

- 1.) Compared to a bull a bullock is docile because of :
 - (a) Higher levels of cortisone
 - (b) Lower levels of blood testosterone
 - (c) Lower levels of adrenalin/nor adrenalin in its blood
 - (d) Higher levels of thyroxin
- 2.) The highest number of species in the world is represented by :
 - (a) Algae
 - (b) Lichens
 - (c) Fungi
 - (d) Mosses
- 3.) A type of life cycle in which plasmogamy, karyogamy, haplodization takes place but not at specific place in life cycle of an organism is called as :
 - (a) Parasexuality
 - (b) Heterozygosity
 - (c) Homozygosity
 - (d) Asexuality
- 4.) Sexual reproduction in fungi may occur by means of :
 - (a) Sporangiospore, oospore and ascospore
 - (b) Zoospore, oospore and ascospore
 - (c) Sporangiospore, ascospore and basidiospore
 - (d) Oospore, ascospore and basidiospore
- 5.) A sexual reproduction in fungi occurs by :
 - (a) Ascospores
 - (b) Conidia
 - (c) Basidiospore
 - (d) Oospore
- 6.) Menstrual flow occurs due to lack of :
 - (a) Vasopressin
 - (b) Progesteron
 - (c) FSH
 - (d) Oxytocin
- 7.) What is correct to say about the hormone action in humans?
 - (a) In females, FSH first binds with specific receptors on ovarian cell membrane
 - (b) FSH stimulates the secretion of estrogen and progesterone
 - (c) Glucagon is secreted by a-cells of Islets of langerhans and stimulates glycogenolysis
 - (d) Secretion of thymosins is stimulated with aging.
- 8.) Which one of the following statements is false in respect of viability of mammalian sperm?
 - (a) Viability of sperm is determined by its motility
 - (b) Sperms must be concentrated in a thick suspension
 - (c) Sperm is viable for only up to 24 hours
 - (d) Survival of sperm depends on the pH of the medium and is more active in alkaline medium
- 9.) The primary spermatocyte of frog contain how many chromosomes?
 - (a) Half of secondary spermatocyte
 - (b) Same as in secondary spermatocyte
 - (c) Same as in spermatogonia
 - (d) Half of that in spermatogonia
- 10.) If mammalian ovum fails to get fertilized, which one of the following is unlikely?
 - (a) Corpus luteum will disintegrate
 - (b) Progesterone secretion rapidly declines
 - (c) Estrogen secretion further decreases
 - (d) Primary follicle starts developing

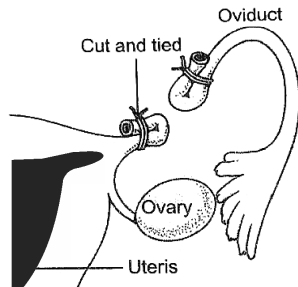
- 11.) About which day in a normal human menstrual cycle does rapid secretion of LH (popularly called LH surge) normally occurs?
(a) 14th day (b) 20th day
(c) 5th day (d) 11th day
- 12.) Where do sperms get matured?
(a) IN seminal vesicle
(b) Seminiferous tubules
(c) In epididymis
(d) Vasa efferentia
- 13.) Cryptorchidism is a condition in which :
(a) Testis does not descend into scrotal sac
(b) Sperm is not found
(c) Male hormones are not reactive
(d) Ovaries are removed
- 14.) Conversion of spermatids into sperm is :
(a) Spermiogenesis
(b) Spermatogenesis
(c) Gametogenesis
(d) Metamorphosis
- 15.) Spermatogenesis is influenced by :
(a) Progesterone (b) FSH
(c) STH (d) LTH
- 16.) Which part of a sperm enters into an ovum during fertilization?
(a) Head (b) Tail
(c) Whole of it (d) Middle piece
- 17.) The secretory phase in the human menstrual cycle is also called :
(a) Follicular phase lasting for about 6 days
(b) Luteal phase and lasts for about 13 days
(c) Follicular phase and lasts for about 13 days
(d) Luteal phase and lasts for about 6 days
- 18.) Ovulation in the human female normally takes place during the menstrual cycle :
(a) At the mid secretory phase
(b) Just before the end of the secretory phase
(c) At the beginning of the proliferative phase
(d) AT the end of the proliferative phase
- 19.) In the absence of acrosome, the sperm cannot :
(a) Get food
(b) Swim
(c) Penetrate the egg
(d) Get energy
- 20.) Sertoli cells are found in :
(a) Uriniferous tubules
(b) Seminal vesicles
(c) Seminiferous tubules
(d) None of these
- 21.) Notochord of frog develops from which embryonic layer :
(a) Ectoderm (b) Mesoderm
(c) Endoderm (d) Mesoendoderm
- 22.) The function of the jelly of frog's spawn :
(a) To keep it waterproof
(b) To keep it cool
(c) To keep it warm
(d) To protect it from shocks
- 23.) Cleavage in frog is called :
(a) Discoidal (b) Superficial

- (c) Holoblastic (d) Meroblastic
- 24.) Tadpole of frog is :
(a) Omnivorous (b) Carnivorous
(c) Sanguivorous (d) Herbivorous
- 25.) If the amount of yolk and its distribution are changed then which process is affected
(a) Pattern of cleavage
(b) Number of blastomeres
(c) Fertilization
(d) Formation of gametes
- 26.) The yolk in telolecithal eggs is :
(a) On one pole
(b) On two opposite poles
(c) In the entire ovum
(d) In the centre of ovum
- 27.) The fish like tadpole of frog moves with the help of :
(a) Hind legs
(b) Cilia
(c) Tail
(d) Fore and hind limbs
- 28.) During metamorphosis of frog :
(a) Gills change into lungs
(b) Tail gets separated
(c) Intestine elongates
(d) Skin gets cornified and mucous and serous glands are formed
- 29.) Which of the following structures is ectodermal in origin?
(a) Notochord (b) Kidney
(c) Brain (d) Liver
- 30.) Differentiation of organs and tissues in a developing organism is associated with :
(a) Developmental mutations
(b) Differential expression of genes
(c) Lethal mutations
(d) Deletion of genes
- 31.) Contraceptive oral pills help in birth control by :
(a) Killing the sperms in uterus
(b) preventing implantation
(c) Preventing ovulation
(d) Both (b) and (c)
- 32.) In assisted reproductive technology where gametes have been fertilized in vitro, which of the following is practicable for embryo transplantation in Fallopian tube?
(a) Only embryo up to 8 blastomeres if zygote is not transplanted
(b) Only zygote is transplanted not embryo
(c) Either embryo or zygote with 8 blastomere phase transplanted
(d) Morulla with 8-24 celled stage is transplanted in Fallopian tube
- 33.) One of the legal methods of birth control is :
(a) By a premature ejaculation during coitus
(b) Abortion by taking an appropriate medicine
(c) By abstaining from coitus from day 10 to 17 of the menstrual cycle
(d) By having coitus at the time of day break
- 34.) Artificial insemination means :
(a) Introduction of sperms of a healthy donor directly into the ovary

