pm

and 140 pm respectively. The type of interstitial void and coordination number of Mg^{2+} ion respectively are

1. tetrahedral, 12
2. octahedral, 6
3. tetrahedral, 6
4. octahedral, 8

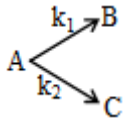
96.

An element crystallizes in a structure having FCC unit cell of an edge length 200 pm. If 200 g this element contains 24 x 10^{23} atoms, the density of the element is

1. 50.3 g/cc
2. 63.4 g/cc
3. 41.6 g/cc
4. 34.8 g/cc

97.

A substance undergoes first order decomposition. The decomposition follows two parallel first order reactions as -



$k_1 = 1.26 \times 10^{-4}\ s^{-1}$ and
$k_2 = 3.8 \times 10^{-5}\ s^{-2}$

The percentage distributions of B and C are –
1. 80% B and 20%
2. 76.83% B and 23.17%
3. 90% B and 10% C
4. 60% B and 40% C

98.

Which is low spin complex :

1. $Fe\,(CN)_6^{3-}$
2. $Co\,(NO_2)_6^{3-}$
3. $Mn\,(CN)_6^{3-}$
4. All

99.

Complexes with halide ligands are generally :

1. High spin complexes
2. Low spin complexes
3. Both
4. None

100.

Which of the following is π-acid ligand

1. NH_3
2. CO
3. F^-
4. ethylene diamine

101.

Which of the following is the most likely structure of $CrCl_3.6H_2O$, if 1/3 of total chlorine of the compound is precipitated by adding $AgNO_3$ to its aqueous solution :

1. $CrCl_3.6H_2O$
2. $[Cr(H_2O)_3Cl_3](H_2O)_3$
3. $[CrCl_2(H_2O)_4]Cl.2H_2O$
4. $[CrCl.(H_2O)_5]Cl_2.H_2O$

102.

Aqua regia reacts with Pt to yield :
1. $Pt(NO_3)_4$
2. H_2PtCl_6
3. $PtCl_4$
4. $PtCl_2$

103.

Pick out from the following complex compounds, a poor electrolytic conductor in solution ?

1. $K_2[PtCl_6]$
2. $[Co(NH_3)_3(NO_2)_3]$
3. $K_4[Fe(CN)_6]$
4. $[Co(NH_3)_4]SO_4$

104.

An excess of liquid Hg was added to 10^{-3} M acidified solution of Fe^{3+} ions. It was found that only 5% of the ions remained as Fe^{+3} at equilibrium at 25ºC. What is Eº for $2Hg/Hg_2^{+2}$ at 25ºC for-

$$2Hg + 2Fe^{+3} \rightleftharpoons Hg_2^{2+} + 2\,Fe^{+2}$$

and $E^0_{Fe^{+2}/Fe^{+3}} = 0.77$ V

1. – 1.347 V

2. – 0.793 V

3. – 0.125 V

4. – 1.110V

105.

The standard reduction potential for Cu^{+2}/Cu is + 0.34V. What will be the reduction potential at pH = 14 for the above couple, K_{sp} of $Cu(OH)_2$ is 1.0×10^{-19}

1. – 3.2013

2. – 0.2205

3. – 0.913

4. – 1.23

106.

Electrolysis of a solution of $MnSO_4$ in aqueous sulphuric acid is a method for the preparation of MnO_2 as per reaction

Mn^{+2} (aq.) + $2H_2O \rightleftharpoons$ MnO_2 (s) + $2H^+$ (aq) + H_2 (g)

Passing a current of 27A for 24 hours gives
1 Kg of MnO_2. What is the value of current efficiency -

1. 50%

2. 94.8%

3. 95.9%

4. 78.3%

107.

In very cold weather, Sn crumbles to a powder, due to –

1. expansion of the crystal lattice

2. formation of SnO at low temperature

3. the conversion of Sn to powdery meta stannic acid

4. the transition from white tin to grey form, which is amorphous

108.

$Zn + NH_3 \xrightarrow{\text{redheat}} ?$

1. $ZnH_2 + N_2$

2. $Zn_3N_2 + H_2$

3. $Zn(NH_2)_2 + H_2$

4. $Zn(NH_3)_4^{2+}$

109.

When a fluoride is heated with conc. H_2SO_4 in a glass tube and if a drop of water is held at the mouth of the glass tube, a white deposit formed is of –

1. H_2SiF_6

2. SiO_2

3. H_2SiO_3

4. $SiF_4 + H_2F_2$

110.

