

BIO-TEGHNOLOGY 2006

Note:- Attempt 70 questions in all.

1. Section A is compulsory for all comprising 1-30 questions.
2. Section B is for Medical Stream comprising 31-70 questions.
3. Section C is for Non-medical Stream comprising 31-70 questions.

Section A' compulsory for all candidates

However candidates shall exercise their option to attempt questions either from section B or Section C.

The relevant box as given below has essentially to be tick-marked by a candidate that the question paper is evaluated as per the option offered by him/her, otherwise the question paper shall render redundant.

Section B
(Medical Stream)

Section C
(Non-medical Stream)

Section A

1. Which of the following is *not* a computer language ?

- (a) PASCAL
- (b) COBOL
- (c) LOTUS
- (d) BASIC

2. Decimal equivalent of binary number 1010 is

- (a) 2
- (b) 10
- (c) 13
- (d) 16

3. Which of the following is *not* a storage device?

- (a) Floppy
- (b) Hard disk
- (c) Register
- (d) ROM

4. Dimensions of moment of inertia are

- (a) ML^2T
- (b) $MOLoTl$
- (c) M^2LT
- (d) $MOLT^2$

5. Four resistors each of value. 4 ohm is connected as shown in figure. The equivalent resistance between points A and B is':



- (a) 1ohm
- (b) 3 ohm
- (c) 4 ohm
- (d) 16 ohm

6. An air bubble under water shines brightly because of the phenomenon of:

- (a) dispersion
- (b) interference
- (c) diffraction
- (d) total internal reflection

7. Balmer series in hydrogen ga~ spectrum is emitted when electro higher orbits to the:

- (a) first orbit
- (b) second orbit
- (c) third orbit
- (d) fourth orbit

8. The maximum height attained by a projectile equals its horizontal range. The angle with the horizontal with which it was projected is :

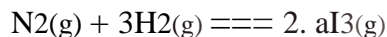
- (a) $\tan^{-1} 1$
- (b) $\tan^{-1} 2$
- (c) $\tan^{-1} 3$
- (d) $\tan^{-1} 4$

9. In a spherical bubble of radius R, the excess pressure is :

10. Which of the g the biggest ion?

- (a) Al^{3+}
- (b) Ba^{2+}
- (c) Mg^{2+}
- (d) Na^{+}

11. Conditions that will favour the exo e ic ammonia synthesis reaction:



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

12. Which one of the following is blue vitriol?

- (a) $CuSO_4 \cdot 7H_2O$
- (b) $CuSO_4 \cdot 5H_2O$

(c) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

(d) $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$

13. pH of 10^{-3} M HCl is :

(a) 2

(b) 3

(c) 4

(d) 11

14. An alcohol is formed when nitrous acid reacts with:

(a) CH_3NH_2

(b) $(\text{CH}_3)_2\text{NH}$

(c) $\text{CH}_3\text{NHC}_2\text{H}_5$

(d) $(\text{CH}_3)_3\text{N}$

15. The edible part of the fruit apple is :

(a) peduncle

(b) thalamus

(c) pericarp

(d) embryo

16. The F₂ ratio resulting from a dihybrid cross will be :

(a) 9 : 3 : 3 : 1

(b) 1 : 1

(c) 3 : 1

(d) 1 : 1 : 1 : 1

17. Application of gibberellic acid induces flowering in

(a) long day plants

(b) short day plants

(c) both (a), (b)

(d) neither of the two

18. The chief nitrogenous waste in human is

(a) urea

(b) ammonia

(c) uric acid

(d) ammonium nitrate

19. Fluid mosaic mode of biological membranes was given by

(a) Robert on

(b) Danielli and Davison

(c) Singer and Nicolson

(d) Gorter and Grendel

20. Phylum Annelida includes

(a) unsegmented triploblastic coelomates

- (b) unsegmented triploblastic acoelomates
- (c) segmented triploblastic coelomates
- (d) segmented triploblastic acoelomates

21. Which of the following is *not* correct ?

- (a) sucrose is a carbohydrate
- (b) ribonuclease is an enzyme
- (c) phosphorus is a component of DNA
- (d) anticodon is present on *rRNA*

22. The correct taxonomic hierarchy is reflected in :

- (a) phylum, class, order and family
- (b) kingdom, family, class and order
- (c) kingdom, family, order and class
- (d) kingdom, class, species and genus