- (b) Transfer of sperms of a healthy donor to a test tube containing ova
- (c) Transfer of sperms of husband to a test tube containing ova
- (d) Artificial introduction of sperms of a healthy donor into the vagina
- 35.)** Medical Termination of Pregnancy (MTP) is considered safe up to how many weeks of pregnancy?
- (a) Eighteen weeks (b) Six weeks
- (c) Eight weeks (d) Twelve weeks
- 36.)** Which one of the following is the most widely accepted method of contraception in India, as at present?
- (a) Diaphragms
- (b) IUDs' (Intra uterine devices)
- (c) Cervical caps
- (d) Tubectomy
- 37.)** The technique called, gamete intrafallopian transfer (GIFT) is recommended for those females :
- (a) Who cannot produce an ovum
- (b) Who cannot retain the foetus inside uterus
- (c) Whose cervical canal is too narrow to allow passage for the sperms
- (d) Who cannot provide suitable environment for fertilization
- 38.)** Correct statement with reference to a test tube baby is :
- (a) The fertilized egg is placed in the womb of the mother where the gastrula period is completed
- (b) Unfertilized egg is placed in the womb and allowed to grow parthenogenetically
- (c) A prematurely born baby is reared in an incubator
- (d) Fertilized egg is taken out and grown in a large test tube
- 39.)** Test tube baby means a baby born when :
- (a) The ovum is fertilized externally and thereafter implanted in the uterus
- (b) It develops from a non-fertilized egg
- (c) It is developed in a test tube
- (d) It is developed through tissue culture method
- 40.)** ZIFT is :
- (a) Transfer of zygote into the fallopian tube
- (b) Transfer of embryo into the uterus
- (c) Transfer of mixture of sperms and ova into the fallopian tube
- (d) Transfer of mixture of sperms and ova into the uterus
- 41.)** Tubectomy is a method of sterilization in which :
- (a) Small part of the fallopian tube is removed or tied up.
- (b) Ovaries are removed surgically
- (c) Small part of vas deferens is removed or tied up.
- (d) Uterus is removed surgically
- 42.)** Which of the following is a hormone releasing intra uterine device (IUD)?
- (a) Multiload 375 (b) Vault
- (c) Cervical cap (d) LNG-20
- 43.)** Assisted reproductive technology, IVF involves transfer of :
- (a) Embryo with 16 blastomeres into the fallopian tube.

- (b) Zygote into the fallopian tube
- (c) Zygote into the uterus
- (d) Ovum into the fallopian tube

44.) What is the figure given below showing in particular ?



- (a) Tubectomy (b) Vasectomy
- (c) Ovarian cancer (d) Uterine cancer

45.) Women who consumed the drug thalidomide for relief from vomiting during early months of pregnancy gave birth to children with :

- (a) No splee
- (b) Hare-lip
- (c) Extra fingers and toes
- (d) Under developed limbs

46.) The pollen grains of rice and wheat lose their viability in minutes of their release:

- (a) 30% (b) 10%
- (c) 60% (d) 90%

47.) After double fertilization, a mature ovule has:

- (a) 1 diploid and 1 haploid cell
- (b) 1 diploid and 1 triploid cell
- (c) 2 haploid and 1 triploid cell
- (d) 1 haploid and 1 triploid cell

48.) Occurrence of triploid (3n) primary endosperm nucleus is a characteristic feature of :

- (a) Algae (b) Gymnosperms
- (c) Angiosperms (d) Bryophytes

49.) Upon fertilization, what structure develops from carpel?

- (a) Testa (b) Tegmen
- (c) Pericarp (d) Perisperm

50.) Cleistogamy is leading over anthesis because :

- (a) Pollination agent is not required
- (b) It assures heterozygosity
- (c) It favours insect pollination
- (d) It allows xenogamy.

51.) What is the characteristic of tapetum?

- (a) It does not store food
- (b) It is multi-nucleated
- (c) It is multi-layered structure
- (d) It nourishes the megaspore

52.) A polygonum type of embryo sac is :

- (a) 7 celled, 8 nucleate
- (b) 8 celled, 7 nucleate
- (c) 7 celled, 7 nucleate
- (d) 8 celled, 8 nucleate

53.) Ubish bodies are associated with development of :

- (a) Embryo (b) Pollen grains
- (c) Endosperm (d) Embryosac

54.) Stalk of ovule is called:

- (a) Pedicel (b) Penduncle
- (c) Funicle (d) Petiole

55.) One of the most resistant biological materials known is :

- (a) Hemicellulose (b) Lignin
- (c) Sporopollenin (d) Lignocellulose

56.) The concept of totipotency was demonstrated by :

- (a) Hilde brandt (b) EC steward
(c) Schleiden (d) Robert Brown
- 57.)** Double fertilization was first discovered by Nawaschin (1898) in :
(a) Liliium and Fritillaria
(b) Mango and sugarcane
(c) Papaya and pea
(d) Brassica and Cauditut
- 58.)** 'Coleorrhiza' is a cap like covering over :
(a) Plumule in a dicot
(b) Radicle in dicot
(c) Plumule in a monocot
(d) The radicle in a monocot
- 59.)** In Litchi, the edible part is the juicy out growth of funiculus and is called :
(a) Caruncle (b) Fruit wall
(c) Aril (d) Cotyledons
- 60.)** Role of suspensor is :
(a) Attaching embryo to endosperm
(b) Nutrition to embryo
(c) Pushing the embryo in nutritive tissue
(d) All of the above
- 61.)** Most comlnon ovule, where micropyle comes to lie close to the funiculusis called as :
(a) Anatropous
(b) Compylotropous
(c) Orthotropous
(d) Amphitropous
- 62.)** Which of the following terms is not concerned with genetic recombination in bacteria?
(a) Tansformation (b) Transduction
(c) Translation (d) Conjugation
- 63.)** Pollination by snail and slug is known as :
(a) Ornithophilous
(b) Chiropterophilous
(c) Entomophilous
(d) Malacophilous
- 64.)** Anemophilous flowers have :
(a) Small, smooth stigma
(b) Coloured flower
(c) Sessile stigma
(d) Large feathery stigma
- 65.)** A typical angiosperm embryo sac at maturity is eight nucleate and :
(a) single celled (b) Four celled
(c) Seven celled (d) Eight celled
- 66.)** Assured sed set is possible even in absence of pollinators when pollination is :
(a) Chasmogamous (b) Cleistogamous
(c) Geitogamous (d) Xenogamous
- 67.)** In a mature embryo sac the central cell is :
(a) Single nucleate (b) Binucleate
(c) Four nucleate (d) Eight nucleate
- 68.)** Endosperm may completely be consumed by the developing embryo before the seed maturation in :
(a) Pea
(b) Groundnut
(c) Pea and Groundnut
(d) Castor, pea and groundnut
- 69.)** Perisperm is :
(a) Peripheral part of endosperm
(b) Remnat of endosperm