Hydracids have no action on litmus when they are –

1. In contact with water

2. Dry

3. Fused with each other

4. Mixed together and dissolved in water

111.

Anhydrous ferric chloride is prepared by -

1. Dissolving ferric hydroxide in dilute HCl.

2. Dissolving ferric hydroxide in conc. HCl.

3. By passing dry Cl_2 gas over heated scrap iron

4. By passing dry HCl gas over heated scrap iron

112.

m–Bromotoluene is prepared by –

1. Bromination of toluene

2. Friedel Craft's reaction of bromobenzene with CH_3Cl

3. Bromination of nitrobenzene and subsequent replacement of $–NO_2$ group with methyl group

4. Bromination of aceto–p–toluidine followed by hydrolysis and deamination

113.

Identify the correct order of boiling point of the following compounds -

$CH_3CH_2CH_2CH_2OH$ $CH_3CH_2CH_2CHO$

1 2

$CH_3CH_2CH_2COOH$

3

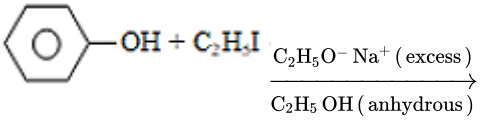
1. 1 > 2 > 3

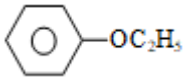
2. 3 > 1 > 2

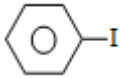
3. 1 > 3 > 2

4. 3 > 2 > 1

114.



1. 

2. 

3. $C_6H_5OC_6H_5$

4. $C_2H_5OC_2H_5$

115.

Reaction of entainomerically pure acid with
1-chiral carbon and racemic alcohol with
1-chiral carbon gives an ester which is -

1. Meso

2. Opticaly active mixure

3. Recemic mixure

4. Enantionmerically pure

116.

Conversion of cyclohexanol into cyclohexene is most effective in -

1. concentrated H_3PO_4

2. concentrated HCl

3. concentrated HCl / $ZnCl_2$

4. concentrated HBr

117.

In Which of the following crossed aldol condensations, only one kind of cross aldol is formed –

1. CH_3CHO & CH_3CH_2CHO

2. CH_3CHO & $(CH_3)_2CO$

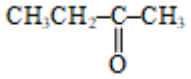
3. $(CH_3)_2CO$ & $(C_2H_5)_2CO$

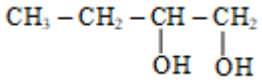
4. C_6H_5CHO & CH_3CHO

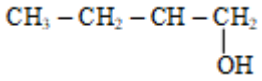
118.

Alkaline hydrolysis of $C_4H_8Cl_2$ gives a compound (A) which on heating with NaOH and I_2 produces a yellow precipitate of CHI_3.The compound (A) should be.

1. $CH_3CH_2CH_2CHO$

2. 

3. 

4. 

119.

Choose the correct statement–

1. Enamine acts as both nucleophile as well as an electrophile

2. Enamine has two nucleophilic center

3. Enamine has single nucleophilic center

4. Enamine can't be acylated.

120.

Which of the following pair, will give positive test with Tollen's reagent :

1. Glucose, sucrose

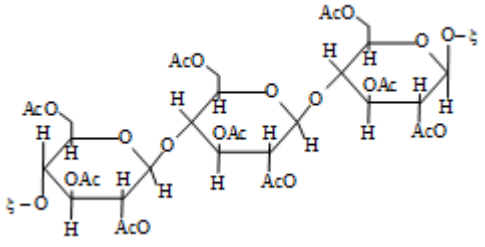
2. Sucrose, fructose

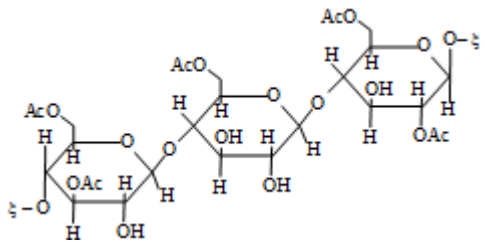
3. Glucose, fructose

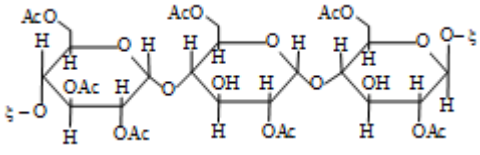
4. Acetophenone, hexanal

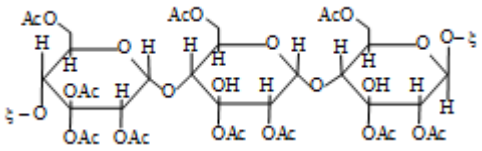
121.

