

**KCET – 2016 TEST PAPER WITH ANSWER KEY
(HELD ON WEDNESDAY 4th MAY, 2016)**

BIOLOGY

1. Identify from the following group of animals, which exhibit oestrous cycle.
- (1) Monkey, ape, man and elephant
 - (2) Lion, deer, dog and cow
 - (3) Lion, dog, monkey and ape
 - (4) Cow, monkey, elephant and ape

Ans: (2)

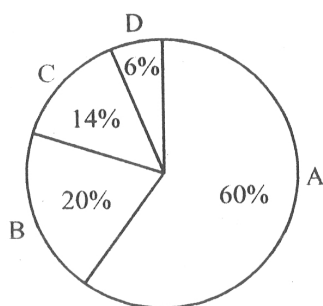
2. The codons UUU and UUC codes for phenylalanine only. This feature of genetic code is called
- (1) Degenerate
 - (2) Commaless
 - (3) Non-ambiguous
 - (4) Non-overlapping

Ans: (1)

3. Connell's field experiment on the rocky sea coast of Scotland, where larger Barnacle balanus dominates the intertidal area and removes the smaller Barnacle cathamalus. This happened due to
- (1) Parasitism
 - (2) Predation
 - (3) Mutualism
 - (4) Competition

Ans: (4)

4. The relative contribution of various green house gases to total global warming is given in the following diagram :



Identify the green house gases.

- (1) A = CFCs; B= CO₂ ; C= CH₄ ; D= N₂O
- (2) A= CO₂ ; B= CH₄ ; C = CFCs; D= N₂O
- (3) A = CFCs ; B = CH₄ ; C = CO₂ ; D = N₂O
- (4) A= CO₂ ; B = CFCs; C= CH₄ ; D= N₂O

Ans: (2)

5. Which among these is not a post fertilization event ?
- (1) Fruit formation
 - (2) Gametogenesis
 - (3) Seed formation
 - (4) Embryogenesis

Ans: (2)

6. Facultative absorption of water from primary urine is influenced by the hormone
- (1) Vasopressin
 - (2) Androgens
 - (3) Thyroxine
 - (4) Epinephrine

Ans: (1)

7. Digestion of proteins is incomplete in the absence of enterokinase, because
- (1) Trypsinogen is not converted into trypsin.
 - (2) Pepsinogen is not converted into pepsin.
 - (3) Prorennin is not converted into rennin.
 - (4) Chymotrypsinogen is not converted into chymotrypsin.

Ans: (1)

8. The puffed-up appearance of dough is due to fermentation by bacteria. Identify the gas liberated during the process.
- (1) Hydrogen sulphide
 - (2) Methane
 - (3) Ammonia
 - (4) Carbon dioxide

Ans: (4)

9. All the following interactions are mutualism, except
- (1) Plant and animal relation for pollination
 - (2) Association of algae and fungi in lichens
 - (3) Association of cattle egret and grazing cattle
 - (4) Association of fungi and roots of higher plants in mycorrhiza

Ans: (3)

10. Identify the incorrect statement from the following.

- (1) Response of T-cells is called cell mediated immunity.
- (2) B-cells produce antibody.
- (3) Macrophages are the phagocytic cells.
- (4) Interferons kill viruses.

Ans: (4)

11. Elution means

- (1) Making the DNA bands visible under UV radiation.
- (2) Separation of DNA fragments on agarose gel.
- (3) Isolating alien DNA from the choice organism.
- (4) Cutting and extraction of DNA bands from the agarose gel.

Ans: (4)

12. Choose the correct sequence of events occur in human reproduction.

- (1) Gametogenesis → insemination → fertilization → implantation → gestation → parturition
- (2) Gametogenesis → gestation → insemination → fertilization → implantation → parturition
- (3) Gestation → gametogenesis → insemination → implantation → fertilization → parturition
- (4) Gametogenesis → insemination → % gestation → implantation → fertilization → parturition

Ans: (1)

13. What is the role of competitive inhibitor during enzyme action ?

- (1) It alters the active site of the enzyme and prevents the binding of substrate.
- (2) It enhances enzyme action.
- (3) It inhibits breaking of chemical bonds of the substrate.
- (4) It declines the enzyme action.

Ans: (4)

14. In which type of interactions, both the interacting organisms do not live close together ?

- (1) Mutualism
- (2) Predation
- (3) Competition
- (4) Parasitism

Ans: (3)

15. Plants obtained through tissue culture are genetically identical and they are obtained by somatic cells. What do you call them ?

- (1) Somatic hybrids
- (2) Somaclones
- (3) Cross hybrids
- (4) Monoclones

Ans: (2)

16. A plant is provided with ideal conditions for photosynthesis and supplied with isotope $^{14}\text{CO}_2$. When the products of the process are analysed carefully, what would be the nature of products ?

- (1) Both glucose and oxygen are normal.
- (2) Both glucose and oxygen are labelled.
- (3) Only glucose is labelled and oxygen is normal.
- (4) Only oxygen is labelled but glucose is normal.

Ans: (3)

17. Sarcomere is the functional unit of contraction in a muscle fibre. Identify the portion of myofibril that constitute a sarcomere.

- (1) The portion of myofibril between two successive 'A' band.
- (2) The portion of myofibril between two successive 'Z' line.
- (3) The portion of myofibril between two successive 'M' line.
- (4) The portion of myofibril between two successive 'I' band.

Ans: (2)

18. Snow blindness is caused due to

- (1) Acid rain
- (2) Ozone hole
- (3) Green house effect
- (4) Nuclear winter

Ans: (2)

19. In a polysaccharide, number of monosaccharides are linked by

- (1) Glycosidic bond
- (2) Peptide bond
- (3) Hydrogen bond
- (4) Phosphoester bond

Ans: (1)

20. Which one of these is not an accessory glands in male reproductive system ?

- (1) Cowper's gland
- (2) Prostate gland
- (3) Bartholin's gland
- (4) Seminal vesicle

Ans: (3)

21. In a dithecous anther, each pollen sac contain 1000 MMC. What is the total number of pollen-grains produced by the anther ?

- (1) 16,000 (2) 4,000
(3) 32,000 (4) 8,000

Ans: (1)

22. Choose the incorrect statement from the following.

- (1) Adipose tissue is a type of dense connective tissue.
(2) Tendons attach muscle to bone.
(3) Cartilage is made up of chondrocytes.
(4) Ciliated epithelium is the modified columnar epithelium.

Ans: (1)

23. What is the function of the enzyme 'recombinase' during meiosis ?

- (1) Condensation of chromosomes
(2) Formation of synaptonemal complex
(3) Alignment of bivalent chromosomes on equatorial plate
(4) Crossing over between non-sister chromatids

Ans: (4)

24. A person admitted to hospital as he had myocardial infarction. A cardiologist injecting him 'streptokinase', why ?

- (1) It stimulates heart beat.
(2) It reduces hypertension.
(3) It acts as clot buster.
(4) It reduces the level of blood cholesterol.

Ans: (3)

25. One of the following area is an example for secondary succession, if the succession take place in/on

- (1) Newly created pond
(2) Abandoned farm land
(3) Bare rock
(4) Newly cooled lava

Ans: (2)

26. Desired genes have been introduced into transgenic animals to obtain large scale production of useful biological products encoded by these genes. This approach is generally referred to as

- (1) Gene therapy
(2) Hybridoma technology
(3) Down stream processing
(4) Molecular farming

Ans: (4)

27. The edible part of the fruit of apple is

- (1) Endocarp (2) Thalamus
(3) Involucre (4) Pericarp

Ans: (2)

28. Lactational amenorrhea

- (1) Prevents secretion of prol actin
(2) Prevents secretion of milk from breast
(3) Prevents spermatogenesis
(4) Prevents conception

Ans: (4)

29. The gene for haemophilia is located on 'X' chromosome. Hence it is normally impossible for a

- (1) Carrier mother to pass the gene to her son.
(2) Haemophilic father to pass the gene to his daughter.
(3) Haemophilic father to pass the gene to his son.
(4) Carrier mother to pass the gene to her daughter.

Ans: (3)

30. The primary treatment of sewage water involves

- (1) Anaerobic bacterial activity
(2) Sludge digestion
(3) Filtration and sedimentation
(4) Aerobic bacterial activity

Ans: (3)

31. Which one of the following statements is not correct about a plasmid ?

- (1) It has the ability of autonomous replication.
(2) It is a circular DNA.
(3) It's DNA is as long as chromosomal DNA.
(4) It has antibiotic resistant gene.

Ans: (3)

32. A scrubber in the exhaust of a chemical industry removes

- (1) Nitrous oxide (2) Hydrogen sulphide
(3) Carbon monoxide (4) Sulphur dioxide

Ans: (4)

33. A doctor identifies symptoms of nasal congestion, headache, sore throat, hoarseness, cough in a patient. The conclusion is that, the patient is infected by a pathogen

- (1) Plasmodium (2) Adeno virus
(3) Salmonella (4) Rhino virus

Ans: (4)

34. Most suitable method of introducing alien DNA into a plant cell is

- (1) Lipofection (2) Biolistics
(3) Heat shock method (4) Microinjection

Ans: (2)

35. Some of the events occur during life cycle of Plasmodium are given below. Identify the correct statement.

- (1) Female mosquito take up sporozoites with blood meal.
(2) The sporozoites reproduce sexually in liver cells.
(3) When mosquito bites a man, gametocytes are injected.
(4) The gametocytes develop in RBC.

