Q.1 People with sulfa allergy may develop fever, rash, hemolytic anemia or Stevens-Johnson syndrome to which of the following drugs:

(A) beta blockers and ace-inhibitors
(B) ace-inhibitors and isoniazid
(C) thiazide diuretics and TMP-SMX
(D) vancomycin and chloramphenicol

Q.2 Drugs that inhibit the P450 system are:

(A) quinidine and rifampin
(B) isoniazid and erythromycin
(C) rifampin and griseofulvin
(D) phenytoin and barbiturates

Q.3 A toddler presents with acute gastric bleeding and is found to have ingested a number of iron containing chewable vitamins. An antidote for iron poisoning would be:

(A) N-acetylcysteine
(B) deferoxamine
(C) flumazenil
(D) protamine

Q.4 Sulfonamides are structurally related to p-aminobenzoic acid (PABA) and inhibit the synthesis of bacterial:

(A) ATP
(B) pyruvate
(C) folic acid
(D) plasmids

Q.5 Mebendazole is effective against which type of helminth infection:

(A) Enterobius vermuculosis
(B) Ascaris lumbricoides
(C) Strongyloides stercoralis
(D) Brugia malayi

Q.6 A 7 year old presents with nephrotic syndrome. Kidney biopsy shows normal glomeruli on light microscopy but electron microscopy (EM) shows foot process effacement. This is consistent with:

(A) Wegener's granulomatosis
(B) Goodpasture's syndrome
(C) Acute post streptococcal glomerulonephritis
(D) Minimal change disease

Q.7 Curschmann's spirals and smooth muscle hypertrophy are seen in:

(A) Asthma
(B) Wegener's granulomatosis
(C) Tuberculosis
(D) Asbestosis

Q.8 Neurofibrillary tangles and cortical atrophy are seen in which of the following:

(A) Guillain-Barre syndrome
(B) Sturge Weber syndrome
(C) Alzheimer's disease
(D) Von Hippel-Lindau disease

Q.9 Polyhydramnios is associated with:

(A) Posterior urethral valves
(B) Esophageal or duodenal atresia
(C) Potters syndrome
(D) Bilateral renal agenesis

Q.10 Components of balanced anesthesia include:

(A) Antibiotics, muscle relaxants, nitric oxide and oxygen
(B) Opioid analgesics, beta blockers, nitric oxide and oxygen
(C) Ultra short acting barbiturates, opioid analgesics, muscle relaxants, nitric oxide and oxygen
(D) Serotonin reuptake inhibitors, muscle relaxants, nitric oxide and oxygen

Q.11 Cavernous sinus syndrome can result in:

(A) Tinnitus and dysphagia
(B) Loss of sensation in the ophthalmic and maxillary branches of CN V, and ophthalmoplegia due to compression of CN VI
(C) Difficulty with tongue movement due to mass effect on CN XII
(D) Shoulder drop due to compression of CN XI

Q.12 Liver elastography is used for:

(A) Assessment of liver fibrosis
(B) Assessment of liver necrosis
(C) To assess liver hemangioma
(D) To diagnose liver metastasis

Q.13 A 20 year old woman presents with abdominal discomfort and pink urine and polyneuropathy. She describes having low mood for the past month and was started on an antidepressant in the past week. Her presentation is suggestive of:

(A) Diabetic ketoacidosis
(B) Acute intermittent porphyria
(C) Multiple sclerosis
(D) Rheumatoid arthritis

Q.14 An obese ten year old boy presents with acute back pain after a class-mate jumped on his back. Lumbar spine X-ray shows a compression fracture in L2. Peripheral blood smear is normal. His presentation is concerning for:

(A) Type 1 diabetes
(B) Celiac disease
(C) Cystic fibrosis
(D) Acute lymphoblastic leukemia

Q.15 A fifty year old woman presents with dry eyes, and difficulty swallowing. She has enlargement of the parotid glands and has auto-antibodies to SS-A (Ro) and SS-B(La). Her symptoms are concerning for:

(A) Goodpasture's syndrome
(B) Sjogren's syndrome
(C) Wegener's granulomatosis
(D) Sarcoidosis