Cellulose upon acetylation with excess acetic anhydride/H_2SO_4 (catalytic) gives cellulose triacetate whose structure is –

1. 

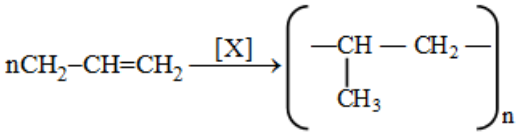
2. 

3. 

4. 

122.

In the reaction–



Reagent X is–

1. Triethylaluminiumandtitanium tetrachloride

2. Triethyl aluminium

3. Zeigler Natta Catalyst

4. both 1 & 3

123.

The activation energies of two reactions are E_{a1} and E_{a2} with $E_{a1} > E_{a2}$. If the temperature of the reacting system is increased from T_1 to T_2 predict which of the following alternative is correct –

1. $\frac{K_1'}{K_1} = \frac{K_2'}{K_2}$

2. $\frac{K_1'}{K_1} > \frac{K_2'}{K_2}$

3. $\frac{K_1'}{K_1} < \frac{K_2'}{K_2}$

4. $\frac{K_1'}{K_1} < 2\frac{K_2'}{K_2}$

124.

According to Freundlich adsorption isotherm, at high pressure, the value of $\frac{x}{m}$ is

1. directly proportional to pressure
2. inversely proportional to pressure
3. directly proportional to square of pressure
4. independent of pressure

125.

Which of the following statements is correct?

1. The rate of reaction cannot be understood from Ellingham diagram

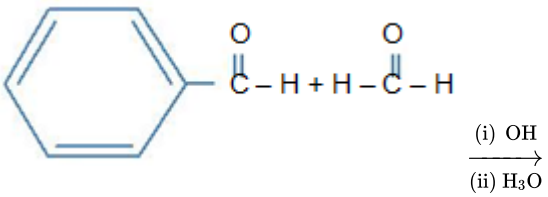
2. During the formation of metal oxide ΔS becomes negative and ΔG becomes positive resulting in positive slope

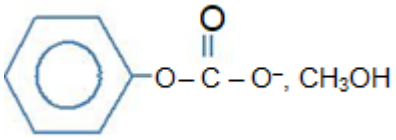
3. There is an abrupt change in the slope of Ellingham line when change in phase (s→l) or (l→g) takes place.

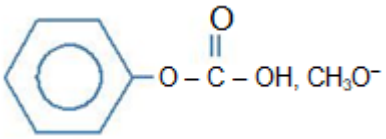
4. All the above.

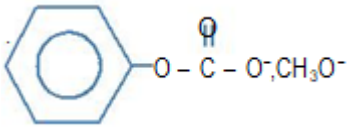
126.

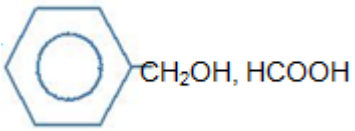
What are the products of the following crossed cannizaro reactions



1. 

2. 

3. 

4. 

127.

In NaCl is doped with 10^{-5} mol% $SrCl_2$, the number of cation vacancies will be

1. 6.02×10^{16}
2. 6.02×10^{18}
3. 6.02×10^{20}
4. $2 \times 6.02 \times 10^{23}$

128.

Which will be adsorbed more readily on the surface of charcoal ?

1. CO_2

2. NH_3

3. O_2

4. N_2

129.

$\left(i\right)\ Zr + 2I_2 \xrightarrow{870K} ZrI_4 \xrightarrow{2075K} Zr + 2I_2$

$\left(ii\right)\ Ni + 4CO \xrightarrow{330K} Ni(CO)_4 \xrightarrow{450K} Ni + 4CO$

$\left(pure\right)$

The respective (ii) and (i) processes are

1. Mond's process; Van Arkel process

2. Van Arkel process; Mond's process

3. Goldschmidt process; Mond's process

4. Mond's process; Goldschmidt proces

130.