Ans: (4)

36. The phenomenon called 'Apical dominance' in plants is due to a phytohormone

- (1) Cytokinins (2) Auxins
(3) ABA (4) Gibberellins

Ans: (2)

37. Match the plant structures given in the column-I with their plants given in the column-II.

- | Column-I | Column-II |
|--------------------|------------------|
| A. Prothallus | P. Bryophytes |
| B. Microsporophyll | q. Pteridophytes |
| C. Protonema | r. Angiosperms |
| D. PEN | s. Gymnosperms |

- (1) A-q, B-s, C-r, D-p (2) A-r, B-p, C-s, D-q
(3) A-q, B-s, C-p, D-r (4) A-s, B-r, C-p, D-q

Ans: (3)

38. Pick the hormone which is not secreted by human placenta.

- (1) Prolactin (2) hCG
(3) Estrogen (4) hPL

Ans: (1)

39. The gene disorder phenylketonuria is an example for

- (1) Multiple allelism (2) Polygenic inheritance
(3) Multiple factor (4) Pleiotropy

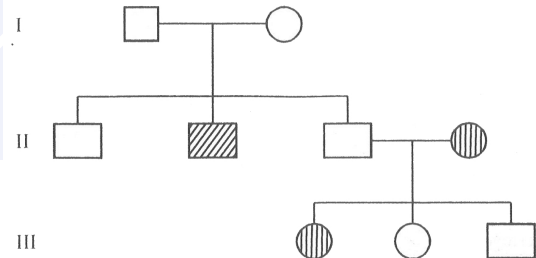
Ans: (4)

40. 'A' and 'B' are the two adjacent living cells. The cell 'A' has solute potential (ψ_s) of -9 bars and pressure potential (ψ_p) of 4 bars, whereas cell 'B' has solute potential (ψ_s) of -8 bars and pressure potential (ψ_p) of 5 bars. What will be the direction of water movement between these cells ?

- (1) Do not move in any direction.
(2) Cell A to Cell B
(3) Moves in both the directions.
(4) Cell B to Cell A

Ans: (4)

41. From the following pedigree chart of a family, one can make an analysis that,



- (1) It is an allosomal dominant trait.
(2) It is an autosomal dominant trait.
(3) It is an allosomal recessive trait.
(4) It is an autosomal recessive trait.

Ans: (4)

42. Find the mis-match from the following pairs :

- (1) Natural selection → Industrial melanism
(2) Divergent evolution → thorn of bougainvillia and tendril of cucurbita
(3) Genetic drift → Constant gene frequency
(4) Adaptive radiation → Australian marsupials

Ans: (3)

43. The hormone 'melatonin' is secreted by the gland

- (1) Pineal (2) Thyroid
(3) Pituitary (4) Adrenal

Ans: (1)

44. Which one of the following statement is correct ?
- Chasmogamous flowers never exhibits autogamy.
 - Chasmogamous flowers always exhibits geitonogamy.
 - Cleistogamous flowers exhibits both autogamy and geitonogamy.
 - Cleistogamous flowers always exhibits autogamy.

Ans: (4)

45. In plants, lateral roots arise from
- Endodermis
 - Epidermis
 - Pericycle
 - Hypodermis

Ans: (3)

46. Identify a micro-organism that can produces biomass of protein.
- Methylophilus methylotrophus*
 - Monascus purpureus*
 - Trichoderma polysporum*
 - Aspergillus niger*

Ans: (1)

47. Identify the correct equation for Hardy-Weinberg law.
- $(p + q)^2 = 1$
 - $p + q = 1$
 - $(p - q)^2 = 1$
 - $p - q = 1$

Ans: (2)

48. A population is correctly defined as having which of the following characteristics ?
- Inhabiting the same geography area
 - Individuals belonging to same species
 - Possessing a constant and uniform density and dispersion
- a and c only
 - a and b only
 - b only
 - b and c only

Ans: (2)

49. Offsprings formed during sexual reproduction exhibits more variation than those formed by asexual method, because,
- Sexual reproduction is more complicated.
 - Genetic material comes from two different individuals.
 - Genetic material comes from male parent.
 - Greater amount of DNA is involved.

Ans: (2)

50. Read the following statements carefully and choose the correct statements :

- In a transcription unit, the promoter located at the 5' end of coding strand.
- The single strand DNA having the polarity 5' → 3' is the template strand.
- RNA polymerase binds to the operator during transcription.
- Single base DNA differences occur in humans are called Single Nucleotide Polymorphism (SNPs).

- Statements b and d
- Statements a and b
- Statements a and d
- Statements b and c

Ans: (3)

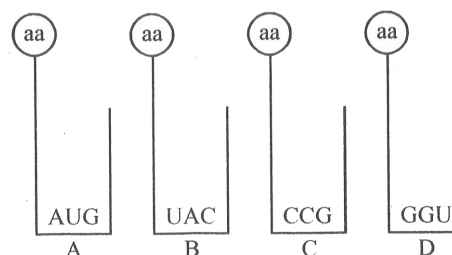
51. In a taxonomic hierarchy, the number of common characters will increase as we go from,
- Class to Order
 - Species to Kingdom
 - Genus to Species
 - Kingdom to Species

Ans: (4)

52. A human male is heterozygous for autosomal genes 'A' and 'B'. He is also hemizygous for haemophilic gene 'h'. What percentage of sperms will carry 'abh' genotype ?
- 75%
 - 25%
 - 0%
 - 50%

Ans: (BONUS)

53. Find the sequence of binding of the following aminoacyl t-RNA complexes during translation to mRNA transcribed by a DNA segment having the base sequences 3'TACATGGGTCCG5'.



Choose the answer showing the correct order of alphabets.

- C, D, B, A
- A, B, D, C
- D, C, A, B
- B, A, D, C

Ans: (4)

54. Some desert beetles can survive on “metabolic water”, without ever drinking liquid water which
- (1) Is a breakdown product of pyruvate inside the mitochondria, along with carbon dioxide.
 - (2) Was produced as water in the organisms they eat.
 - (3) Is a breakdown product from glycolysis in the cytoplasm.
 - (4) Is absorbed from the air along with respiratory oxygen.

Ans: (1)

55. Which one of the following statement is wrong with respect to separation of DNA fragments on gel electrophoresis ?
- (1) The DNA fragments resolve according to their size.
 - (2) The DNA fragments move towards anode under electric field through the matrix.
 - (3) The smaller DNA fragments separate first.
 - (4) The commonly used matrix is agarose gel.

Ans: (BONUS)

56. E. coli bacteria grew in $^{15}\text{NH}_4\text{Cl}$ medium for several generations are allowed to grow in $^{14}\text{NH}_4\text{Cl}$ medium. After 2 generations, the bacteria are isolated from the medium and DNA of bacteria centrifuged in CsCl . The result of the density gradient of DNA is
- (1) Both heavy and light DNA
 - (2) Only hybrid DNA
 - (3) Both hybrid and light DNA
 - (4) Both hybrid and heavy DNA

Ans: (3)

57. Amniocentesis is one of the methods
- (1) For foetal sex determination
 - (2) Adapted for MTP
 - (3) Used for safe parturition
 - (4) Of birth control

Ans: (1)

58. The rate of formation of new organic matter by deer in a forest ecosystem is called
- (1) Standing crop
 - (2) Primary productivity
 - (3) Net Primary productivity
 - (4) Secondary productivity

Ans: (4)

59. One of the breeding techniques useful to eliminate harmful recessive genes by selection is
- (1) In-breeding
 - (2) Artificial insemination
 - (3) MOET
 - (4) Out-breeding

Ans: (1)

60. A person who has allergy, the type of antibody produced in his body is
- (1) IgE
 - (2) IgA
 - (3) IgM
 - (4) IgG

Ans: (1)

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MATHEMATICS

1. The maximum value of $\left(\frac{1}{x}\right)^x$ is

- (1) $\left(\frac{1}{e}\right)^e$ (2) $e^{1/e}$
(3) e^e (4) e

Ans: (2)

2. The contrapositive of the converse of the statement "If x is a prime number then x is odd" is

- (1) If x is not a prime number then x is not an odd
(2) If x is a prime number then it is not odd.
(3) If x is not an odd number then x is not a prime number.
(4) If x is not a prime number then x is odd

Ans: (1)

3. The simplified form of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is

- (1) i (2) -1
(3) 1 (4) 0

Ans: (4)

4. The coefficient of variation of two distributions are 60 and 70. the standard deviation are 21 and 16 respectively, then their mean is

- (1) 22.85 (2) 28.25
(3) 23 (4) 35

Ans: (1, 4)

5. The slope of the tangent to the curve

$$x = t^2 + 3t - 8, y = 2t^2 - 2t - 5 \text{ at the point } (2, -1) \text{ is}$$

- (1) $-\frac{6}{7}$ (2) $\frac{7}{6}$
(3) $\frac{6}{7}$ (4) $\frac{22}{7}$

Ans: (3)

6. Suppose $\vec{a} + \vec{b} + \vec{c} = 0, |\vec{a}| = 3, |\vec{b}| = 5, |\vec{c}| = 7$, then

the angle between \vec{a} & \vec{b} is

- (1) $\pi/4$ (2) $\pi/3$
(3) $\pi/2$ (4) π

Ans: (2)

7. Let $*$ be a binary operation defined on R by $a * b =$

$$\frac{a+b}{4} \forall a, b \in R \text{ then the operation } * \text{ is}$$

- (1) Neither Associative nor commutative
(2) Associative but not commutative
(3) Commutative but not Associative
(4) Commutative and Associative

Ans: (3)