- (c) Disintegrated secondary nucleus
(d) Persistent of nucellus
- 70.)** The asexual production of seed is called:
(a) Fragmentation (b) Apomixis
(c) Self-fertilization (d) both (a) & (b)
- 71.)** Pollinium is found in family:
(a) Asclepidaceae (b) Rubiaceae
(c) Solanaceae (d) Myrtaceae
- 72.)** When pollen grains are not transferred from anthers to stigma in a flower, due to the barrier, it is called:
(a) Cleistogamy (b) Herkogamy
(c) Dichogamy (d) Heterogamy
- 73.)** During which of the following formation free nuclear division occurs?
(a) Flower (b) Endosperm
(c) Gametes (d) Fruit
- 74.)** Perisperm differs from endosperm in :
(a) Its formation by fusion of secondary nucleus with several sperms
(b) Being a haploid tissue
(c) Having no reserve food
(d) Being a diploid tissue
- 75.)** Megasporangium is equivalent to :
(a) Ovule (b) Embryo sac
(c) Fruit (d) Nucellus
- 76.)** Advantage of cleistogamy is :
(a) Vivipary
(b) Higher genetic variability
(c) More vigorous offspring
(d) No dependence on pollinators
- 77.)** Both, autogamy and goitonogamy are prevented in:
(a) Castor (b) Maize
(c) Papaya (d) Cucumber
- 78.)** Even in absence of pollinating agents seed-setting is assured in :
(a) Salvia (b) Fig
(c) Commellina (d) Zostera
- 79.)** Plants with ovaries having only one or a few ovules, are generally pollinated by:
(a) Butterflies (b) Birds
(c) Wind (d) Bees
- 80.)** What is the function of germ pore?
(a) Absorption of water for seed germination
(b) Initiation of pollen tube
(c) Release of male gametes
(d) Emergence of radicle
- 81.)** Which one of the following statements is wrong?
(a) Vegetative cell is larger than generative cell
(b) Pollen grains in some plants remain viable for months
(c) Intine is made u of cellulose and pectin
(d) When pollen is shed at two-called stage, double fertilization does not take place
- 82.)** Formation of liquid endosperm in coconut takes place beacuse:
(a) Karyokinesis is not followed by cytokinesis
(b) Karyokinesis is followed by cytokinesis
(c) Formation of liquid endosperm is not dependent upon karyokinesis and cytokinesis
(d) None of the above

- 83.) Which of the following floral parts forms pericarp after fertilization?
 (a) Nucellus
 (b) Outer integument
 (c) Ovary wall
 (d) Inner integument
- 84.) Stalk with which ovules remain attached to the placenta is called:
 (a) Funicle (b) Raphe
 (c) Hilum (d) Chalaza
- 85.) One advantage of cleistogamy is :
 (a) It leads to greater genetic diversity
 (b) Seed dispersal is more efficient and widespread
 (c) Seed set is not dependent on pollinators
 (d) Each visit of a pollinator results in transfer of hundreds of pollen grains
- 86.) Embryos developed from the somatic cells are called:
 (a) Cybrids (b) Embryoid
 (c) Callus (d) Hybrids
- 87.) Unisexuality of flowers prevents:
 (a) Autogamy, but not geitonogamy
 (b) Both geitonogamy and xenogamy
 (c) Geitonogamy, but not xenogamy
 (d) Autogamy and geitonogamy
- 88.) A normal plant suddenly started reproducing parthenogenetically. The number of chromosomes of the second generation as compared to the parent will be:
 (a) One half (b) One fourth
 (c) Same (d) Double
- 89.) The type of pollination found in Calotropis is:

- (a) Dicliny (b) Herkogamy
 (c) Heterostyly (d) Dichogamy

- 90.) The root cell of wheat plant has 42 chromosomes. What would be the number of chromosomes in the synergid cell?
 (a) 21 (b) 7
 (c) 28 (d) 14

Physics

- 91.) A light bulb is placed between two plane mirrors inclined at an angle of 60° . The number of images formed are
 (a) 6 (b) 2
 (c) 5 (d) 4
- 92.) In a concave mirror experiment, an object is placed at a distance x_1 from the focus and the image is formed at a distance x_2 from the focus. The focal length of the mirror would be
 (a) $x_1 x_2$ (b) $\sqrt{x_1 x_2}$
 (c) $\frac{x_1 + x_2}{2}$ (d) $\sqrt{\frac{x_1}{x_2}}$
- 93.) An object moving at a speed of 5m/s towards a concave mirror of focal length $f = 1m$ is at a distance of 9m. The average speed of the image is
 (a) $\frac{1}{5} m/s$ (b) $\frac{1}{10} m/s$
 (c) $\frac{5}{9} m/s$ (d) $\frac{2}{5} m/s$
- 94.) A ray of light is incident on the surface of a glass plate of thickness t . If the angle of incidence θ is small, the emerging ray would be displaced side ways by an amount [take n = refractive index of glass]

(a) $\theta n / (n+1)t$ (b) $t\theta(n-1)/n$

(c) $t\theta n / (n-1)$ (d) $t\theta(n+1)/n$

- 95.) Each quarter of a vessel of depth H is filled with liquids of the refractive indices n_1, n_2, n_3 and n_4 from the bottom respectively. The apparent depth of the vessel when looked normally is