$A(C_3H_9N)$ reacts with benzenesulphonoyl chloride to give a solid insoluble in alkali. The compound (A) is

1. $CH_3CH_2CH_2NH_2$

2. $CH_3NHCH_2CH_3$

3. $CH_3 - \overset{CH_3}{\underset{|}{N}} - CH_3$

4. Any of these

131.

Monomer of natural number is

1. 1, 3-butadiene

2. Isoprene

3. Styrene

4. Chloroprene

132.

Equanil is used as

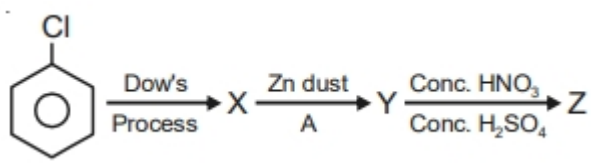
1. Analgesic

2. Antibiotic

3. Tranquilizer

4. Antacid

133.



When 'Z' is treated with Sn/HCl it gives

1. Acetamide

2. Aniline

3. Benzamide

4. Benzylamine

134.

Which of the following is an example of antiseptic?

1. Iodine + C_2H_5OH

2. Boric acid

3. H_2O_2

4. All of these

135.

Benzoic acid on heating with soda lime gives

1. Phenol

2. Benzene

3. Salicylic acid

4. Soda ash

136.

In a parallel plate capacitor of capacitance C, a metal sheet is inserted between the plates, parallel to them. The thickness of the sheet is half of the separation between the plates. The capacitance now becomes

1. 4C

2. 2C

3. C/2

4. C/4

137.

When two resistances X and Y are put in the left hand and right hand gaps in a wheatstone meter bridge, the null point is at 60cm. If X is shunted by a resistance equal to half of itself then find the shift in the null point.

1. 26.7 cm

2. 33.4 cm

3. 46.7 cm

4. 96.7 cm

138.

A magnetic material of volume 30 cm^3 is placed in a magnetic field of intensity 5 oersted. The magnetic moment produced due to it is 6 amp-m^2. The value of magnetic induction will be-

1. 0.2517 Tesla

2. 0.025 Tesla

3. 0.0025 Tesla
4. 25 Tesla.

139.

Current of 30 A is flowing in a vertical straight wire. If the horizontal component of earth's magnetic field is 2 x 10^{-5} Tesla, then the position of null point will be-

1. 0.9 m
2. 0.3 mm
3. 0.3 cm
4. 0.3 m

140.

A 220 - volt input is supplied to a Transformer. The output circuit draws a current of 2.0 ampere at 440 volts. If the efficiency of the transformer is 80%, the current drawn by the primary windings of the transformer is :-

1. 5.0 ampere
2. 3.6 ampere
3. 2.8 ampere
4. 2.5 ampere

141.

In an ac circuit an alternating voltage e = 200 $\sqrt{2}$ sin 100 t volts is connected to a capacitor of capacity 1μF. The r.m.s. value of the current in the circuit is :-

1. 10 mA
2. 100 mA
3. 200 mA
4. 20 mA

142.

A sinusoidal voltage V(t) = 100 sin(500t) is applied across a pure inductance of L= 0.02 H. The current through the coil is :

1. 10 cos (500 t)
2. -10 cos(500t)
3. 10 sin (500t)
4. -10 sin (500t)

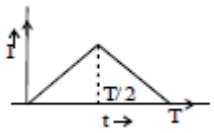
143.

A conducting circular loop is placed in a uniform magnetic field, B = .025 T with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of 1 mm s^{-1}. The induced e.m.f. when the radius is 2 cm, is :-

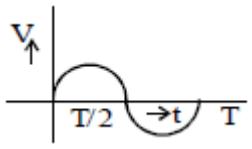
1. 2 μV
2. $2\pi\mu$V
3. $\pi\mu$V
4. $\frac{\pi}{2}\mu$V

144.

The current (I) in the inductance is varying with time according to the plot shown in figure.



Which one of the following is the correct variation of voltage with time in the coil ?

1.


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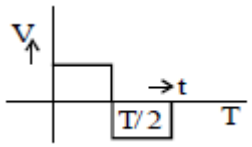

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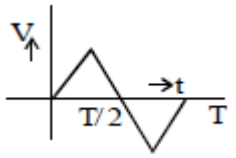
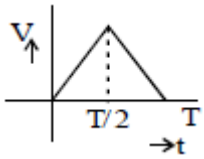


4.