8. if $x^m y^n = (x+y)^{m+n}$ then $\frac{dy}{dx}$ is equal to

- (1) $\frac{y}{x}$ (2) 0
(3) xy (4) $\frac{x+y}{xy}$

Ans: (1)

9. If $y = e^{\sin^{-1}(t^2-1)}$ & $x = e^{\sec^{-1}\left(\frac{1}{t^2-1}\right)}$ then $\frac{dy}{dx}$ is equal to

- (1) $-\frac{x}{y}$ (2) $\frac{y}{x}$
(3) $-\frac{y}{x}$ (4) $\frac{x}{y}$

Ans: (3)

10. If $1 + \sin \theta + \sin^2 \theta + \dots$ upto $\infty = 2\sqrt{3} + 4$, then $\theta =$ _____

- (1) $3\pi/4$ (2) $\pi/3$
(3) $\pi/4$ (4) $\pi/6$

Ans: (2)

11. The order and degree of the differential equation

$$\left[1 + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right)\right]^{3/4} = \frac{d^2y}{dx^2}$$

- (1) order = 2
degree = not defined (2) order = 2
degree = $\frac{3}{4}$
(3) order = 2
degree = 4 (4) order = 2
degree = 3

Ans: (1)

12. The value of $\sin^{-1}\left(\cos\frac{53\pi}{5}\right)$ is

- (1) $\frac{-\pi}{10}$ (2) $\frac{\pi}{10}$
 (3) $\frac{-3\pi}{5}$ (4) $\frac{3\pi}{5}$

Ans: (1)

13. If $a = 3, b = 4, c = 5$ each one of \vec{a}, \vec{b} & \vec{c} is perpendicular to the sum of the remaining then

$|\vec{a} + \vec{b} + \vec{c}|$ is equal to

- (1) $\sqrt{5}$ (2) $5\sqrt{2}$
 (3) $\frac{2}{\sqrt{5}}$ (4) $\frac{5}{\sqrt{2}}$

Ans: (2)

14. The real part of $(1 - \cos\theta + i\sin\theta)^{-1}$ is

- (1) $\cot\frac{\theta}{2}$ (2) $\tan\frac{\theta}{2}$
 (3) $\frac{1}{1 + \cos\theta}$ (4) $\frac{1}{2}$

Ans: (4)

15. Area lying between the curves $y^2 = 2x$ and $y = x$ is

- (1) $\frac{3}{4}$ sq.units (2) $\frac{1}{4}$ sq.units
 (3) $\frac{1}{3}$ sq.units (4) $\frac{2}{3}$ sq.units

Ans: (4)

16. If the straight lines $2x + 3y - 3 = 0$ and $x + ky + 7 = 0$ are perpendicular, then the value of k is

- (1) $-3/2$ (2) $-2/3$
 (3) $3/2$ (4) $2/3$

Ans: (2)

17. If $A = \frac{1}{\pi} \begin{bmatrix} \sin^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & \cot^{-1}(\pi x) \end{bmatrix}, B = \frac{1}{\pi} \begin{bmatrix} -\cos^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right) \\ \sin^{-1}\left(\frac{x}{\pi}\right) & -\tan^{-1}(\pi x) \end{bmatrix}$

then $A - B$ is equal to

- (1) $\frac{1}{2}I$ (2) $2I$
 (3) 0 (4) I

Ans: (1)

18. The set A has 4 elements and the set B has 5 elements then the number of injective mappings that can be defined from A to B is

- (1) 120 (2) 60
 (3) 72 (4) 144

Ans: (1)

19. Integrating factor of $x \frac{dy}{dx} - y = x^4 - 3x$ is

- (1) $-x$ (2) $\frac{1}{x}$
 (3) $\log x$ (4) x

Ans: (2)

20. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then $A^2 - 5A$ is equal to

- (1) $-7I$ (2) $7I$
 (3) $-I$ (4) I

Ans: (1)

21. Two cards are drawn at random from a pack of 52 cards. The probability of these two being "Aces" is

- (1) $\frac{1}{13}$ (2) $\frac{1}{2}$
 (3) $\frac{1}{221}$ (4) $\frac{1}{26}$

Ans: (3)

22. The value of $\int_{-\pi/4}^{\pi/4} \sin^{103} x \cdot \cos^{101} x dx$ is

- (1) 0 (2) 2
 (3) $\left(\frac{\pi}{4}\right)^{101}$ (4) $(\pi/4)^{103}$

Ans: (1)

23. $\lim_{x \rightarrow 0} \frac{xe^x - \sin x}{x}$ is equal to

- (1) 2 (2) 0
(3) 1 (4) 3

Ans: (2)

24. If $x = 2 + 3 \cos \theta$ and $y = 1 - 3 \sin \theta$ represent a circle then the centre and radius is

- (1) $(-2, -1), 3$ (2) $(1, 2), \frac{1}{3}$
(3) $(2, 1), 3$ (4) $(2, 1), 9$

Ans: (3)

25. If $\sin^{-1} x + \sin^{-1} y = \frac{\pi}{2}$, then x^2 is equal to

- (1) $\sqrt{1-y}$ (2) 0
(3) y^2 (4) $1 - y^2$

Ans: (4)

26. The value of the $\sin 1^\circ + \sin 2^\circ + \dots + \sin 359^\circ$ is equal to

- (1) 180 (2) -1
(3) 1 (4) 0

Ans: (4)

27. The 11th term in the expansion of $\left(x + \frac{1}{\sqrt{x}}\right)^{14}$ is

- (1) $\frac{x}{1001}$ (2) i
(3) $\frac{1001}{x}$ (4) $\frac{999}{x}$

Ans: (3)

28. If A is a matrix of order $m \times n$ and B is a matrix such that AB' and $B'A$ are both defined, the order of the matrix B is

- (1) $m \times n$ (2) $n \times m$
(3) $n \times n$ (4) $m \times m$

Ans: (1)

29. The differential coefficient of $\log_{10} x$ with respect to $\log_x 10$ is

- (1) $\frac{x^2}{100}$ (2) $(\log_x 10)^2$
(3) $-(\log_{10} x)^2$ (4) 1

Ans: (3)

30. The two curves $x^3 - 3xy^2 + 2 = 0$ and $3x^2y - y^3 = 2$

- (1) Cut at an angle $\pi/4$
(2) Cut at an angle $\pi/3$
(3) Cut each other at right angle
(4) Touch each other

Ans: (3)

31. If $\tan^{-1}(x^2 + y^2) = \alpha$ then $\frac{dy}{dx}$ is equal to

- (1) $-xy$ (2) $\frac{x}{y}$
(3) xy (4) $\frac{-x}{y}$

Ans: (4)

32. The rate of change of area of a circle with respect to its radius at $r = 2$ cms is

- (1) 4π (2) 2
(3) 2π (4) 4

Ans: (1)

33. $\int_0^{\pi/2} \frac{\sin^{1000} x dx}{\sin^{1000} x + \cos^{1000} x}$ is equal to

- (1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$
(3) 1 (4) 1000

Ans: (1)

34. The value of $\tan \frac{\pi}{8}$ is equal to

- (1) $1 - \sqrt{2}$ (2) $\frac{1}{\sqrt{2} + 1}$
(3) $\sqrt{2} + 1$ (4) $\frac{1}{2}$

Ans: (2)

35. The solution for the differential equation $\frac{dy}{y} + \frac{dx}{x} = 0$

is

- (1) $x + y = c$ (2) $xy = c$
(3) $\log x \cdot \log y = c$ (4) $\frac{1}{y} + \frac{1}{x} = c$

Ans: (2)

36. Find the co-ordinates of the foot of the perpendicular drawn from the origin to the plane $5y + 8 = 0$

- (1) $\left(0, -\frac{8}{5}, 0\right)$ (2) $\left(\frac{8}{25}, 0, 0\right)$
(3) $\left(0, \frac{8}{5}, 0\right)$ (4) $\left(0, -\frac{18}{5}, 2\right)$

Ans: (1)

37. The simplified form of $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$ is

equal to

- (1) π (2) $\frac{\pi}{2}$
(3) $\frac{\pi}{4}$ (4) 0

Ans: (3)

38. If $A = \begin{bmatrix} \cos 2\theta & -\sin 2\theta \\ \sin 2\theta & \cos 2\theta \end{bmatrix}$ and $A + A^T = I$

Where I is the unit matrix of 2×2 & A^T is the transpose of A , then the value of θ is equal to

- (1) $3\pi/2$ (2) π
(3) $\pi/3$ (4) $\pi/6$

Ans: (4)

39. The value of $\int \frac{e^{6\log x} - e^{5\log x}}{e^{4\log x} - e^{3\log x}} dx$ is equal to

- (1) $\frac{1}{x}$ (2) $\frac{3}{x^3}$
(3) $\frac{x^3}{3}$ (4) 0

Ans: (3)

40. If $3 \tan^{-1} x + \cot^{-1} x = \pi$ then x equal to

- (1) $1/2$ (2) -1
(3) 1 (4) 0

Ans: (3)

41. The value of $\int \frac{e^x (x^2 \tan^{-1} x + \tan^{-1} x + 1)}{x^2 + 1} dx$ is

equal to

- (1) $e^{\tan^{-1} x} + c$ (2) $\tan^{-1}(x^c) + c$
(3) $\tan^{-1}(e^x) + c$ (4) $e^x \tan^{-1} x + c$

Ans: (4)

42. The value of x if $x(\hat{i} + \hat{j} + \hat{k})$ is a unit vector is

- (1) $\pm \frac{1}{3}$ (2) ± 3
(3) $\pm \sqrt{3}$ (4) $\pm \frac{1}{\sqrt{3}}$

Ans: (4)