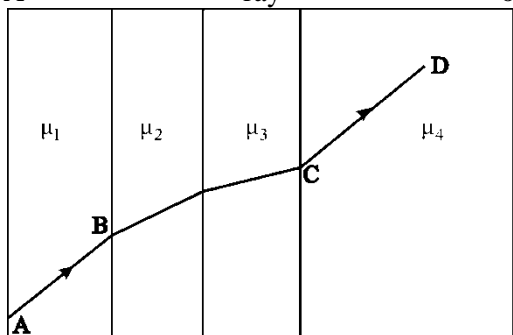
(a) $\frac{H(n_1 + n_2 + n_3 + n_4)}{4}$

(b) $H \left(\frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} + \frac{1}{n_4} \right)$

(c) $\frac{(n_1 + n_2 + n_3 + n_4)}{4H}$

(d) $\frac{H \left(\frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} + \frac{1}{n_4} \right)}{2}$

- 96.) A ray of light passes through four transparent media of



light passes through four transparent media with refractive indices μ_1, μ_2, μ_3 and μ_4 as shown in the figure.

The surfaces of all media are parallel. If the emergent ray CD is parallel to the incident ray AB, we must have

(a) $\mu_1 = \mu_2$ (b) $\mu_2 = \mu_3$

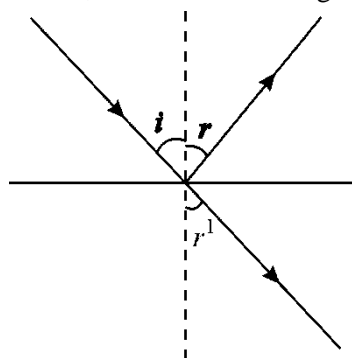
(c) $\mu_3 = \mu_4$ (d) $\mu_4 = \mu_1$

- 97.) Let the $x-z$ plane be the boundary between two transparent media. Medium 1 in $z \geq 0$ has refractive index of $\sqrt{2}$ and medium 2 with $z < 0$ has a refractive index of $\sqrt{3}$. A ray of light in medium 1 given by the vector $\vec{A} = 6\sqrt{3}\hat{i} + 8\sqrt{3}\hat{j} - 10\hat{k}$ is incident on the plane of separation. The angle of refraction in medium 2 is

(a) 30° (b) 45°

(c) 60° (d) 75°

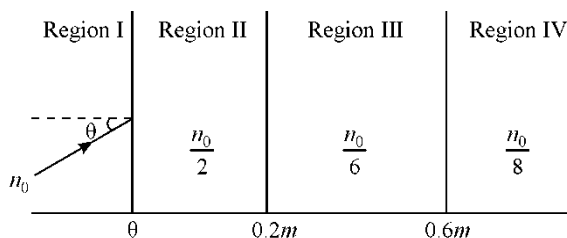
- 98.) A ray of light is incident at an angle i from denser to rarer medium. The reflected and the refracted rays are mutually perpendicular. The angle of reflection and the angle of refraction are respectively r and r' , then the critical angle will be



(a) $\sin^{-1}(\sin r)$ (b) $\sin^{-1}(\tan r')$

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

- 99.) A light beam is travelling from Region I to Region IV (Refer Figure). The refractive index in Regions I, II, III and IV are $n_0, \frac{n_0}{2}, \frac{n_0}{6}$ and $\frac{n_0}{8}$, respectively. The angle of incidence θ for which the beam just misses entering Region IV is



- (a) $\sin^{-1}\left(\frac{3}{4}\right)$ (b) $\sin^{-1}\left(\frac{1}{8}\right)$
 (c) $\sin^{-1}\left(\frac{1}{4}\right)$ (d) $\sin^{-1}\left(\frac{1}{3}\right)$

100.) A ray of light travelling in water is incident on its surface open to air. The angle of incidence is θ , which is less than the critical angle. Then there will be

- (a) Only a reflected ray and no refracted ray
 (b) Only a refracted ray and no reflected ray
 (c) A reflected ray and a refracted ray and the angle between them would be less than $180^\circ - 2\theta$
 (d) A reflected ray and a refracted ray and the angle between them would be greater than $180^\circ - 2\theta$

101.) consider telecommunication through optical fibres, Which of the following statements is not true

- (a) Optical fibres may have homogeneous core with a suitable cladding
 (b) Optical fibres can be of graded refractive index
 (c) Optical fibres are subject to electromagnetic interference from outside
 (d) Optical fibres have extremely low transmission loss

102.) A convex lens of focal length 40 cm is in contact with a concave lens of focal length

- (a) $-1.5D$ (b) $-6.5D$
 (c) $+6.5D$ (d) $+6.67D$

103.) In an optics experiment, with the position of the object fixed, a student varies the position of a convex lens and for each position, the screen is adjusted to get a clear image of the object. A graph between the object distance u and the image distance v , from the lens, is plotted using the same scale for the two axes. A straight line passing through the origin and making an angle of 45° with the xx -axis meets the experimental curve at P . the coordinates of P will be

- (a) $(2f, 2f)$ (b) $\left(\frac{f}{2}, \frac{f}{2}\right)$
 (c) (f, f) (d) $(4f, 4f)$

104.) A convex lens makes a real image 4 cm long on a screen. When the lens is shifted to a new position without disturbing the object, we again get a real image on the screen which is 16 cm tall. The length of the object must be

- (a) $\frac{1}{4}$ cm (b) 8 cm
 (c) 12 cm (d) 20 cm

105.) A glass convex lens ($\mu_g = 1.5$) has a focal length of 8 cm when placed in air. What would be the focal length of the lens when it is immersed in water ($\mu_w = 1.33$)

- (a) 2 m (b) 4 cm
 (c) 16 cm (d) 32 cm

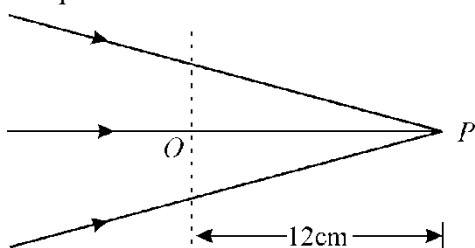
106.) A thin glass (refractive index 1.5) lens has optical power of $-5D$ in air. It's optical power in a liquid medium with refractive index 1.6 will be

- (a) 25 D (b) $-25 D$
 (c) 1 D (d) None of these

107.) A convex lens is in contact with concave lens. The magnitude of the ratio of their focal length is $\frac{2}{3}$. Their equivalent focal length is 30 cm. What are their individual focal lengths.