145.

Two circuits have coefficient of mutual induction of 0.09 *henry*. Average e.m.f. induced in the secondary by a change of current from 0 to 20 *ampere* in 0.006 *second* in the primary will be

1. 120 *V*
2. 80 *V*
3. 200 *V*
4. 300 *V*

146.

The electric field of an electromagnetic wave in free space is given by :
$\vec{E} = 10\ \cos(10^7 t + kx)\hat{j}\ V/m$, where t and x are in seconds and metres respectively. It can be inferred that :-
(a) The wavelength λ is 188.4 m
(b) The wave number k is 0.33 rad/m
(c) The wave amplitude is 10 V/m
(d) The wave is propagating along +x direction
Which one of the following pairs of statements is correct :-

1. (a) and (b)

2. (b) and (c)

3. (a) and (c)

4. (c) and (d)

147.

A plane mirror approaches a stationary person with acceleration 10 ms^{-2}. The acceleration of his image as seen by the person, will be
1. 10 m/s^2

2. 20 m/s^2

3. 5 m/s^2

4. can't determined

148.

A light ray is incident at an angle 30^0 on a transparent surface separating two media. If the angle of refraction is 60^0 then critical angle is

1. $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

2. $\sin^{-1}\left(\sqrt{3}\right)$

3. $\sin^{-1}\left(\frac{2}{3}\right)$

4. 45°

149.

In Young's double slit experiment the light emited from source has $l = 6.5 \times 10^{-7}$ m and the distance between the two slits is 1 mm. Distance between the screen and slit is 1 metre. Distance between third dark and fifth birth fringe will be
1. 3.2 mm

2. 1.63 mm

3. 0.585 mm

4. 2.31 mm

150.

White light is used to illuminate the two slits in Young's double slit experiment, separation between the slits is b and the screen is at a distance d(>>b) from the slits. At a point on the screen, directly in front of the slits, certain wavelengths are missing. Some of these missing wavelengths are

1. $\frac{b^2}{2d}$

2. $\frac{2b^2}{d}$

3. $\frac{2b^2}{3d}$

4. $\frac{b^2}{3d}$

151.

A photoelectric cell is illuminated by a small bright source of light placed at 1m. If the same source of light is placed 2m away, the electrons emitted by the cathode
1. each carries one quarter of its previous momentum.
2. each carries one quarter of its previous energy.
3. are half the previous number.
4. are one quarter of the previous number.

152.

The de-Broglie wavelength of a particle moving with a velocity 2.25×10^8 m/s is equal to the wavelength of photon. The ratio of kinetic energy of the particle to the energy of the photon is (velocity of light is 3×10^8 m/s)

1. 1/8

2. 3/8

3. 5/8

4. 7/8

153.

An element X decays, first by positron emission and then two α-particles are emitted in successive radioactive decay. If the product nuclei has a mass number 229 and atomic number 89, the mass number and atomic number of element X are
1. 237,93

2. 237,94

3. 221,84

4. 237,92

154.

An electron in a hydrogen atom makes a transition from first excited state to ground state. The equivalent current due to circulating electron

1. increases 2 times
2. increases 4 times
3. increases 8 times
4. remains the same

155.

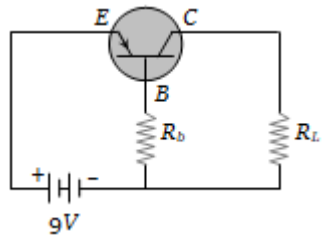
Work function of lithium and copper are respectively 2.3 eV and 4.0 eV. Which one of the metal will be useful for the photoelectric cell working with visible light ? (h = 6.6×10^{-34} J-s, c = 3×10^{8} m/s)
1. Lithium
2. Copper
3. Both
4. None of these

156.

The logic behind 'NOR' gate is that it gives
1. High output when both the inputs are low
2. Low output when both the inputs are low
3. High output when both the inputs are high
4. None of these

157.

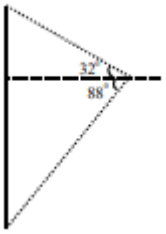
In a transistor circuit shown here the base current is 35 μ A and the potential difference across base is 4.5 V. The value of the resistor R_b is



1. 128.5 kΩ
2. 257 kΩ
3. 380.05 kΩ
4. None of these

158.