43. If $\cos \alpha, \cos \beta, \cos \gamma$ are the direction cosines of a vector \vec{a} , then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma$ is equal to

- (1) 0 (2) -1
(3) 3 (4) 2

Ans: (2)

44. If A is any square matrix of order 3×3 then $|3A|$ is equal to

- (1) $9|A|$ (2) $27|A|$
(3) $\frac{1}{3}|A|$ (4) $3|A|$

Ans: (2)

45. If x, y, z are not equal and $\neq 0, \neq 1$ the value of

$\begin{vmatrix} \log x & \log y & \log z \\ \log 2x & \log 2y & \log 2z \\ \log 3x & \log 3y & \log 3z \end{vmatrix}$ is equal to

- (1) $\log(x + y + z)$ (2) 0
(3) $\log(6xyz)$ (4) $\log(xyz)$

Ans: (2)

46. The function $f(x) = [x]$ where $[x]$ the greatest integer function is continuous at

- (1) -2 (2) 1
(3) 4 (4) 1.5

Ans: (4)

47. If $2\vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}|$ then the angle between \vec{a} & \vec{b} is

- (1) 60° (2) 90°
(3) 0° (4) 30°

Ans: (1)

48. The length of latus rectum of the parabola $4y^2 + 3x + 3y + 1 = 0$ is

- (1) $3/4$ (2) 12
(3) 7 (4) $4/3$

Ans: (1)

49. If $P(A \cap B) = 7/10$ $P(B) = 17/20$, where P stands for probability then $P(A|B)$ is equal to

- (1) $1/8$ (2) $14/17$
(3) $17/20$ (4) $7/8$

Ans: (2)

50. If x y z are all different and not equal to zero and

$$\begin{vmatrix} 1+x & 1 & 1 \\ 1 & 1+y & 1 \\ 1 & 1 & 1+z \end{vmatrix} = 0$$

then the value of

- $x^{-1} + y^{-1} + z^{-1}$ is equal to
(1) -1 (2) $-x - y - z$
(3) $x^{-1}y^{-1}z^{-1}$ (4) xyz

Ans: (1)

51. The value of $\int \frac{e^x(1+x)dx}{\cos^2(e^x \cdot x)}$ is equal to

- (1) $\cot(e^x) + c$ (2) $\tan(e^x) + c$
(3) $\tan(e^x \cdot x) + c$ (4) $-\cot(ex^x) + c$

Ans: (3)

52. Two dice are thrown simultaneously, the probability of obtaining a total score of 5 is

- (1) $\frac{1}{6}$ (2) $\frac{1}{9}$
(3) $\frac{1}{12}$ (4) $\frac{1}{18}$

Ans: (2)

53. If \vec{a} and \vec{b} are unit vectors then what is the angle between \vec{a} and \vec{b} for $\sqrt{3}\vec{a} - \vec{b}$ to be unit vector?

- (1) 90° (2) 60°
(3) 45° (4) 30°

Ans: (4)

54. The general solution of $\cot \theta + \tan \theta = 2$ is

- (1) $\theta = n\pi + (-1)^n \pi/8$ (2) $\theta = \frac{n\pi}{2} + (-1)^n \pi/6$
(3) $\frac{n\pi}{2} + (-1)^n \pi/4$ (4) $\theta = \frac{n\pi}{2} + (-1)^n \pi/8$

Ans: (3)

55. The vector equation of the plane which is at a distance of $3/\sqrt{14}$ from the origin and the normal from the origin is $2\hat{i} - 3\hat{j} + \hat{k}$ is

- (1) $\vec{r} \cdot (2\hat{i} + \hat{k}) = 3$ (2) $\vec{r} \cdot (\hat{i} + 2\hat{j}) = 3$
(3) $\vec{r} \cdot (\hat{i} + \hat{j} + \hat{k}) = 9$ (4) $\vec{r} \cdot (2\hat{i} - 3\hat{j} + \hat{k}) = 3$

Ans: (4)

56. The value of $\int_2^8 \frac{\sqrt{10-x}}{\sqrt{x} + \sqrt{10-x}} dx$ is

- (1) 3 (2) 8
(3) 0 (4) 10

Ans: (1)

57. The sum of 1st n terms of the series

$$\frac{1^2}{1} + \frac{1^2 + 2^2}{1+2} + \frac{1^2 + 2^2 + 3^2}{1+2+3} + \dots$$

- (1) $\frac{n(n-2)}{6}$ (2) $\frac{n(n-2)}{3}$
(3) $\frac{n(n+2)}{3}$ (4) $\frac{n+2}{3}$

Ans: (3)

58. If $x^y = e^{x-y}$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{1}{y} - \frac{1}{x-y}$ (2) $\frac{\log x}{(1 + \log x)^2}$

(3) $\frac{e^x}{x^{x-y}}$ (4) $\frac{\log x}{\log(x-y)}$

Ans: (2)

59. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 2x + 6$ which is a bijective mapping then $f^{-1}(x)$ is given by

(1) $6x + 2$ (2) $x - 3$

(3) $2x + 6$ (4) $\frac{x}{2} - 3$

Ans: (4)

60. The equation of the normal to the curve $(1 + x^2) = 2 - x$ where the tangent crosses x - axis is

(1) $x + 5y + 10 = 0$ (2) $5x + y + 10 = 0$

(3) $x - 5y - 10 = 0$ (4) $5x - y - 10 = 0$

Ans: (4)

**KCET – 2016 TEST PAPER WITH ANSWER KEY
 (HELD ON THURSDAY 5th MAY, 2016)**

PHYSICS

1. A galvanometer coil has a resistance of 50Ω and the meter shows full scale deflection for a current of 5 mA. This galvanometer is converted into voltmeter of range 0 - 20 V by connecting
- (1) 4050Ω in parallel with galvanometer
 - (2) 3950Ω in parallel with galvanometer
 - (3) 4050Ω in series with galvanometer
 - (4) 3950Ω in series with galvanometer

Ans: (4)

2. For what distance is ray optics is good approximation when the aperture is 4 mm and the wavelength of light is 400 nm ?
- (1) 30 m
 - (2) 18 m
 - (3) 40 m
 - (4) 24 m

Ans: (3)

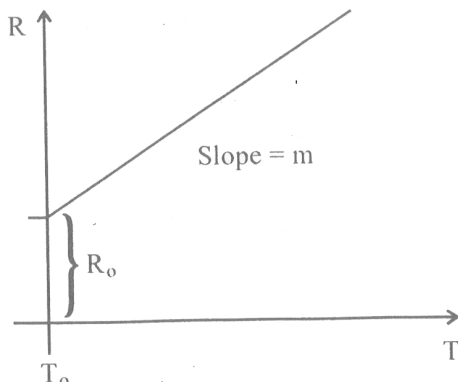
3. In the cyclotron, as radius of the circular path of the charged particle increases (ω = angular velocity, v = linear velocity)
- (1) v increases, ω decreases
 - (2) v increases, ω remains constant
 - (3) ω only increases, v remains constant
 - (4) both ω and v increases

Ans: (2)

4. Focal length of a convex lens is 20 cm and its RI is 1.5. it produces and erect, enlarged image if the distance of the object from the lens is
- (1) 20 cm
 - (2) 15 cm
 - (3) 30 cm
 - (4) 40 cm

Ans: (2)

5. Variation of resistance of the conductor with temperature is as shown



The temperature co-efficient (α) of the conductor is

- (1) $\frac{m}{R_0}$
- (2) $m^2 R_0$
- (3) $m R_0$
- (4) $\frac{R_0}{m}$

Ans: (1)

6. The rms value of current in a 50 Hz AC circuit is 6A. The average value of AC current over a cycle is

- (1) $\frac{6}{\pi\sqrt{2}}$
- (2) Zero
- (3) $\frac{3}{\pi\sqrt{2}}$
- (4) $6\sqrt{2}$

Ans: (2)

7. The component of a vector \vec{r} along x - axis will have a maximum value if

- (1) \vec{r} makes an angle of 45° with the x - axis
- (2) \vec{r} is along -ve y - axis
- (3) \vec{r} is along +ve y - axis
- (4) \vec{r} is along +ve x - axis

Ans: (4)

8. If \vec{E}_{ax} and \vec{E}_{eq} represents electric field at a point on the axial and equatorial line of a dipole. If points are at a distance r from the centre of the dipole, for $r \gg a$

- (1) $\vec{E}_{eq} = 2\vec{E}_{ax}$
- (2) $\vec{E}_{ax} = -2\vec{E}_{eq}$
- (3) $\vec{E}_{ax} = -\vec{E}_{eq}$
- (4) $\vec{E}_{ax} = \vec{E}_{eq}$

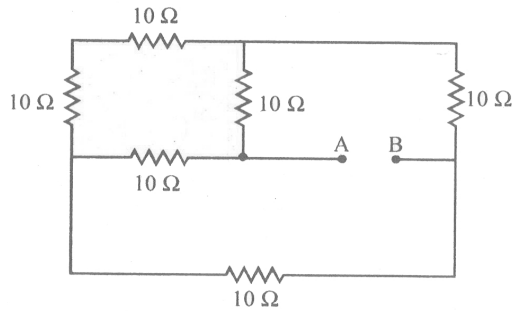
Ans: (2)

9. A spring is stretched by applying a load to its free end. The strain produced in the spring is

- (1) Longitudinal
- (2) Longitudinal & Shear
- (3) Shear
- (4) Volumetric

Ans: (2)