Q.16 A three year old boy presents with jaundice and altered mental status and is found to have hypoglycemia. The child has been recovering from varicella zoster infection and was treated with aspirin for fever. His presentation is concerning for:

(A) Reye's syndrome
(B) Rheumatic fever
(C) Viral Hepatitis
(D) Gilbert's disease

Q.17 The major cause of cervical cancer is:

(A) Hepatits E
(B) Human Papilloma virus
(C) Herpes virus
(D) Advanced age

Q.18 The major vaccine preventable cause of pneumonia is:

(A) Tuberculosis
(B) *Streptococcus pneumoniae*
(C) Methicillin resistant *Staphylococcus aureus*
(D) Diptheria

Q.19 According to WHO the leading cause of years lost due to disability in the world today is:

(A) Diabetes
(B) Major depression
(C) Trauma
(D) Neoplasia

Q.20 Uncomplicated falciparum malaria should be treated with:

(A) Artemisinin monotherapy
(B) Artemisinin based combination therapy
(C) Chloroquine
(D) Fluoroquinolones

Q.21 The following cutaneous patches are used for pain relief **EXCEPT**:

(A) Buprenorphine patch
(B) Lidocaine patch
(C) Propofol patch
(D) Fentanyl patch

Q.22 Which auscultatory sign is absent in mitral stenosis in the presence of atrial fibrillation?

(A) Mid-diastolic murmur
(B) Pre-systolic accentuation
(C) Variable first heart sound
(D) Loud P2

Q.23 All the following are features of Takotsubo (stress-related) cardiomyopathy **EXCEPT:**

(A) Global ventricular dilatation with basal contraction
(B) ST elevation can be seen on EKG and elevation of cardiac biomarkers in peripheral blood
(C) Left ventricular dysfunction is permanent
(D) Recurrences have been described in up to 10% of patients

Q.24 In Lafora Body disease, all are true **EXCEPT:**

(A) Progressive myoclonic epilepsy Type I
(B) Usually starts in adolescence
(C) Associated with PAS (+), photosensitive Lafora inclusions
(D) Associated with Laforin (EPM2A) or Malin (EPM2B) gene mutations

Q.25 Factors predisposing to childhood leukemia include all **EXCEPT:**

(A) Down's Syndrome
(B) Fanconi's anemia
(C) Bloom's Syndrome
(D) Turner's Syndrome

Q.26 Iron deposits in the basal ganglia are seen in:

(A) Hallervorden-Spatz disease
(B) Hemochromatosis
(C) Hemosiderosis
(D) Wilson's disease

Q.27 The drug that does not cause secondary Parkinsonism is:

(A) Tetrabenazine (B) Amiodarone (C) Lithium (D) Verapamil

Q.28 According to the WHO staging of HIV in adults and adolescents, Herpes zoster and papular pruritic eruptions are clinical features of:

(A) Stage I disease
(B) Stage II disease
(C) Stage III disease
(D) Stage IV disease

Q.29 The following is the MRI unsafe device, rest are MRI conditional:

(A) Pacemaker
(B) Hip prosthesis
(C) Knee prosthesis
(D) Biliary stent

Q.30 According to WHO fast breathing in children between 2 to 12 months is present when the respiratory rate is:

(A) ≥60 breaths/ minute
(B) ≥50 breaths/ minute
(C) ≥40 breaths/ minute
(D) ≥30 breaths/ minute

Q.31 Characteristic feature of Congenital Varicella Syndrome is:

(A) Cataract, choreo-retinitis, microphthalmia
(B) Atrophy of limb/ limb hypoplasia
(C) Hydronephrosis, hydroureter
(D) Cicatrix-- zig-zag scarring in dermatomal distribution

Q.32 Surgical correction of cleft-lip and cleft-palate is usually done at:

(A) age 3 months and 1 year respectively
(B) age 1 year and 2 year respectively
(C) age 1 year and 3 years respectively
(D) age 3-5 years

Q.33 Triple A syndrome (Allgrove syndrome) refers to the triad of all **EXCEPT:**