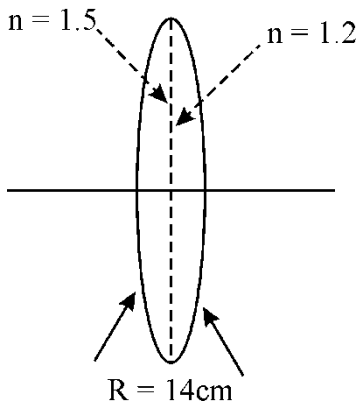
- (a) -75,50 (b) -10,15
 (c) 75,50 (d) -15,10

108.) Figure given below shows a beam of light converging at point P. When a concave lens of focal length 16 cm is introduced in the path of the beam at a place O shown by dotted line such that OP becomes the axis of the lens, the beam converges at a distance x from the lens. The value x will be equal to



- (a) 12 cm (b) 24 cm
 (c) 36 cm (d) 48 cm

109.) A bi-convex lens is formed with two thin plano-convex lenses as shown in the figure. Refractive index n of the first lens is 1.5 and that of the second lens is 1.2. Both the curved surfaces are of the same radius of curvature 40cm, the image distance will be



- (a) -280.0 cm (b) 40.0 cm
 (c) 21.5 cm (d) 13.3 cm

110.) Two beams of red and violet colours are made to pass separately through a prism (angle of the prism is 60°). In the position of minimum deviation, the angle of refraction will be

- (a) 30° for both the colours
 (b) Greater for the violet colour
 (c) Greater for the red colour
 (d) Equal but not 30° for both the colours

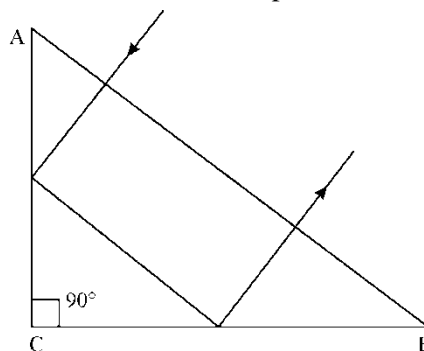
111.) If the ratio of amount of scattering of two light waves is 1 : 4, the ratio of their wavelength is

- (a) 1 : 2 (b) $\sqrt{2} : 1$
 (c) $1 : \sqrt{2}$ (d) 1 : 1

112.) Angle of prism is A and its one surface is silvered. Light rays falling at an angle of incidence $2A$ on first surface return back through the same path after suffering reflection at second silvered surface. Refractive index of the material of prism is

- (a) $2 \sin A$ (b) $2 \cos A$
 (c) $\frac{1}{2} \cos A$ (d) $\tan A$

113.) A ray of light incident normally on an isosceles right angled prism travels as shown in the figure. The least value of the refractive index of the prism must be



- (a) $\sqrt{2}$ (b) $\sqrt{3}$
 (c) 1.5 (d) 2.0

114.) A person who can see things most clearly at a distance of 10 cm. Requires spectacles to enable to him to see clearly things at a distance of 30 cm. What should be the focal length of the spectacles.

- (a) 15 cm (concave) (b) 15 cm (Convex)
 (c) 10 cm (d) 0

115.) An electric bulb illuminates a plane surface. The intensity of illumination on the surface at a point 2m away from the bulb is 5×10^{-4} phot (lumen/cm^2). The line joining the bulb to the point makes an angle of 60° with the normal to the surface. The intensity of the bulb is candela is

- (a) $40\sqrt{3}$ (b) 40
 (c) 20 (d) 40×10^{-4}

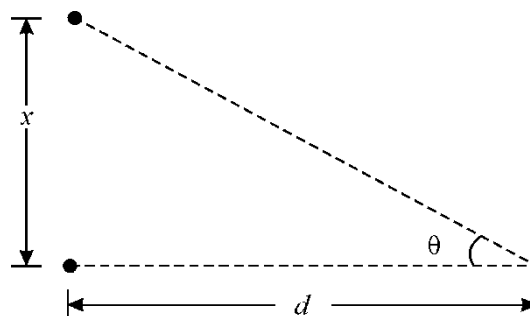
116.) In a compound microscope, the intermediate image is

- (a) Virtual, erect and magnified
 (b) Real, erect and magnified
 (c) Real, inverted and magnified
 (d) Virtual, erect and reduced

117.) A wire mesh consisting of very small squares is viewed at a distance of 8 cm through a magnifying converging lens of focal length 10 cm, kept close to the eye. The magnification produced by the lens is

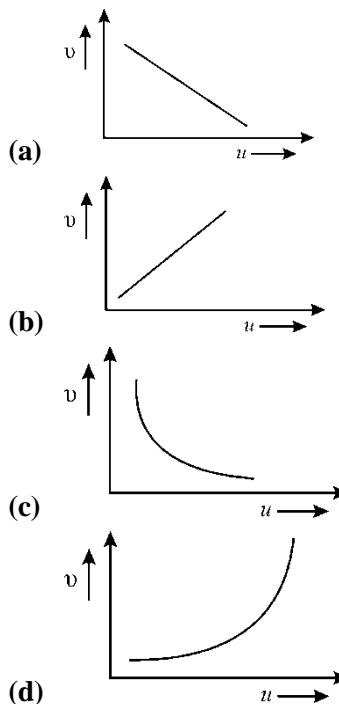
- (a) 5 (b) 8
 (c) 10 (d) 20

118.) Two point white dots are 1 mm apart on a black paper. They are viewed by eye of pupil diameter 3 mm. Approximately, what is the maximum distance at which dots can be resolved by the eye? [Take wavelength of light = 500 nm]



- (a) 6 m (b) 3 m
 (c) 5 m (d) 1 m

119.) In an experiment to find the focal length of a concave mirror a graph is drawn between the magnitudes of u and v . The graph looks like



120.) The image of a small electric bulb fixed on the wall of a room is to be obtained on the opposite wall 4m away by means of a large convex lens. The maximum possible focal length of the lens required for this purpose will be