10. Effective resistnace between A and B in the following circuit



- (1) $\frac{20}{3} \Omega$ (2) 5Ω
 (3) 20Ω (4) 10Ω

Ans: (4)

11. At certain place, the horizontal component of earth's magnetic field is 3.0 G and the angle dip at that place is 30° . The magnetic field of earth at that location

- (1) 6.0 G (2) 3.5 G
 (3) 5.1 G (4) 4.5 G

Ans: (2)

12. Maximum acceleration of the train in which a 50 kg box lying on its floor will remain stationary (Given : μ - efficient of static friction between the box and the train's floor is 0.3 and $g = 10 \text{ ms}^{-2}$)

- (1) 15 ms^{-2} (2) 1.5 ms^{-2}
 (3) 3.0 ms^{-2} (4) 5.0 ms^{-2}

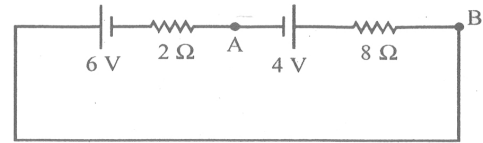
Ans: (3)

13. A capacitor of capacitance $10 \mu\text{F}$ is connected to an AC Source and an AC Ammeter. If the source voltage varies as $V = 50\sqrt{2} \sin 100 t$, the reading of the ammeter is

- (1) 7.07 mA (2) 5.0 mA
 (3) 70.7 mA (4) 50 mA

Ans: (4)

14. Potential difference between A and B in the following circuit



- (1) 6V (2) 2.8 V
 (3) 5.6 V (4) 4 V

Ans: (3)

15. A plane galss plate is placed over a various coloured letters (violet, green, yellow, red). The letter which appears to raised more

- (1) Violet (2) Green
 (3) Yellow (4) Red

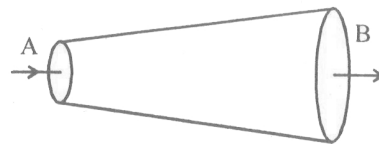
Ans: (1)

16. In a series L.C.R cirucit, the potential drop across L, C and R respectively are 40 V, 120 V and 60 V. Then the source voltage is

- (1) 100 V (2) 180 V
 (3) 160 V (4) 220 V

Ans: (1)

17. An ideal fluid flows through a pipe of circular cross section with diameters 5 cm and 10 cm as shown. The ratio of velocities of fluid at A and B is



- (1) 1 : 2 (2) 2 : 1
 (3) 1 : 4 (4) 4 : 1

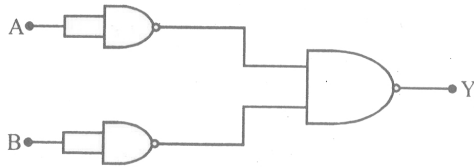
Ans: (4)

18. A body falls freely for 10 sec. Its average velocity during this journey (take $g = 10 \text{ ms}^{-2}$)

- (1) 5 ms^{-1} (2) 50 ms^{-1}
 (3) 10 ms^{-1} (4) 100 ms^{-1}

Ans: (2)

19. Identify the logic operation carried out by the following circuit



- (1) OR (2) NOR
(3) NAND (4) AND

Ans: (1)

20. Total energy of electron in an excited state of hydrogen atom is -3.4 eV. The kinetic and potential energy of electron in this state

- (1) $K = +10.2$ eV $U = -13.6$ eV
(2) $K = -6.8$ eV $U = +3.4$ eV
(3) $K = 3.4$ eV $U = -6.8$ eV
(4) $K = -3.4$ eV $U = -6.8$ eV

Ans: (3)

21. A ray of light suffers a minimum deviation when incident on an equilateral prism of refractive index $\sqrt{2}$. The angle of incidence is

- (1) 50° (2) 60°
(3) 45° (4) 30°

Ans: (3)

22. A particle of mass 1 gm and charge $1\mu\text{C}$ is held at rest on a frictionless horizontal surface at distance 1 m from the fixed charge 2 mC. If the particle is released, it will be repelled. The speed of the particle when it is at a distance of 10 m from the fixed charge

- (1) 180 ms^{-1} (2) 90 ms^{-1}
(3) 100 ms^{-1} (4) 60 ms^{-1}

Ans: (1)

23. Two heating coils of resistances $10\ \Omega$ and $20\ \Omega$ are connected in parallel and connected to a battery of emf 12 V and internal resistance $1\ \Omega$. The power consumed by them are in the ratio

- (1) $4 : 1$ (2) $2 : 1$
(3) $1 : 3$ (4) $1 : 4$

Ans: (2)

24. A radio - active sample of half - life 10 days contains 1000 x nuclei. Number of original nuclei present after 5 days is

- (1) 250 x (2) 500 x
(3) 750 x (4) 707 x

Ans: (4)

25. In young's double slit experiment the source is white light. One slit is covered with red filter and the other with blue filter. There shall be

- (1) No interference
(2) Alternate dark & yellow fringes
(3) Alternate dark & pink fringes
(4) Alternate red & blue fringes

Ans: (1)

26. In a transistor, the collector current varies by 0.49 mA and emitter current varies by 0.50 mA. Current gain β measured is

- (1) 100 (2) 99
(3) 150 (4) 49

Ans: (4)

27. A wheel with 10 spokes each of length ' L ' m is rotated with a uniform angular velocity ' ω ' in a plane normal to the magnetic field ' B '. The emf induced between the axle and the rim of the wheel

- (1) $N\omega BL^2$ (2) ωbL^2
(3) $\frac{1}{2}\omega BL^2$ (4) $\frac{1}{2}N\omega BL^2$

Ans: (3)

28. Four rods with different radii r and length l are used to connect two heat reservoirs at different temperature. Which one will conduct most heat?

- (1) $r = 2$ cm, $l = \frac{1}{2}$ m (2) $r = 2$ cm, $l = 2$ m
(3) $r = 1$ cm, $l = \frac{1}{2}$ m (4) $r = 1$ cm, $l = 1$ m

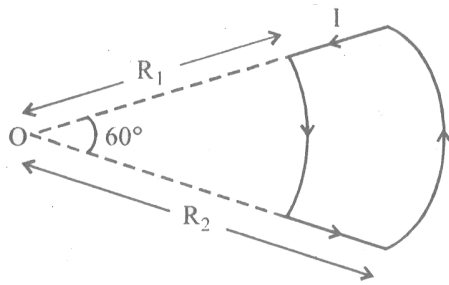
Ans: (1)

29. Mobility of free electrons in a conductor is

- (1) Inversely proportional to relaxation time.
(2) Inversely proportional to electron density
(3) Directly proportional to relaxation time
(4) Directly proportional to electron density

Ans: (3)

30. A conducting wire carrying current is arranged as shown. The magnetic field at 'O'



- (1) $\frac{\mu_0 i}{6} \left[\frac{1}{R_1} + \frac{1}{R_2} \right]$ (2) $\frac{\mu_0 i}{6} \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$
 (3) $\frac{\mu_0 i}{12} \left[\frac{1}{R_1} + \frac{1}{R_2} \right]$ (4) $\frac{\mu_0 i}{12} \left[\frac{1}{R_1} - \frac{1}{R_2} \right]$

Ans: (4)

31. A proton is projected with a uniform velocity 'v' along the axis of a current carrying solenoid, then

- (1) The proton will continue to move with velocity 'v' along the axis.
 (2) The proton move along helical path
 (3) The proton path will be circular about the axis
 (4) The proton will be accelerated along the axis

Ans: (1)

32. In a series L.C.R circuit an alternating emf (v) and current (i) are given by the equation $v = v_0 \sin \omega t, i = i_0 \sin \left(\omega t + \frac{\pi}{3} \right)$

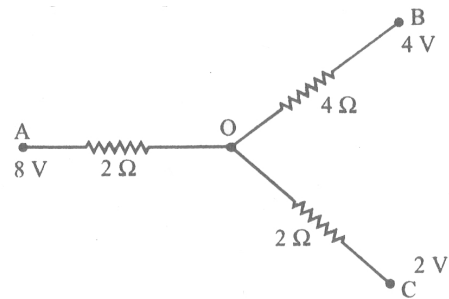
$$v = v_0 \sin \omega t, i = i_0 \sin \left(\omega t + \frac{\pi}{3} \right)$$

The average power dissipated in the circuit over a cycle of AC is

- (1) Zero (2) $\frac{\sqrt{3}}{2} v_0 i_0$
 (3) $\frac{v_0 i_0}{4}$ (4) $\frac{v_0 i_0}{2}$

Ans: (3)

33. In the following network potential at 'O';



- (1) 4.8 V (2) 6 V
 (3) 3 V (4) 4 V

Ans: (1)

34. Electromagnetic radiation used to sterilise milk is

- (1) Radiowaves (2) UV rays
 (3) γ - ray (4) X - ray

Ans: (2)

35. x_1 and x_2 are susceptibility of a paramagnetic material at temperatures $T_1 K$ and $T_2 K$ respectively, then

- (1) $x_1 \sqrt{T_1} = x_2 \sqrt{T_2}$ (2) $x_1 T_2 = x_2 T_1$
 (3) $x_1 T_1 = x_2 T_2$ (4) $x_1 = x_2$

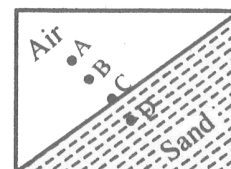
Ans: (3)