(A) Abulia (B) Achalasia (C) Alacrima (D) Adrenal insufficiency

Q.34 Retained placenta is defined when the placenta is not expelled out:

(A) after 30 minutes of delivery
(B) 1 hour of delivery
(C) 6 hours of delivery
(D) 12 hours of delivery

Q.35 Commonest cause of post-partum hemorrhage is:

(A) Atonic uterus
(B) Retained placenta
(C) Tocolytic drugs
(D) Blood coagulation disorder

Q.36 All are true of hematological changes during pregnancy **EXCEPT:**

(A) Plasma volume increases up to 50%
(B) RBC mass is increased to the extent of 20-30%
(C) Reticulocyte count is increased up to 2%
(D) Erythropoietin level is decreased

Q.37 One of the following pathogens is **NOT** associated with Necrotizing Enterocolitis in the newborn:

(A) *Escherichia coli*
(B) *Klebsiella pneumoniae*
(C) *Rotavirus*
(D) *Streptococcus pneumoniae*

Q.38 Infants of diabetic mothers who are born at term can have all the following **EXCEPT:**

(A) Hypoglycemia
(B) Low birth weight
(C) Cardiomegaly and heart failure
(D) Respiratory distress syndrome

Q.39 All are causes of hyperphosphatemia **EXCEPT:**

(A) Tumor lysis syndrome
(B) Rhabdomyolysis
(C) Acute hemolysis
(D) Tumor induced rickets

Q.40 Ante-natal corticosteroids given to mothers in preterm labor before 34 weeks of gestation does not reduce risk of:

(A) Incidence and severity of respiratory distress syndrome in the newborn
(B) Severe intraventricular hemorrhage in the neonate
(C) Necrotizing enterocolitis in the neonate
(D) Apnea in the newborn

Q.41 Swimmer's ear is commonly caused by:

(A) *Pseudomonas aeruginosa*
(B) *Klebsiella pneumoniae*
(C) *Streptococci*
(D) Coagulase negative *Staphylococci*

Q.42 Risk factors for urinary tract infection in children include all the following **EXCEPT:**

(A) Female gender
(B) Circumcised male
(C) Vesico-ureteral reflux
(D) Toilet training

Q.43 Common causes of precocious puberty are all **EXCEPT:**

(A) CNS tumors
(B) Primary hypothyroidism
(C) McCune-Albright syndrome
(D) Congenital adrenal hyperplasia

Q.44 Characteristic findings of Turner's syndrome are all **EXCEPT:**

(A) Short height (142-147 cm)
(B) Micrognathia
(C) Coarctation of aorta
(D) Cubitus varus

Q.45 FAST scan (Focused Assessment with Sonography for Trauma) is used to diagnose:

(A) Pneumothorax
(B) Pneumoperitoneum
(C) Hemoperitoneum
(D) Fractures

Q.46 Patients with Juvenile Idiopathic Arthritis with rheumatoid nodules and chronic uveitis are likely to be:

(A) RF+, ANA +
(B) RF -, ANA +
(C) RF +, ANA -
(D) RF-, ANA -

Q.47 Which sign does **NOT** elicit appendicitis:

(A) Rovsing's sign
(B) Ballance's sign
(C) Obturator sign
(D) Dunphy's sign

Q.48 The following is **NOT** used for assessment of acute pancreatitis:

(A) Ranson Criteria
(B) Balthezar CT Severity Index
(C) APACHE II Score
(D) Well's Criteria

Q.49 In robotic surgery the following robotic surgical system is used:

(A) Da Vinci
(B) Johnson and Johnson
(C) Dynarex Corporation
(D) Watson

Q.50 The E-cadherin antibody is used as a biomarker for the following type of breast carcinoma:

(A) Ductal carcinoma
(B) Medullary carcinoma
(C) Lobular carcinoma
(D) Inflammatory carcinoma

Q.51 The most common type of ligament tear following knee injury is:

(A) Anterior cruciate ligament
(B) Posterior cruciate ligament
(C) Medial collateral ligament
(D) Lateral collateral ligament