- (a) 0.5 m (b) 1.0 m
(c) 1.5 m (d) 2.0 m
- 121.)** A concave mirror of focal length ' f_1 ' is placed at a distance of 'd' from a convex lens of focal length ' f_2 '. A beam of light coming from infinity and falling on this convex lens concave mirror combination returns to infinity. The distance 'd' must equal
- (a) $f_1 + f_2$ (b) $-f_1 + f_2$
(c) $2f_1 + f_2$ (d) $-2f_1 + f_2$
- 122.)** An astronaut is looking down on earth's surface from a space shuttle at an altitude of 400 km. Assuming that the astronaut's pupil diameter is 5 mm and the wavelength of visible light is 500 nm. The astronaut will be able to resolve linear object of the size of about
- (a) 0.5 m (b) 5m
(c) 50m (d) 500 m
- 123.)** A car is fitted with a convex side-view mirror of focal length 20 cm. A second car 2.8 m behind the first car is overtaking the first car at a relative speed of 15 m/s . The speed of the image of the second car as seen in the mirror of the first one is :
- (a) $\frac{1}{10} \text{ m/s}$ (b) $\frac{1}{15} \text{ m/s}$
(c) 10 m/s (d) 15 m/s
- 124.)** Wavelength of light used in an optical instrument are $\lambda_1 = 4000 \text{ \AA}$ $\lambda_2 = 5000 \text{ \AA}$, then the ratio of their respective resolving power (corresponding to λ_1 and λ_2) is
- (a) 16 : 25 (b) 9 : 1
- (c) 4 : 5 (d) 5 : 4
- 125.)** The separation between two microscopic particles is measured P_A and P_B by two different lights of wavelength 2000 \AA and 3000 \AA respectively, then
- (a) $P_A > P_B$ (b) $P_A < P_B$
(c) $P_A < 3/2 P_B$ (d) $P_A = P_B$
- 126.)** A telescope has an objective lens of focal length 200 cm and an eye piece with focal length 2 cm. If this telescope is used to see a 50 meter tall building at a distance of 2 km, what is the height of the image of the building formed by the objective lens
- (a) 5 cm (b) 10 cm
(c) 1 cm (d) 2 cm
- 127.)** Which of the following is not correct regarding the radio telescope
- (a) It can not work at night
(b) It can detect a very faint radio signal
(c) It can be operated even in cloudy weather
(d) It is much cheaper than optical telescope
- 128.)** If F_o and F_e are the focal length of the objective and eye piece respectively of a telescope, then its magnifying power will be
- (a) $F_o + F_e$
(b) $F_o \times F_e$
(c) F_o / F_e
(d) $\frac{1}{2}(F_o + F_e)$

- 129.) When light travels from one medium to the other of which the refractive index is different, then which of the following will change
- (a) Frequency, wavelength and velocity
(b) Frequency and wavelength
(c) Frequency and velocity
(d) Wavelength and velocity
- 130.) A light wave has a frequency of 4×10^{14} Hz and a wavelength of 5×10^{-7} metres in a medium. The refractive index of the medium is
- (a) 1.5 (b) 1.33
(c) 1.0 (d) 0.66
- 131.) Relation between critical angles of water and glass is
- (a) $C_w > C_g$ (b) $C_w < C_g$
(c) $C_w = C_g$ (d) $C_w = C_g = 0$
- 132.) A ray of light enters from a rarer to a denser medium. The angle of incidence is i . Then the reflected and refracted rays are mutually perpendicular to each other. The critical angle for the pair of media is
- (a) $\sin^{-1}(\cot i)$ (b) $\cos^{-1}(\tan i)$
(c) $\sin^{-1}(\tan i)$ (d) $\tan^{-1}(\sin i)$
- 133.) The refractive index of water is 1.33. The direction in which a man under water should look to see the setting sun is
- (a) 49° to the horizontal
(b) 90° with the vertical
(c) 49° to the vertical
(d) Along the horizontal
- 134.) Optical fibres are related with
- (a) Communication (b) Light
(c) Computer (d) None of these
- 135.) Brilliance of diamond is due to
- (a) shape
(b) Cutting
(c) Reflection
(d) Total internal reflection
- Chemistry**
- 136.) For a reversible reaction, the concentration of the reactants are doubled, then the equilibrium constant
- (a) becomes one-fourth
(b) is doubled
(c) is halved
(d) remains same
- 137.) When two reactants A and are mixed to give products and D, the reaction quotient Q, at the initial stages of the reaction
- (a) is zero
(b) decreases with time
(c) is independent of time
(d) increases with time
- 138.) In a reversible reaction, the catalyst
- (a) decreases activation energy of forward reaction
(b) increases activation energy of forward reaction
(c) decreases activation energy of both forward and backward reactions
(d) increases activation energy of backward reaction

- 139.) Which of the following favours the backward reactions in a chemical equilibrium?
- (a) decreasing the concentration of one of the reactants
(b) increasing the concentration of one of the reactants
(c) increasing the concentration of one or more of the products
(d) removal of at least one of the products at regular intervals
- 140.) The equilibrium constant of mutarotation of α -D-glucose to β -D-glucose is 1.8. What percent of the α -form remains under equilibrium?
- (a) 35.7 (b) 64.3
(c) 55.6 (d) 44.4
- 142.) The ionization constant of phenol is higher than that of ethanol because
- (a) phenoxide ion is bulkier than ethoxide
(b) phenoxide ion is stronger base than ethoxide
(c) phenoxide ion is stabilized through delocalization
(d) phenoxide ion is less stable than ethoxide
- 143.) in which of the following acid- base titration, pH is greater than 8 at equivalence point?
- (a) acetic acid vs ammonia
(b) acetic acid vs sodium hydroxide
(c) hydrochloric acid vs ammonia
(d) hydrochloric acid vs sodium hydroxide
- 144.) When a buffer solution of CH_3COONa and CH_3COOH is diluted with water then
- (a) H^+ ion concentration increases
(b) H^+ ion concentration decreases
(c) H^+ ion concentration remains constant
(d) CH_3COO^- ion concentration increases
- 145.) CH_3COOH is weaker acid than H_2SO_4 . It is due to
- (a) more ionization
(b) less ionization
(c) covalent bond
(d) electrovalent bond
- 146.) Pure ammonia is placed in a vessel at a temperature where its dissociation constant (α) is appreciable. At equilibrium
- (a) α does not change with pressure
(b) concentration of NH_2 does not change with pressure
(c) concentration of hydrogen is less than that of nitrogen
(d) K_p does not change significantly with pressure
- 147.) If ΔH is the change in enthalpy, ΔE is the change in internal energy, N_p is the number of moles of products and N_r is the number of moles of reactants then :
- (a) $\Delta H > \Delta E$ always
(b) $\Delta H < \Delta E$ when $N_p > N_r$
(c) $\Delta H < \Delta E$ when $N_p < N_r$