36. A nucleus of mass 20 u emits a γ photon of energy 6 MeV. If the emission assume to occur when nucleus is free and rest, then the nucleus will have kinetic energy nearest to (take $1 u = 1.6 \times 10^{-27} \text{ kg}$)

- (1) 100 KeV (2) 0.1 KeV
 (3) 1 KeV (4) 10 KeV

Ans: (3)

37. Which of the points is likely position of the centre of mass of the system shown in the figure



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

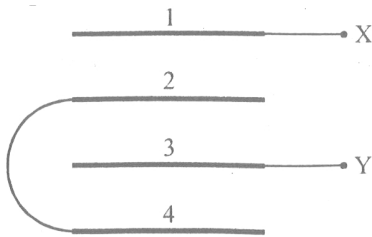
Ans: (3)

38. The de Broglie wavelength of an electron accelerated to a potential of 400 V is approximately

- (1) 0.06 nm (2) 0.12 nm
 (3) 0.04 nm (4) 0.03 nm

Ans: (1)

39. Four metal plates are arranged as shown. Capacitance between X and Y (A → Area of each plate, d → distance between the plates)



- (1) $\frac{3\epsilon_0 A}{d}$ (2) $\frac{2\epsilon_0 A}{3d}$
 (3) $\frac{2\epsilon_0 A}{d}$ (4) $\frac{3\epsilon_0 A}{2d}$

Ans: (2)

40. A 12 kg bomb at rest explodes into two pieces of 4 kg and 8 kg. If the momentum of 4 kg piece is 20 Ns, the kinetic energy of the 8 kg piece is

- (1) 40 J (2) 50 J
 (3) 20 J (4) 25 J

Ans: (4)

41. If there are only one type of charge in the universe, then

(\vec{E} → Electric field, \vec{ds} → Area vector)

- (1) $\oint \vec{E} \cdot d\vec{s} = 0$ if charge is outside = $\frac{q}{\epsilon_0}$ if charge is inside
 (2) $\oint \vec{E} \cdot d\vec{s} = \infty$ if charge is inside
 (3) $\oint \vec{E} \cdot d\vec{s}$ could not be defined
 (4) $\oint \vec{E} \cdot d\vec{s} \neq 0$ on any surface

Ans: (1)

42. When electron jumps from $n = 4$ level to $n = 1$ level, the angular momentum of electron changes by

- (1) $\frac{4h}{2\pi}$ (2) $\frac{3h}{2\pi}$
 (3) $\frac{2h}{2\pi}$ (4) $\frac{h}{2\pi}$

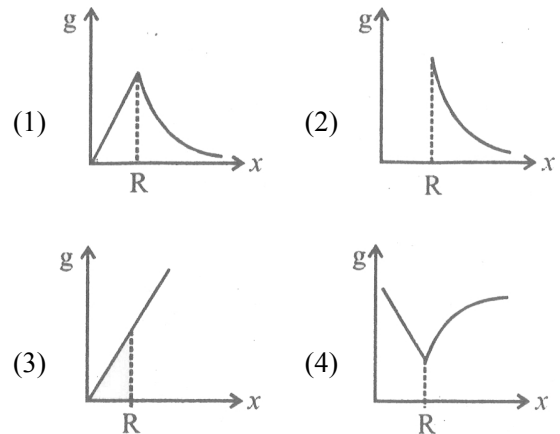
Ans: (2)

43. Constant DC voltage is required from a variable AC voltage. Which of the following is correct order of operation ?

- (1) Filter, regulator, rectifier
 (2) Rectifier, filter, regulator
 (3) Rectifier, regulator, filter
 (4) Regulator, filter, rectifier

Ans: (2)

44. Variation of acceleration due to gravity (g) with distance x from the centre of the earth is best represented by (R → Radius of the earth)



Ans: (1)

45. A particle executing SHM has a maximum speed of 0.5 ms^{-1} and maximum acceleration of 1.0 ms^{-2} . The angular frequency of oscillation is

- (1) $0.5\pi \text{ rad s}^{-1}$ (2) $2\pi \text{ rad s}^{-1}$
 (3) 0.5 rad s^{-1} (4) 2 rad s^{-1}

Ans: (4)

46. A source of sound is moving with a velocity of 50 ms^{-1} towards a stationary observer. The observer measures the frequency of sound as 500 Hz. The apparent frequency of sound as heard by the observer when source is moving away from him with the same speed is (Speed of sound at room temperature 350 ms^{-1})

- (1) 177.5 Hz (2) 375 Hz
(3) 666 Hz (4) 400 Hz

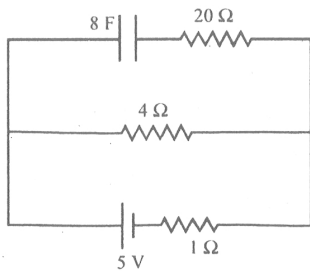
Ans: (2)

47. An electron of mass m , charge e falls through a distance h meter in a uniform electric field E . Then time of fall

- (1) $t = \frac{2eE}{hm}$ (2) $t = \sqrt{\frac{2eE}{hm}}$
(3) $t = \frac{2hm}{eE}$ (4) $t = \sqrt{\frac{2hm}{eE}}$

Ans: (4)

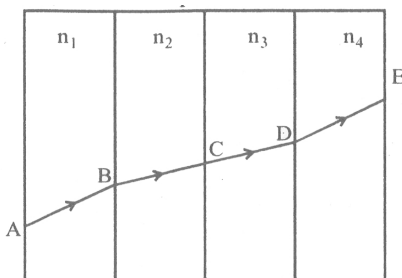
48. A capacitor of 8 F is connected as shown. Charge on the plates of the capacitor



- (1) 80 C (2) 0 C
(3) 40 C (4) 32 C

Ans: (4)

49. A ray of light passes through four transparent media with refractive index n_1, n_2, n_3 and n_4 as shown. The surfaces of all media are parallel



If the emergent ray DE is parallel to incident ray AB , then

- (1) $n_1 = \frac{n_2 n_3 n_4}{3}$ (2) $n_3 = n_4$
(3) $n_2 = n_4$ (4) $n_1 = n_4$

Ans: (4)

50. Three bodies a ring (R), a solid cylinder (C) and a solid sphere (S) having same mass and same radius roll down the inclined plane without slipping. They start from rest, if V_R, V_C and V_S are velocities of respective bodies on reaching the bottom of the plane, then

- (1) $V_R > V_C > V_S$ (2) $V_R < V_C < V_S$
(3) $V_R < V_C < V_S$ (4) $V_R > V_C > V_S$

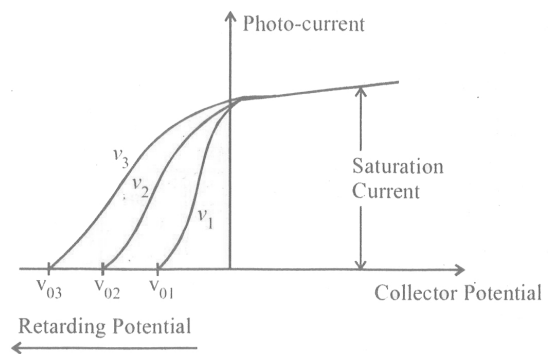
Ans: (2)

51. A Carnot engine working between 300 K and 400 K has 800 J of useful work. The amount of heat energy supplied to the engine from the source is

- (1) 3600 J (2) 1200 J
(3) 3200 J (4) 2400 J

Ans: (3)

52. The variation of photo-current with collector potential for different frequencies of incident radiation ν_1, ν_2 and ν_3 is as shown in the graph, then



- (1) $\nu_3 = \frac{\nu_1 + \nu_2}{2}$ (2) $\nu_1 < \nu_2 < \nu_3$
(3) $\nu_1 > \nu_2 > \nu_3$ (4) $\nu_1 = \nu_2 = \nu_3$

Ans: (2)

53. The process of super imposing message signal on high frequency carrier wave is called

- (1) Modulation (2) Transmission
(3) Demodulation (4) Amplification

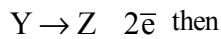
Ans: (1)

54. Nature of equipotential surface for a point charge is

- (1) Plane with charge on the surface.
(2) Sphere with charge on the surface of the sphere.
(3) Sphere with charge at the centre of the sphere.
(4) Ellipsoid with charge at foci.

Ans: (3)

55. An element X decays into element Z by two-step process.



- (1) X & Z are isotopes. (2) X & Z are isotones.
(3) X & Y are isotopes. (4) X & Z are isobars.

Ans: (1)

56. Light of wavelength 600 nm is incident normally on a slit of width 0.2 mm . The angular width of central maxima in the diffraction pattern is

(measured from minimum to minimum)

- (1) $4.5 \times 10^{-3} \text{ rad}$ (2) $2.4 \times 10^{-3} \text{ rad}$
(3) $4 \times 10^{-3} \text{ rad}$ (4) $6 \times 10^{-3} \text{ rad}$

Ans: (4)

57. A long solenoid with 40 turns per cm carries a current of 1 A. The magnetic energy stored per unit volume is _____ J/m^3 .

- (1) 6.4π (2) 1.6π
(3) 32π (4) 3.2π

Ans: (4)

58. A pan filled with hot food cools from 94°C to 86°C in 2 minutes. When the room temperature is 20°C . How long will it cool from 74°C to 66°C ?