Q.52 The following information about multiple myeloma is **INCORRECT:**

(A) Presents with lytic bone lesions
(B) Monoclonal gammopathy is diagnostic
(C) Associated with low blood calcium level
(D) A plasma cell tumor

Q.53 One of the following is **NOT** a premalignant oral condition:

(A) Chronic hyperplastic candidiasis
(B) Pyogenic granuloma
(C) Oral submucous fibrosis
(D) Erythroplakia

Q.54 The following statements regarding prostate cancer are correct **EXCEPT:**

(A) Lower Gleason's Score means high grade tumor
(B) Prostatic cancer arise from both peripheral zone and transition zone
(C) Somatic mutation of PTEN gene causes metastatic prostatic cancer
(D) Adenocarcinoma is the commonest variety of prostate cancer

Q.55 Which of the following cellular organelles have genetic material that can be transmitted only maternally:

(A) Endoplasmic reticula
(B) Vacuoles
(C) Mitochondria
(D) Ribosomes

Q.56 One of the following mechano-sensors responds to deep pressure and fast vibration:

(A) Meissner corpuscles
(B) Merkel cells
(C) Ruffini corpuscles
(D) Pacinian corpuscles

Q.57 One of the following is **NOT CORRECTLY** paired:

(A) Axon damage: Wallerian degeneration
(B) Glutamate: Inhibitory neurotransmitter in the central nervous system
(C) Transmission from synaptic junction along axon to termination: Orthodromic transmission
(D) Protein necessary for growth and maintenance of sympathetic neurons: Nerve growth factor

Q.58 One of the following is **NOT CORRECT** with respect to the adrenal glands:

(A) Adrenal medulla secretes dopamine and catecholamines
(B) Hormones of adrenal cortex are derivatives of cholesterol
(C) Prolonged decreased levels of plasma glucocorticoids cause Cushing's syndrome
(D) Excess glucocorticoids leads to osteoporosis

Q.59 One of the following is **NOT SEEN** after total pancreatectomy

(A) Steatorrhea
(B) Hyperglycemia
(C) Metabolic acidosis
(D) Weight gain

Q.60 Physiological changes that accompany prolonged exposure to high altitudes include all **EXCEPT**:

(A) Increase in number of erythrocytes
(B) Increased concentration of hemoglobin
(C) Low levels of 2,3 Bisphosphoglycerate (BPG)
(D) Lower affinity of adult hemoglobin (HBA) for oxygen

Q.61 Tonic pupil reacting poorly to light along with decreased tendon reflex is seen in:

(A) Charcot Marie Tooth
(B) Adie Syndrome
(C) Riley-Day Syndrome
(D) Peter's anomaly

Q.62 All of the following occur in the case of Klumpke's paralysis **EXCEPT:**

(A) Damage of T1 root
(B) Claw hand
(C) Sensory loss of the medial border of forearm and hand
(D) Paralysis of deltoid, biceps, and brachialis

Q.63 Which of the following is **INCORRECT** with respect to the pupillary light reflex?

(A) Relay path includes optic nerve, optic tract, lateral geniculate nuclei
(B) Cortex is not involved
(C) Lesions of the brain stem may result in Argyll-Robertson pupil
(D) There is loss of accommodation reflex in Argyll Robertson pupil

Q.64 One of the following is **NOT** a branch of the facial nerve:

(A) Greater petrosal nerve
(B) Nerve to stapedius
(C) Chorda tympani nerve
(D) Recurrent laryngeal nerve

Q.65 Which of the following about subclavian steal syndrome is **CORRECT?**

(A) Stenosis of the subclavian artery distal to the vertebral artery
(B) There is a change of more than 20mmHg in blood pressure between two arms
(C) There is ante-grade blood flow in the vertebral artery
(D) Diagnosis is usually by an x-ray imaging

Q.66 Which of the following has the highest respiratory quotient?