Consider a finite charged rod. Electric field at Point P (shown) makes an angle θ with horizontal dotted line then angle θ is :-



1. 60°
2. 28°
3. 44°
4. information insufficient

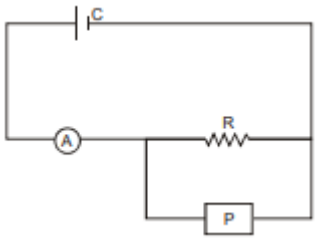
159.

The electric potential due to an infinite sheet of positive charge density σ at a point located at a perpendicular distance Z from the sheet is (Assume V_0 to be the potential at the surface of sheet) :

1. V_0
2. $V_0 - \frac{\sigma Z}{\varepsilon_0}$
3. $V_0 + \frac{\sigma Z}{2\varepsilon_0}$
4. $V_0 - \frac{\sigma Z}{2\varepsilon_0}$

160.

An ammeter A of finite resistance, and a resistor R are joined in series to an ideal cell C. A potentiometer P is joined in parallel to R. The ammeter reading is I_0 and the potentiometer reading is V_0 . P is now replaced by a voltmeter of finite resistance. The ammeter reading now is I and the voltmeter reading is V.



1. $I > I_0,\ V < V_0$
2. $I > I_0,\ V = V_0$
3. $I = I_0,\ V < V_0$
4. $I < I_0,\ V = V_0$

161.

A frog can be levitated in a magnetic field produced by a current in a vertical solenoid placed below the frog. This is possible because the body of the frog behaves as

1. paramagnetic
2. Diamagnetic
3. ferromagnetic
4. Antiferromagnetic

162.

Two similar coils of radius R are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and 2I respectively. The resultant magnetic field induction at the centre will be:

1. $\frac{\mu_0 I}{2R}$
2. $\frac{\mu_0 I}{R}$
3. $\frac{\sqrt{5}\mu_0 I}{2R}$
4. $\frac{3\mu_0 I}{2R}$

163.

An aeroplane in which the distance between the tips of wings is 50 m is flying horizontally with a speed of 360 km/hr over a place where the vertical components of earth magnetic field is 2.0×10^{-4} weber $/m^2$. The potential difference between the tips of wings would be

1. 0.1 V
2. 1.0 V
3. 0.2 V
4. 0.01 V

164.

A man is 180 cm tall and his eyes are 10 cm below the top of his head. In order to see his entire height from toe to head, he uses a plane mirror kept at a distance from him. The minimum length of the plane mirror required is -

1. 180 cm
2. 90 cm
3. 85 cm
4. 170 cm

165.

A fish is a little away below the surface of a lake. If the critical angle is 49°, then the fish could see things above the water surface within an angular range of θ° where

1. $\theta = 49^\circ$
2. $\theta = 90^\circ$
3. $\theta = 98^\circ$
4. $\theta = 24\frac{1}{2}^\circ$

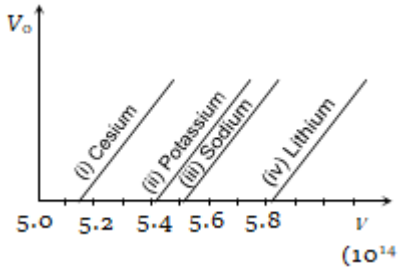
166.

In the Young's double slit experiment, the ratio of intensities of bright and dark fringes is 9. This means that

1. The intensities of individual sources are 5 and 4 units respectively
2. The intensities of individual sources are 4 and 1 units respectively
3. The ratio of their amplitudes is 3
4. The ratio of their amplitudes is 6

167.

The figure shows different graphs between stopping potential (V_0) and frequency (v) for photosensitive surface of cesium, potassium, sodium and lithium. The plots are parallel. Correct ranking of the targets according to their work function greatest first will be



1. (i) > (ii) > (iii) > (iv)
2. (i) > (iii) > (ii) > (iv)
3. (iv) > (iii) > (ii) > (i)
4. (i) = (iii) > (ii) = (iv)

168.

The collector plate in an experiment on photoelectric effect is kept vertically above the emitter plate. Light source is put on and a saturation photo current is recorded. An electric field is switched on which has a vertically downward direction

1. The photo current will increase
2. The kinetic energy of the electrons will increase
3. The stopping potential will decrease
4. The threshold wavelength will increase

169.

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. $4 \rightarrow 2$
2. $4 \rightarrow 3$
3. $2 \rightarrow 1$

4. $3 \rightarrow 2$

170.