- (1) 1.8 minutes (2) 2.5 minutes
(3) 2.8 minutes (4) 2 minutes

Ans: (3)

59. Three projectiles A, B and C are projected at an angle of 30° , 45° , 60° respectively. If R_A , R_B and R_C are ranges of A, B and C respectively, then (velocity of projection is same for A, B & C)

- (1) $R_A = R_C < R_B$ (2) $R_A < R_B < R_C$
(3) $R_A = R_C > R_B$ (4) $R_A = R_B = R_C$

Ans: (1)

60. The quantity of a charge that will be transferred by a current flow of 20 A over 1 hour 30 minutes period is

- (1) $1.8 \times 10^4 \text{ C}$ (2) $5.4 \times 10^3 \text{ C}$
(3) $10.8 \times 10^4 \text{ C}$ (4) $10.8 \times 10^3 \text{ C}$

Ans: (3)

**KCET – 2016 TEST PAPER WITH ANSWER KEY
(HELD ON THURSDAY 5th MAY, 2016)**

CHEMISTRY

1. The property which is not true about Fluorine is,

- (1) High F-F bond dissociation enthalpy
- (2) Highest electronegativity
- (3) It forms only one oxo acid
- (4) Most of its reactions are exothermic

Ans: (1)

2. HCl gas is covalent and NaCl is an ionic compound. this is because

- (1) Electronegativity difference between H and Cl is less than 2.1
- (2) HCl is a gas
- (3) Hydrogen is a non - metal
- (4) Sodium is highly electro +Ve.

Ans: (1)

3. Van -- Arkel method of refining Zirconium involves,

- (1) Removing silica impurity
- (2) Removing Hydrogen impurity
- (3) Removing CO impurity
- (4) Removing all oxygen and nitrogen impurities

Ans: (4)

4. A liquid can exist only,

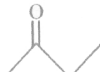
- (1) Between boiling and melting points
- (2) Between melting point and critical point
- (3) At any temperature above melting point
- (4) Between triple point and critical point

Ans: (4)

5. Predict the product 'C' in the following series of reactions:



- (1) $(\text{CH}_3)_2\text{C}(\text{OH})\text{C}_6\text{H}_5$ (2) $\text{CH}_3\text{CH}(\text{OH})\text{C}_2\text{H}_5$

- (3) $\text{CH}_3\text{CH}(\text{OH})\text{C}_6\text{H}_5$ (4) 

Ans: (1)

6. When a brown compound of Mn (A) is treated with HCl, it gives a gas (B). The gas (B) taken in excess reacts with NH_3 to give an explosive compound (C).

The compounds A, B and C are;

- (1) $\text{A} = \text{MnO}_3, \text{B} = \text{Cl}_2, \text{C} = \text{NCl}_2$
- (2) $\text{A} = \text{Mn}_3\text{O}_4, \text{B} = \text{Cl}_2, \text{C} = \text{NCl}_3$
- (3) $\text{A} = \text{MnO}, \text{B} = \text{Cl}_2, \text{C} = \text{NH}_4\text{Cl}$
- (4) $\text{A} = \text{MnO}_2, \text{B} = \text{Cl}_2, \text{C} = \text{NCl}_3$

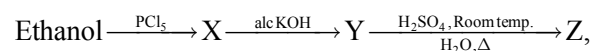
Ans: (4)

7. The contribution of particle at the edge centre to a particular unit cell is,

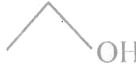
- (1) $\frac{1}{8}$ (2) 1
- (3) $\frac{1}{4}$ (4) $\frac{1}{2}$

Ans: (3)

8. In the reaction

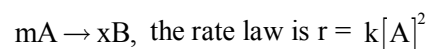


the product Z is,

- (1)  (2) $\text{CH}_3\text{CH}_2\text{OSO}_3\text{H}$
- (3) $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ (4) C_2H_4

Ans: (1)

9. For a chemical reaction,



If the concentration of A is doubled, the reaction rate will be,

- (1) Unchanged (2) Increases by 8 times
- (3) Quadrupled (4) Doubled

Ans: (3)

10. In the reaction; $\text{Fe}(\text{OH})_{3(s)} \rightleftharpoons \text{Fe}^{3+}(\text{aq}) + 3\text{OH}^{-}(\text{aq})$,

if the concentration of OH^{-} ions is decreased by $\frac{1}{4}$

times, then the equilibrium concentration of Fe^{3+} will increase by,

- (1) 4 times (2) 64 times
(3) 16 times (4) 8 times

Ans: (2)

11. The shape of XeF_6 is,

- (1) Pyramidal (2) Square pyramidal
(3) Distorted octahedral (4) Square planar

Ans: (3)

12. When an electrolyte is dissociated in solution, the van't Hoff's factor (i) is,

- (1) = 1 (2) = 0
(3) < 1 (4) > 1

Ans: (4)

13. Mn^{2+} compounds are more stable than Fe^{2+} compounds towards oxidation to their +3 state, because

- (1) Mn^{2+} does not exist
(2) Mn^{2+} has completely filled d - orbitals
(3) Mn^{2+} is bigger in size
(4) Mn^{2+} is more stable with high 3rd ionisation energy

Ans: (4)

14. The number of oxygen atoms in 4.4 gm of CO_2 is,

- (1) 12×10^{23} (2) 6×10^{23}
(3) 6×10^{22} (4) 1.2×10^{23}

Ans: (4)

15. An organic compound A on reduction gives compound B, which on reaction with trichloro methane and caustic potash forms C. The compound 'C' on catalytic reduction gives N - methyl benzenamine, the compound 'A' is

- (1) Benzenamine (2) Methanamine
(3) Nitromethane (4) Nitrobenzene

Ans: (4)

16. Which of the following sequence is correct regarding field strength of ligands as per spectrochemical series ?

- (1) $\text{SCN}^{-} < \text{CO} < \text{F}^{-} < \text{CN}^{-}$
(2) $\text{CN}^{-} < \text{F}^{-} < \text{CO} < \text{SCN}^{-}$
(3) $\text{F}^{-} < \text{SCN}^{-} < \text{CN}^{-} < \text{CO}$
(4) $\text{SCN}^{-} < \text{F}^{-} < \text{CN}^{-} < \text{CO}$

Ans: (4)

17. Schottky defect in a crystal is observed when,

- (1) No ion is missing from its lattice site
(2) An ion leaves its normal site and occupies an interstitial site
(3) Equal number of cations and anions are missing from the lattice
(4) Unequal number of cations and anions are missing from the lattice

Ans: (3)

18. The half - life period of a 1st order reaction is 60 minutes. What percentage will be left over after 240 minutes?

- (1) 6% (2) 5%
(3) 4.25% (4) 6.25%

Ans: (4)

19. Electrophile that participates in nitration of benzene is

- (1) NO_3^{-} (2) NO
(3) NO_2^{+} (4) NO^{+}

Ans: (3)

20. Which of the following is correct about H - bonding in DNA?

- (1) A - A, T - T (2) G - T, A - C
(3) A - G, T - C (4) A - T, G - C

Ans: (4)

21. The energy of electron in the nth bohr orbit of H - atom is

- (1) $\frac{-13.6}{n^3} \text{eV}$ (2) $\frac{-13.6}{n^4} \text{eV}$
(3) $\frac{-13.6}{n} \text{eV}$ (4) $\frac{-13.6}{n^2} \text{eV}$

Ans: (4)

22. Benzene carbaldehyde is reacted with concentrated NaOH solution to give the products A and B. The product A can be used food preservative and the product B is an aromatic hydroxy compound where OH group is linked to sp^3 hybridised carbon atom next to Benzene ring. The product A and B are respectively.

- (1) Sodium benzoate and picric acid
- (2) Sodium benzoate and cresol
- (3) Sodium benzoate and phenyl methanol
- (4) Sodium benzoate and phenol

Ans: (3)

23. The correct statement regarding entropy is

- (1) At 0°C the entropy of a perfect crystalline solid is zero.
- (2) At absolute zero temperature, the entropy of all crystalline substances is zero
- (3) At absolute zero temperature, the entropy of a perfectly crystalline substance is +Ve
- (4) At absolute zero temperature, entropy of a perfectly crystalline solid is zero.

Ans: (4)

24. Reactivity of order of halides for dehydrohalogenation is

- (1) $\text{F} - \text{F} > \text{R} - \text{I} > \text{R} - \text{Br} > \text{R} - \text{Cl}$
- (2) $\text{R} - \text{I} > \text{R} - \text{Cl} > \text{R} - \text{Br} > \text{R} - \text{F}$
- (3) $\text{R} - \text{I} > \text{R} - \text{Br} > \text{R} - \text{Cl} > \text{R} - \text{F}$
- (4) $\text{R} - \text{F} > \text{R} - \text{Cl} > \text{R} - \text{Br} > \text{R} - \text{I}$

Ans: (3)

25. Consider the following sets of quantum numbers:

Which of the below setting is not permissible arrangement of electrons in an atom?

- | | n | l | m | s |
|-----|---|---|----|----------------|
| (1) | 3 | 2 | -3 | $+\frac{1}{2}$ |
| (2) | 3 | 2 | -2 | $-\frac{1}{2}$ |
| (3) | 5 | 3 | 0 | $+\frac{1}{2}$ |
| (4) | 4 | 0 | 0 | $-\frac{1}{2}$ |

Ans: (1)

26. An organic compound contains C = 40%, H = 13.33% and N = 46.67%. It's empirical formula is

- (1) CHN
- (2) CH_4N
- (3) $\text{C}_3\text{H}_7\text{N}$
- (4) $\text{C}_2\text{H}_2\text{N}$

Ans: (2)

27. The bivalent metal ion having maximum paramagnetic behaviour among the first transition series elements is

- (1) Cu^+
- (2) Sc^{2+}
- (3) Cu^{2+}
- (4) Mn^{2+}

Ans: (4)

28. The activation energy of a chemical reaction can be determined by,

- (1) evaluating rate constant at standard temperature.
- (2) evaluating the concentration of reactants at two different temperatures.
- (3) changing the concentration of reactants.
- (4) evaluating rate constants at two different temperatures.