(A) Carbohydrate
(B) Protein
(C) Fat
(D)Alcohol

Q.67 Pisiform is a sesamoid bone in the tendon of:

(A) Flexor digitorum superficialis
(B) Flexor digitorum profundus
(C) Abductor digiti minimi
(D) Flexor carpi ulnaris

Q.68 Largest bursa in the human body is:

(A) Subacromial bursa
(B) Prepatellar bursa
(C) Infrapatellar bursa
(D) Trochanteric bursa

Q.69 Juxtamedullary nephrons:

(A) help in regulating the concentration of urine
(B) have smaller loops of Henle compared to cortical nephrons
(C) have larger glomeruli compared to cortical nephrons
(D) are more numerous than cortical nephrons

Q.70 Which of the following enzymes is rate limiting for the urea cycle?

(A) Ornithine transcarbamylase
(B) Argininosuccinate synthase
(C) Arginase
(D) Carbamoyl phosphate synthase

Q.71 Enzyme that catalyzes the formation of cyclic AMP from ATP is:

(A) ATP synthase
(B) ATP cleavase
(C) Adenylate cyclase
(D) Tyrosine kinase

Q.72 The following are external beam radiotherapy **EXCEPT**:

(A) IGRT
(B) IMRT
(C) Gamma Knife
(D) Brachytherapy

Q.73 Features of Retroperitoneal Fibrosis include all **EXCEPT:**

(A) Medial deviation of kidneys at D12/L1 level
(B) Associated with Crohn's disease, ulcerative colitis
(C) ESR and C-Reactive Protein elevation
(D)Treatment includes immunosuppressive agents, anti-inflammatory and anti CD20 drugs

Q.74 ALARA (as low as reasonably achievable) is an acronym for:

(A) radiation safety
(B) MRI contrast
(C) Thermography
(D) USG contrast

Q.75 Kohler's disease in osteochondritis of following bone:

(A) Navicular
(B) Patella
(C) Scaphoid
(D) Tibial tuberosity

Q.76 The roots of the equation $x^2 - 2x - 5 = 0$ are

(A) real and distinct
(B) real and equal
(C) distinct and complex but not real
(D) equal and complex but not real

Q.77 If $2, -4$ are the roots of the equation $x^2 - bx - c = 0$, then

(A) $b = 2, c = 10$
(B) $b = 2, c = -8$
(C) $b = -2, c = 8$
(D) $b = -2, c = -8$

Q.78 If $3 + ia$ is a complex number, where $a > 0$ is real, and $|3 + ia| = 5$, then

(A) $a = 10$ (B) $a = 8$ (C) $a = 5$ (D) $a = 4$

Q.79 The sum of the first 20 terms of the geometric progression $2, 6, 18, 54, \ldots$ is

(A) $3^{17} - 1$ (B) $3^{20} - 1$ (C) $3^{19} - 1$ (D) $2^{20} - 1$

Q.80 The 30^{th} term of the arithmetic progression whose initial term is -1 and the common difference is 3, is

(A) 86 (B) 87 (C) 89 (D) 100

Q.81 The acute angle between the straight lines $2x + y = 100, -x - 3y = 12$ is

(A) 0 (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{3}$

Q.82 The equation of the straight line having slope -2 and passing through the point of intersection of the lines $x + 2y = 7, -2x + y = 6$ is

(A) $2x + y = 2$
(B) $x + 2y = 2$
(C) $-2x + y = 4$
(D) $2x - y = 5$

Q.83 $\lim_{x\to 0} \frac{\sin(50x)}{\sin(10x)} =$

(A) 0 (B) 1 (C) 2 (D) 5

Q.84 Let $\mathbb{R}$ denotes the set of real numbers. Let $f: \mathbb{R} \to \mathbb{R}$ be a function defined by

$$f(x) = \begin{cases} 1 & for\ x \leq -1 \\ \frac{1}{1-x} & for\ -1 < x \leq 0 \\ \frac{\sin x}{x} & for\ x > 0 \end{cases}$$

Then

(A) f is continuous at both the points $x = 0$ and $x = -1$
(B) f is continuous at $x = 0$ and not continuous at $x = -1$
(C) f is continuous at $x = -1$ and not continuous at $x = 0$
(D) f is not continuous at both the points $x = 0$ and $x = -1$