- (d) $\Delta H > \Delta E$ when $N_p < N_r$
- 148.)** Hess law is applicable for the determination of heat of :
- Reaction
 - Transition
 - Formation
 - All of these
- 149.)** Which of the following pairs of a chemical reaction is certain to result in a spontaneous reaction?
- endothermic and decreasing disorder
 - exothermic and increasing disorder
 - endothermic and increasing disorder
 - exothermic and decreasing disorder
- 150.)** For a spontaneous process the correct statement is :
- Entropy of the system always increase
 - Free energy of the system always increases
 - Total entropy change is always negative
 - Total entropy change is always positive
- 151.)** In a closed insulated container a liquid is stirred with a paddle to increase the temperature which of the following is true :
- $\Delta E = W \neq 0, q = 0$
 - $\Delta E = W = q \neq 0$
 - $\Delta E = 0, W = q \neq 0$
 - $W = 0, \Delta E = q \neq 0$
- 152.)** Change in volume of the system does not alter the number of moles in which of the following equilibria?
- $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$
 - $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$
 - $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$
 - $SO_2Cl_{2(g)} \rightleftharpoons SO_{2(g)} + Cl_{2(g)}$
- 153.)** For the reaction equilibrium,
- $$N_2O_{4(g)} \rightleftharpoons 2NO_{2(g)}$$
- the concentrations of N_2O_4 and NO_2 at equilibrium are 4.8×10^{-2} and 1.2×10^{-2} mol L^{-1} respectively. the value of K_c for the reaction is**
- $3.3 \times 10^2 \text{ mol } L^{-1}$
 - $3 \times 10^{-1} \text{ mol } L^{-1}$
 - $3 \times 10^{-3} \text{ mol } L^{-1}$
 - $3 \times 10^3 \text{ mol } L^{-1}$
- 154.)** When rain is accompanied by a thunderstorm, the collected rain water will have a pH value.
- slightly lower than that of rain water without thunderstorm.
 - slightly higher than that when the thunderstorm is not there
 - uninfluenced by occurrence of thunderstorm
 - which depends on the amount of dust in air.
- 155.)** The conjugate base of $H_2PO_4^-$ is
- PO_4^{3-}
 - P_2O_5
 - H_3PO_4
 - HPO_4^{2-}
- 156.)** What is the equilibrium expression for the reaction
- $$P_{4(s)} + 5O_{2(g)} \rightleftharpoons P_4O_{10(s)} ?$$

(a) $K_c = \frac{[P_4O_{10}]}{[P_4][O_2]^5}$

(b) $K_c = \frac{[P_4O_{10}]}{5[P_4][O_2]}$

(c) $K_c = [O_2]^5$

(d) $K_c = \frac{1}{[O_2]^5}$

157.) The molar solubility (in mol L^{-1}) of a sparingly soluble salt MX_4 is s . The corresponding solubility product is K_{sp} . s is given in terms of K_{sp} by the relation

(a) $s = (K_{sp} / 128)^{1/4}$

(b) $s = (128K_{sp})^{1/4}$

(c) $s = (256K_{sp})^{1/5}$

(d) $s = (K_{sp} / 256)^{1/5}$

158.) The solubility product of a salt having general formula MX_2 , in water is 4×10^{-12} . The concentration of M^{2+} ions in the aqueous solution of the salt is

(a) $2.0 \times 10^{-6} M$ (b) $1.0 \times 10^{-4} M$

(c) $1.6 \times 10^{-4} M$ (d) $4.0 \times 10^{-10} M$

159.) An amount of solid NH_4HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm. pressure. Ammonium hydrogen sulphide decomposes to yield NH_3 and H_2S gases in the flask. When the decomposition to 0.84 atm. The equilibrium constant for NH_4HS decomposition at this temperature is

(a) 0.30 (b) 0.18

(c) 0.17 (d) 0.11

160.) The first and second dissociation constants of an acid H_2A are 1.0×10^{-5} and 5.0×10^{-10} respectively. The overall dissociation constant of the acid will be

(a) 0.2×10^5 (b) 5.0×10^{-5}

(c) 5.0×10^{15} (d) 5.0×10^{-15}

161.) Four species are listed below :

(a) HCO_3^- (b) H_3O^+

(c) HSO_4^- (d) HSO_3F

Which one of the following is the correct sequence of their acid strength?

(a) $iii < i < iv < ii$

(b) $iv < ii < iii < i$

(c) $ii < iii < i < iv$

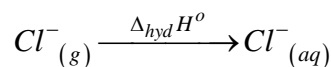
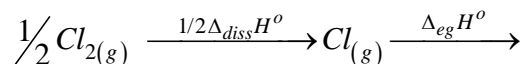
(d) $i < iii < ii < iv$

162.) Standard entropy of X_2 , Y_2 and XY_3 are 60, 40 and $50 J K^{-1} mol^{-1}$, respectively. For the reaction, $1/2 X_2 + 3/2 Y_2 \rightarrow XY_3$, $\Delta H = -30 kJ$, to be at equilibrium, the temperature will be

(a) 1000 K (b) 1250 K

(c) 500 K (d) 750 K

163.) Oxidising power of chlorine in aqueous solution can be determined by the parameters indicated below :



The energy involved in the conversion of $1/2 Cl_{2(g)}$ to $Cl^-_{(aq)}$ (using data

$$\Delta_{diss} H^o_{Cl_2} = 240 kJ mol^{-1},$$

$$\Delta_{eg} H^{\circ}_{Cl} = -349 \text{ kJ mol}^{-1},$$

$$\Delta_{hyd} H^{\circ}_{Cl^{-}} = -381 \text{ kJ mol}^{-1}) \text{ will be}$$

- (a) $+120 \text{ kJ mol}^{-1}$ (b) $+152 \text{ kJ mol}^{-1}$
 (c) -610 kJ mol^{-1} (d) -850 kJ mol^{-1}

164.) $(\Delta H - \Delta U)$ for the formation of carbon monoxide (CO) from its elements at 298 K is

$$(R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1})$$

- (a) $-1238.78 \text{ J mol}^{-1}$
 (b) $1238.78 \text{ J mol}^{-1}$
 (c) $-2477.57 \text{ J mol}^{-1}$

(d) $2477.57 \text{ J mol}^{-1}$

165.) The internal energy change when a system goes from state A to B is 40 kJ/mole. If the system goes from A to B by a reversible path and returns to state A by an irreversible path what would be the net change in internal energy?