Ans: (4)

29. An organic compound X is oxidised by using acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution. The product obtained reacts with phenyl hydrazine but does not answer silver mirror test. The compound X is,

- (1) $\text{CH}_3\text{CH}_2\text{CH}_3$
- (2) Ethanol
- (3) Ethanal
- (4) 2 - propanol

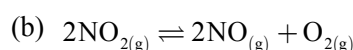
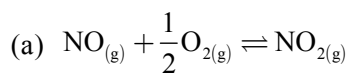
Ans: (4)

30. The composition of 'copper matte' is,

- (1) $\text{Cu}_2\text{O} + \text{FeS}$
- (2) $\text{Cu}_2\text{S} + \text{FeO}$
- (3) $\text{Cu}_2\text{S} + \text{Cu}_2\text{O}$
- (4) $\text{Cu}_2\text{S} + \text{FeS}$

Ans: (4)

31. Equilibrium constants K_1 and K_2 for the following equilibria



(1) $K_2 = \frac{1}{K_1^2}$ (2) $K_1 = 2K_2$

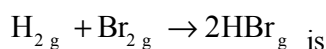
(3) $K_2 = \frac{1}{K_1}$ (4) $K_1 = \sqrt{K_2}$

Ans: (1)

32. As per IUPAC norms, the name of the complex $[\text{Co}(\text{en})_2(\text{ONO})\text{Cl}]\text{Cl}$ is
- (1) Chloro ethylene diamine nitro-o-cobalt (III) chloride.
 - (2) Chlorido di(ethylene diamine) nitro cobalt (III) chloride.
 - (3) Chloro bis(ethylene diamine) nitro-o-cobalt (III) chloride.
 - (4) Chlorido bis(ethane-1, 2 - diamine) nitro-o-cobalt (III) chloride

Ans: (4)

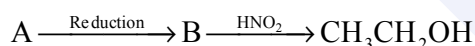
33. If the bond energies of H-H, Br-Br and H-Br are 433, 192 and 364 kJ mol⁻¹ respectively, then ΔH for the reaction :



- (1) - 103 kJ
- (2) +261 kJ
- (3) +103 kJ
- (4) -261 kJ

Ans: (1)

34. In the following sequence of reactions ;



The compound A is

- (1) CH₃NC
- (2) CH₃NO₂
- (3) Ethane nitrile
- (4) Propane nitrile

Ans: (3)

35. Which is true regarding nitrogen ?

- (1) Ability to form $p\pi - p\pi$ bonds with itself
- (2) d-orbitals are available
- (3) Has low ionisation enthalpy
- (4) Less electronegative

Ans: (1)

36. The hybridisation of C in diamond, graphite and ethyne is in the order

- (1) sp², sp³, sp
- (2) sp, sp², sp³
- (3) sp³, sp², sp
- (4) sp³, sp, sp²

Ans: (3)

37. A secondary cell is one

- (1) can not recharged.
- (2) can be recharged by passing current through it in the opposite direction.
- (3) can be recharged by passing current through it in the same direction.
- (4) can be recharged.

Ans: (2)

38. Which of the following is a polyamide ?

- (1) Buna-S
- (2) Polythene
- (3) Terylene
- (4) Nylon-6,6

Ans: (4)

39. Ethanol is converted into ethoxy ethane,

- (1) by treating with conc. H₂SO₄ at 273 K.
- (2) by treating with conc. H₂SO₄ at room temperature.
- (3) by heating Ethanol with excess of conc. H₂SO₄ at 443 K.
- (4) by heating excess of ethanol with conc. H₂SO₄ at 140 °C.

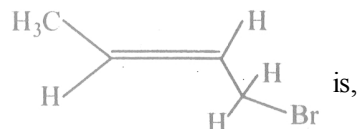
Ans: (4)

40. Which of the following is incorrect in a galvanic cell ?

- (1) The electrode at which electrons are lost is called cathode.
- (2) The electrode at which electrons are gained is called cathode.
- (3) Reduction occurs at cathode.
- (4) Oxidation occurs at anode.

Ans: (1)

41. IUPAC name of the compound



- (1) 1 -Bromo but-3-ene
- (2) Bromo butene
- (3) 2-Bromo-2-butene
- (4) 1 -Bromo but-2-ene

Ans: (4)

42. Which of the following is employed as Tranquilizer ?

- (1) Dettol
- (2) Tetracyclin
- (3) Naproxen
- (4) Equanil

Ans: (4)

43. A miscible mixture of C₆H₆ + CHCl₃ can be separated by

- (1) Crystallisation
- (2) Filtration
- (3) Distillation
- (4) Sublimation

Ans: (3)

44. The amount of current in Faraday is required for the reduction of 1 mol of Cr₂O₇²⁻ ions to Cr³⁺ is,

- (1) 4F
- (2) 6F
- (3) 2 F
- (4) 1 F

Ans: (2)

45. Sulphur sol contains

- (1) Water dispersed in Solid Sulphur
- (2) Large aggregates of S-molecules
- (3) Discrete S-molecules
- (4) Discrete S-atoms

Ans: (2)

46. Reactions in Zeolite catalyst depend on,

- (1) All of these
- (2) Size of cavity
- (3) Apertures
- (4) Pores

Ans: (1)

47. Replacement of Cl of Chlorobenzene to give phenol requires drastic conditions, but Cl of 2, 4 - dinitro chlorobenzene is readily replaced. This is because,

- (1) $-NO_2$ withdraws electrons from ortho and para positions.
- (2) $-NO_2$ donate electrons at meta position.
- (3) $-NO_2$ group withdraws electrons from meta position.
- (4) $-NO_2$ group makes the ring electron rich at ortho and para positions.

Ans: (1)

48. The reaction which involves dichlorocarbene as an electrophile is,

- (1) Fittig's reaction.
- (2) Friedel-Craft's acylation
- (3) Kolbe's reaction
- (4) Reimer-Tiemann reaction

Ans: (4)

49. Which of the following gives positive Fehling's solution test ?

- (1) Protein
- (2) Fats
- (3) Glucose
- (4) Sucrose

Ans: (3)

50. Osmotic pressure of the solution can be increased by,

- (1) diluting the solution.
- (2) increasing the volume of the vessel.
- (3) decreasing the temperature of the solution.
- (4) increasing the temperature of the solution.

Ans: (4)

51. Which of the following statements is incorrect w.r.t. Physisorption ?

- (1) $\Delta H_{\text{adsorption}}$ is low and +Ve.
- (2) Under high pressure it results into Multi-molecular layer on adsorbent surface.
- (3) More easily liquifiable gases are adsorbed easily.
- (4) The forces involved are van der Waal's forces.

Ans: (1)

52. Which of the following is not true ?

- (1) Natural rubber is 1, 4-polymer of isoprene.
- (2) Buna-S is a co-polymer of Butene and styrene.
- (3) Natural rubber has 'trans' configuration at every double bond.
- (4) In vulcanisation the rubber becomes harder and stronger.

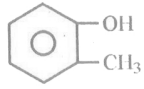
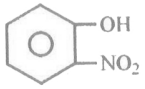
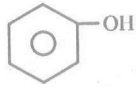
Ans: (2)

53. The number of isomers possible for the octahedral complex $[CoCl_2(en)(NH_3)_2]^+$ is,

- (1) Four isomers
- (2) No isomer
- (3) Three
- (4) Two

Ans: (1)

54. Which of the following compound is most acidic ?

- (1) 
- (2) 
- (3) 
- (4) $Cl - CH_2 - CH_2 - OH$

Ans: (2)

55. Main axis of diatomic molecule is Z. The orbitals P_x and P_y overlap to form

- (1) No bond is formed.
- (2) δ - molecular orbital
- (3) σ - molecular orbital
- (4) π - molecular orbital

Ans: (1)

56. The increasing order of bond order of O_2, O_2^+, O_2^- and O_2^{2-} is

- (1) $O_2^{2-}, O_2^-, O_2, O_2$
- (2) $O_2, O_2^+, O_2^-, O_2^{2-}$
- (3) O_2^-, O_2^-, O_2, O_2
- (4) $O_2^+, O_2, O_2^-, O_2^{2-}$

Ans: (1)

57. CO is a stronger ligand than Cl^- , because

- (1) CO is more reactive.
- (2) CO is poisonous.
- (3) CO has π -bonds.
- (4) CO is a neutral molecule.

Ans: (3)

58. $3A \rightarrow 2B$, rate of reaction $\frac{d B}{dt}$ is equal to

- (1) $-\frac{1}{3} \frac{d A}{dt}$
- (2) $2 \frac{d A}{dt}$
- (3) $-\frac{2}{3} \frac{d A}{dt}$
- (4) $-\frac{3}{2} \frac{d A}{dt}$

Ans: (3)

59. Which of the following is not a colligative property ?

- (1) Elevation in Boiling point
- (2) Depression in Freezing point
- (3) Optical activity
- (4) Osmotic pressure

Ans: (3)

60. The complex formed when Al_2O_3 is leached from Bauxite using concentrated NaOH solution is,

- (1) Na_2AlO_2
- (2) $Na_2[Al(OH)_3]$
- (3) $NaAl_2O_4$
- (4) $Na[Al(OH)_4]$

Ans: (4)