Q.85 If $y = \frac{1}{x\sqrt{x}}$ then $\frac{dy}{dx} =$

(A) $-\frac{1}{2x\sqrt{x}}$
(B) $\frac{1}{2x\sqrt{x}}$
(C) $\frac{2}{3x^2\sqrt{x}}$
(D) $-\frac{3}{2x^2\sqrt{x}}$

Q.86 The perpendicular distance from the point $(1, -2)$ to the straight line $4x - 3y - 5 = 0$ is

(A) 2 (B) 1 (C) 3 (D) 5

Q.87 If $y = a^x e^x$, where $a > 0$, then $\frac{dy}{dx} - y =$

(A) $a^x e^x \log_e a$
(B) $x a^x e^x \log_e a$
(C) $a^x e^x$
(D) $e^x \log_e a$

Q.88 The value of the integral $\int \frac{(\log_e x)^4}{x} dx$ is

(A) $(\log_e x)^5 + c$
(B) $\frac{(\log_e x)^5}{5} + c$
(C) $x(\log_e x)^5 + c$
(D) $\log_e x^5 + c$

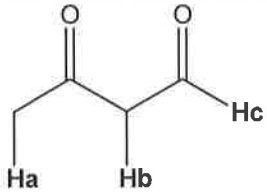
Q.89 The value of the integral $\int x^2 e^x dx$ is

(A) $e^x(x^2 + x + 1) + c$
(B) $e^x(-x^2 + 2x - 2) + c$
(C) $e^x(x^2 + 2x + 2) + c$
(D) $e^x(x^2 - 2x + 2) + c$

Q.90 The value of the integral $\int_0^{\frac{\pi}{2}} \sin x \cos x \, dx$ is

(A) $-\frac{1}{2}$ (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) $-\frac{1}{4}$

Q.91 The correct order of acidity of the labeled hydrogens in the following molecule is

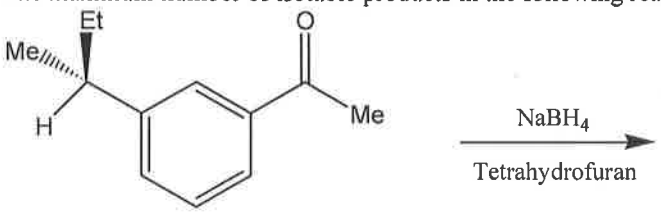


(A) $H_a > H_b > H_c$
(B) $H_b > H_a > H_c$
(C) $H_a > H_c > H_b$
(D) $H_b > H_c > H_a$

Q.92 The percentage of the major enantiomer present in 60% optically pure mixture is

(A) 60 (B) 70 (C) 80 (D) 90

Q.93 The maximum number of isolable products in the following reaction is



(A) 1 (B) 2 (C) 3 (D) 4

Q.94 The oxidation number of the central metal atom in the following complex is

$[Pt(NH_3)_3Cl]Cl$

(A) -1 (B) 0 (C) +1 (D) +2

Q.95 A molecule which is not superimposable on its mirror image is said to exhibit

(A) Enantiomerism
(B) Diastereomerism
(C) Constitutional isomerism
(D) Linkage isomerism

Q.96 For a first order radioactive decay of an element, the time required for 50% decay is 30 years. The time that will be required for its 87.5% decay will be

(A) 40 years (B) 60 years (C) 90 years (D) 120 years

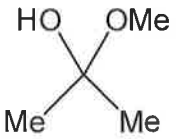
Q.97 The substrate concentration required to attain half of V_{max} in an enzyme catalyzed reaction is equal to

(A) Turnover number
(B) Michaelis constant
(C) Half of Michaelis constant
(D) Half of Turnover number

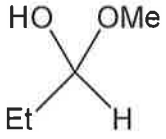
Q.98 In addition to H-bonding, the two strands in a double helix is also stabilized by

(A) ionic bonding
(B) covalent bonding
(C) coordinate bonding
(D) π-stacking

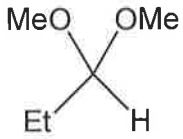
Q.99 Amongst the following, the molecule(s) that has (have) hemiacetal functionality is/are