- (a) 40 kJ (b) $> 40 \text{ kJ}$
 (c) $< 40 \text{ kJ}$ (d) zero

166.) For a spontaneous reaction the ΔG , equilibrium constant (K) and E°_{cell} will be respectively

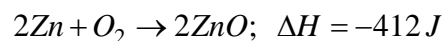
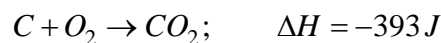
- (a) $-ve, > 1, +ve$ (b) $+ve, > 1, -ve$
 (c) $-ve, < 1, -ve$ (d) $-ve, > 1, -ve$

167.) If the bond dissociation energies of XY, X_2 and Y_2 (all diatomic molecules) are in the ratio of 1 : 1 : 0.5 and ΔH_f for the formation of XY is -200 kJ mol^{-1} . The bond dissociation energy of X_2 will be

- (a) 100 kJ mol^{-1} (b) 200 kJ mol^{-1}

- (c) 800 kJ mol^{-1} (d) 400 kJ mol^{-1}

168.) For the reactions ,

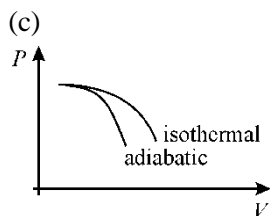
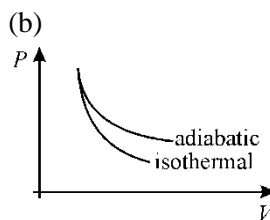
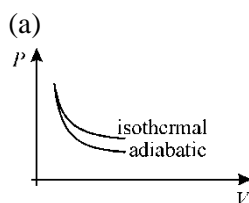


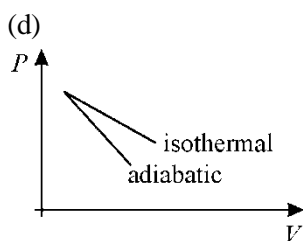
- (a) carbon can oxidise Zn
 (b) oxidation of carbon is not feasible
 (c) oxidation of Zn is not feasible
 (d) Zn can be oxidise carbon.

169.) If an endothermic reaction is non-spontaneous at freezing point of water and becomes feasible at its boiling point, then

- (a) ΔH is $-ve$, ΔS is $+ve$
 (b) ΔH and ΔS both are $+ve$
 (c) ΔH and ΔS both are $-ve$
 (d) ΔH is $+ve$, ΔS is $-ve$

170.) The correct figure representing isothermal and adiabatic expansions of an ideal gas from a particular initial state is





171.) The pH of 0.31 M solution of following increases in the order

- (a) $NaCl < NH_4Cl < NaCN < HCl$
 (b) $HCl < NH_4Cl < NaCl < NaCN$
 (c) $NaCN < NH_4Cl < NaCl < HCl$
 (d) $HCl < NaCl < NaCN < NH_4Cl$

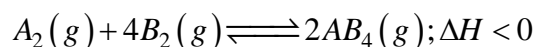
172.) When equal volume of the following solutions are mixed, precipitation of $AgCl$ ($K_{sp} = 1.8 \times 10^{-10}$) will occur only with

- (a) $10^{-4} M (Ag^+)$ and $10^{-4} M (Cl^-)$
 (b) $10^{-5} M (Ag^+)$ and $10^{-5} M (Cl^-)$
 (c) $10^{-10} M (Ag^+)$ and $10^{-6} M (Cl^-)$
 (d) $10^{-10} M (Ag^+)$ and $10^{-10} M (Cl^-)$

173.) Which of the following statements is false ?

- (a) work is a state function
 (b) temperature is a state function
 (c) change in the state is completely defined when the initial and final states are specified.
 (d) work appears at the boundary of the system.

174.) In a reaction



The formation of $AB_4(g)$ will be favoured by

- (a) low temperature and high pressure
 (b) high temperature and high pressure
 (c) low temperature and low pressure
 (d) high temperature and low pressure

175.) At $100^\circ C$ the vapour density of nitrogen peroxide (N_2O_4) is 26.8. The percentage dissociation into NO_2 molecules is

- (a) 71.64% (b) 61.57%
 (c) 83.56% (d) 67.39%

176.) The _____ reaction

$PCl_5(s) \rightleftharpoons PCl_3(g) + Cl_2(g)$ is in equilibrium. If the equilibrium concentration of $PCl_3(g)$ is doubled, then concentration of $Cl_2(g)$ would become

- (a) $1/2$ of its initial value
 (b) $1/4$ of its initial value
 (c) four times of its initial value
 (d) two times of its initial value

177.) In which of the following reactions, the concentration of reactant is equal to concentration of product at equilibrium constant ?

- (a) $A \rightleftharpoons B; K = 0.01$
 (b) $R \rightleftharpoons P; K = 1$
 (c) $X \rightleftharpoons Y; K = 10$
 (d) $L \rightleftharpoons J; K = 0.025$

178.) The pK_a of acetyl salicylic acid (aspirin) is 3.5. The pH of gastric juice in human stomach is about 2-3 and pH in the small intestine is about 8. Aspirin will be

- (a) ionized in the small intestine and almost unionized in the stomach
 (b) unionized in the small intestine and in the stomach

(c) completely ionized in the small intestine and in the stomach

(d) ionized in the stomach and almost unionized in the small intestine.

179.) A $(OH)_2$ is a partially soluble substance.

Its K_{sp} value is 4×10^{-12} , which of the following statement is correct?

(i) The solubility is unaffected by pH of the medium

(ii) Its solubility has been decreased in a buffered medium at pH at 1 L

(iii) Its solubility has been increased in a buffered medium having pH at 9

(iv) Its saturated solution has pH is equal to 10.3

(a) 1, 2, 3

(b) 3 and 4

(c) 2 and 3

(d) 2, 3 and 4

180.) Identify the correct statement regarding entropy.

(a) at absolute zero temperature, entropy of a perfectly crystalline substance is +ve.

(b) at absolute zero temperature, entropy of a perfectly crystalline substance is taken to be zero

(c) at absolute zero temperature, entropy of all crystalline substances is taken to be 0.

(d) at $0^\circ C$, entropy of a perfectly crystalline substance is taken to be 0.

181.) Which of the following statement is true for ΔG ?

(a) it is always proportional to ΔH

(b) it may be less than or greater than or equal to ΔH

(c) it is always greater than ΔH

(d) it is always less than ΔH