In a common emitter circuit if V_{CC} is changed by 0.2 V, collector current changes by 4 x 10^{-3} mA. The output resistance will be:

1. 10 kΩ

2. 30 kΩ

3. 50 kΩ

4. 70 kΩ

171.

The reverse bias in a junction diode is changed from 5V to 15V then the value of current changes from 38μA to 88 μA. The resistance of junction diode will be:

1. $4 \times 10^5\ \Omega$

2. $3 \times 10^5\ \Omega$

3. $2 \times 10^5\ \Omega$

4. $10^6\ \Omega$

172.

A particle having charge q_0 when placed at a point in electric field experiences a force $\vec{F}$. The electric field at that point.

1. $\frac{\vec{F}}{q_0}$

2. $> \frac{\vec{F}}{q_0}$

3. $< \frac{\vec{F}}{q_0}$

4. May be any of the above depending on the source of the field.

173.

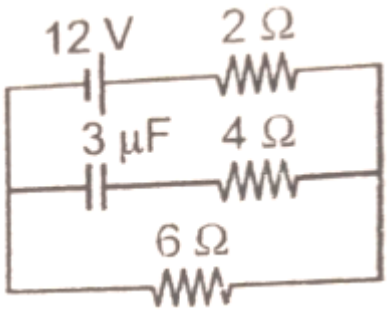
Electric potential (in volts) in a region is given by $V = -6x - 2y + 3z$. The magnitude of electric field in the region is (where x, y and z are in metres)

1. 6 Vm^{-1} 2. 7 Vm^{-1}

3. 11 Vm^{-1} 4. 5 Vm^{-1}

174.

The charge on the plates of the capacitor in steady state will be



1. 3 μC

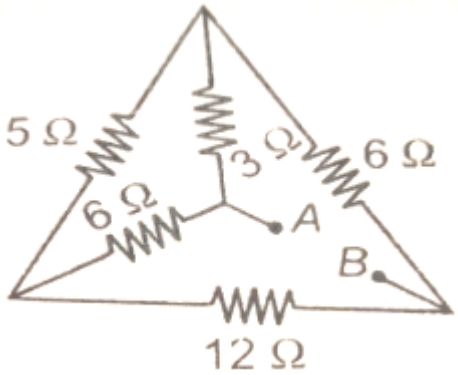
2. 9 μC

3. 27 μC

4. 36 μC

175.

In the circuit shown in figure, the effective resistance of the system between the points A and B is

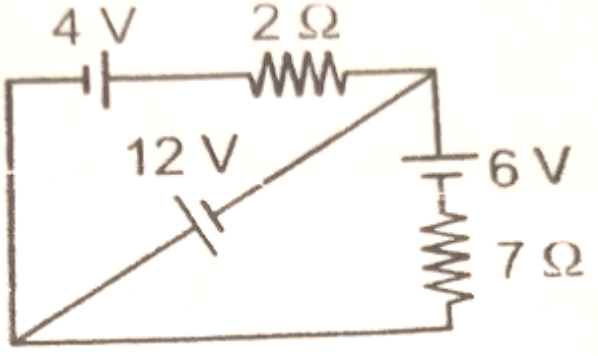


1. 6 Ω 2. 9 Ω

3. 11 Ω 4. $\frac{30}{11}\ \Omega$

176.

In the circuit shown in figure, the current through the 2 Ω resistor will be



1. 8 A

2. 6 A

3. 11 A

4. 5 A

177.

The current sensitivity of a moving coil galvanometer will be high, if its (N = number of turns, B = magnetic field, A = area of coil and C = Torsional constant of spring)

1. N is small

2. B is small

3. A is small

4. C is small

178.

In an electromagnetic wave, if at a point at an instant electric field is along y axis and magnetic field is along z axis, then the direction of propagation of the wave must be

1. x axis

2. -x axis

3. -y axis

4. Both 1 & 2 are possible

179.

In an NPN transistor amplifier if 98% of electrons emitted from the emitter reach the collector then the value of collector current for base current of 40 μA will be

1. 1.96 mA

2. 1.92 mA

3. 1.96 A

4. 1.92 A

180.

If $\frac{N}{Z}$ ratio in a nucleus is smaller than the required value for stability, then

1. It may emit α-particle

2. It may emit β^+ particle

3. It may go for K capture

4. All of the above are possible

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