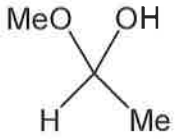
M



N



O



P

(A)**M** and **N** only
(B)**M** and **O** only
(C)**N** and **P** only
(D)**N** and **O** only

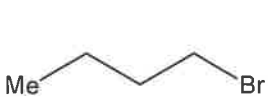
Q.100 Amongst the following, the correct statement about the equilibrium constant **K** for a specific reversible reaction $A \rightleftharpoons B$ is

(A) **K** changes in presence of a catalyst
(B) **K** increases if the concentration of the reactant is increased
(C) **K** decreases if the concentration of the product is increased
(D) **K** changes with change in temperature

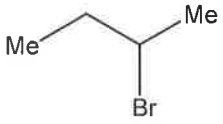
Q.101 The isoelectric point of phenyl alanine is (the pKa's of COOH and NH_3^+ are 1.83 and 9.13 respectively)

(A) 5.17 (B) 5.48 (C) 7.30 (D) 10.96

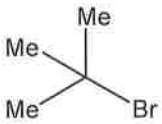
Q.102 Amongst the following bromides, the one that will most readily form precipitate of AgBr upon treatment with aqueous $AgNO_3$ is



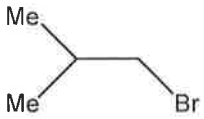
I



II



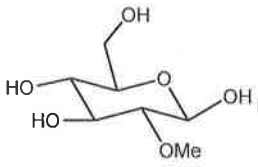
III



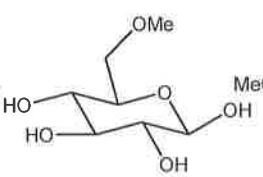
IV

(A) **I** (B) **II** (C) **III** (D) **IV**

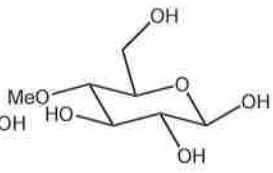
Q.103 Amongst the following molecules, the one having a glycosidic bond is



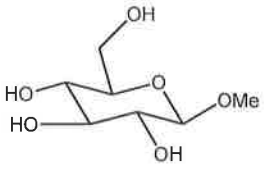
V



VI



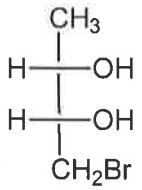
VII



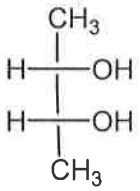
VIII

(A) **V** (B) **VI** (C)**VII** (D) **VIII**

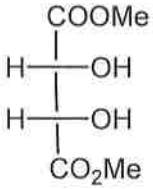
Q.104 Amongst the following, the optically active molecule is



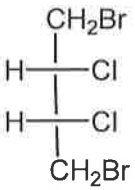
I



J



K



L

(A) **I** (B) **J** (C) **K** (D) **L**

Q.105 0.023 g of Na (atomic weight 23) is reacted with 100 mL of water. The pH of the resulting solution is

(A) 12 (B) 10 (C) 9 (D) 8

Q.106 At a pressure of 10^5 N/m^2, an ideal gas contains 3×10^5 molecules in 0.5 m^3. The temperature of the gas (in Kelvin) is (Boltzmann constant is 1.38×10^{-23} J/K)

(A) 220 (B) 420 (C) 120 (D) 320

Q.107 A gas absorbs 25J of heat and expands from 50 cm^3 to 100 cm^3 against a constant pressure. If the change in its internal energy is 10J, then the constant pressure is

(A) 100kPa (B) 300kPa (C) 400kPa (D) 200kPa

Q.108 A steel plate has a circular hole of radius 5cm at 0°C. The temperature (in °C) required to increase the radius of the hole to 5.05 cm is (Coefficient of linear expansion of steel is 1.2×10^{-5} °C^{-1})

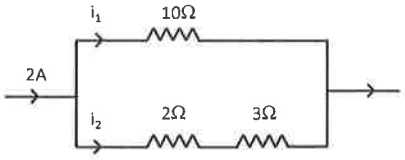
(A) 630 (B) 530 (C) 730 (D) 830

Q.109 Two positive charges, 'Q' and 'Q/2', are separated by a distance of 1 cm. If the force between them is equal to the weight of a sphere of mass 4.5 kg, then the value of 'Q' is

(Acceleration due to gravity is 10 m/s^2; $\frac{1}{4\pi\varepsilon_0}=9\times10^9$ Nm^{2}C^{-2})

(A) 10^{-4} C (B) 10^{-6} C (C) 10^{-5} C (D) 10^{-3} C

Q.110 In the situation shown in the figure, the ratio, $i_1:i_2$ =



(A) 1:1 (B) 2:1 (C) 1:2 (D) 3:2

Q.111 If the maximum wavelength of light that can cause photoelectric effect in a metal is 500 nm, then the work function of the metal is (Plank's Constant $=4.14\times10^{-15}$ eVs; Speed of light $=3\times10^{8}$ m/s)

(A) 1.48eV (B) 2.48eV (C) 3.48eV (D) 4.48eV

Q.112 In order to get an energy output greater than the input energy in a fusion reactor, the Lawson number should be

(A) $<10^{14}$scm^{-3} (B) $>10^{12}$scm^{-3} (C) $>10^{14}$scm^{-3} (D) $<10^{12}$scm^{-3}

Q.113 The magnetic flux through a conducting loop changes according to the relation $\phi = 4t^3 + 5t - 1$, where 'ϕ' is in milliweber and 't' in second. The magnitude of the emf induced (in mV) in the loop at t=4s is

(A) 187 (B) 177 (C) 197 (D) 167

Q.114 Two straight, parallel wires, each carrying an electric current of 2A are separated by a distance 'd'. If the magnetic field at the location of one wire due to the other is 4×10^{-5} T, then the value of 'd' is

(A) 1cm (B) 2cm (C) 3cm (D) 4cm

Q.115 A particle of mass 20 g experiences a force and starts moving from rest. If the particle is at a position $(2000\vec{i}+4000\vec{j})$ m at 10s, then the force experienced by the particle is

(A) $(1.6\vec{i}+0.8\vec{j})$ N (B) $(0.8\vec{i}+1.6\vec{j})$
(C) $(0.4\vec{i}+0.8\vec{j})$ (D) $(0.8\vec{i}+0.4\vec{j})$

Q.116 During projectile motion, the following statement is correct

(A) Horizontal motion has constant velocity and vertical motion has constant acceleration
(B) Horizontal motion has constant acceleration and vertical motion has constant velocity
(C) Both horizontal and vertical motions have constant velocity
(D) Both horizontal and vertical motions have constant acceleration

Q.117 A force of $(5+ax)$ N is exerted on a particle in the x-direction. If the work done by the force to displace the particle from x=0 to x=1 m is 10J, then the value of 'a' is

(A) 5 (B) 10 (C) 15 (D) 20

Q.118 A particle of mass 10 kg moving at a speed of 10 m/s collides with another particle of mass 40 kg which is at rest. If the lighter particle comes to rest after collision, then the velocity of the heavier particle (in m/s) is

(A) 5 (B) 10 (C) 2.5 (D) 20

Q.119 A particle is subjected to two simple harmonic motions in the same direction. The displacements of the motions (in cm) are $x_1 = 4\sin(10\pi t)$ and $x_2 = 4\sin(10\pi t + \frac{\pi}{3})$ where 't' is in second. The amplitude of the resultant simple harmonic motion (in cm) is

(A) $2\sqrt{3}$ (B) $4\sqrt{3}$ (C) $5\sqrt{3}$ (D) $3\sqrt{3}$

Q.120 A double slit is illuminated with a white light and resultant interference pattern is observed on a screen 2 m away. The separation between the slits is 0.5 mm. If red fringes are formed 4 mm away from the central white fringe, then the wavelength of the red light is

(A) 800 nm (B) 700 nm (C) 900 nm (D) 1000 nm

END OF THE QUESTION PAPER

SPACE FOR ROUGH WORK

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