23. The soil type with the poor water holding capacity is

- (a) silty
- (b) loamy
- (c) clay
- (d) sandy

24. The missing term in the series 2, 3, 5,, 12 is :

- (a) 7
- (b) 8
- (c) 9
- (d) 11

25. In a certain language WORK is coded as 4567 and MAN as 328, then in that Language WOMAN is coded as :

- (a) 43528
- (b) 82354
- (c) 32845
- (d) 45328

26. $\sin^2 38^\circ + \cos^2 38^\circ = ?$

- (a) $1/2$
- (b) 3.32
- (c) 1
- (d) $1/3$

27. In a right-angled triangle, the sides perpendicular to each other are 15 cm and 8 cm. Its perimeter is:

- (a) 46 cm
- (b) 60 cm
- (c) 120 cm
- (d) 40 cm

28. A alone completes a piece of work " days. If A and B work together the same work can be completed in 6 day . In how many days can B alone complete that work?

- (a) 24
- (b) 12
- (c) 7
- (d) 5

29. The critical temperarure a which an unsaturated air becomes saturated is called:

- (a) dew point
- (b) frost
- (c) condensaaation
- (d) absolute humidity

30. In the SARS

- (a) and
- (b) acute
- (c) asthma
- (d) anti

Section B

31. The uncertainty in the velocity of a ball of mass 100 g when its uncertainty in position is 1 Å is :

- (a) $3.24 * 10^{-24} \text{ m/s}$
- (b) $5.23 * 10^{-24}$
- (c) $6.14 * 10^{-12} \text{ m/s}$
- (d) 10^{-12}

32. Which of the following favours the pontaneity of change?

- (a) $\sim H$ is - ve
- (b) $\sim S$ is + ve
- (c) $\sim G$ is -ve
- (d) All of the above

33. EOfor a cell $Zn | Zn^{2+}(aq) || Cu^{2+}(aq) | Cu$ is 1.10 V at 25°C. The equilibrium constant for the reaction $Zn + Cu^{2+}(aq) = Cu + Zn^{2+}(aq)$ is of the order' of :

- (a) 10^{-28}
- (b) 10^{-37}
- (c) 10^{18}
- (d) 10^{17}

34. "In a given photochemical reaction, each molecule of a reaction absorbs only one quantum of radiation causing tha particular reaction." It is a statement of :

- (a) Stark-Einstein law

- (b) Lambert-Beer's law
- (c) Grothus-Draper law
- (d) None of the above

35. The decreasing order of stability of carbonium ions is given by

- (a) tertiary > primary > secondary
- (b) primary > secondary > tertiary
- (c) tertiary > secondary > primary
- (d) secondary > primary > tertiary

36. Glucose on warming with excess of phenyl hydrazine forms a yellow crystalline compound called :

- (a) fructose
- (b) glucosone
- (c) glucosazone
- (d) arabino e

37. The following reaction is an example of :



- (a) Perkin reaction
- (b) Witting reaction
- (c) Aldol condensation
- (d) Cannizaro reaction

38. Which of the following metal ions is green coloured ?

40. XeF_2 involves hybridization

- (a) sp^3d
- (b) dsp^2
- (c) sp^3d^2
- (d) sp^2

41. African sleeping sickness is caused by :

- (a) Giardia
- (b) Trypanosome
- (c) Trichomonas
- (d) Leishmania

42. The major immunoglobulin in normal human serum is

- (a) IgG
- (b) IgM
- (c) IgD
- (d) IgE

43. Which of the following *does not* secrete silk ?

- (a) *Bombyx mori*
- (b) *Apis indica*

- (c) *Attacus atlas*
- (d) *Apis indica*

44. Which of the following is meant for reproduction in *Taenia solium* ?

- (a) Scolex
- (b) Strobila
- (c) Rostellum
- (d) None of the above

45. The diploid number of an organism is 12. Number of chromosomes expected to be in monosomic is

- (a) 11
- (b) 10
- (c) 9
- (d) 13

46. Modern horse is

- (a) *Pliohippus*
- (b) *Equus*
- (c) *Merychippus*
- (d) *Mesohippus*

47. Loss of water as drops of liquid from the surface of plant is called :

- (a) Transpiration •
- (b) Evaporation
- (c) Guttation
- (d) Condensation

48. The main body of ovule is called:

- (a) nucellus
- (b) integument
- (c) embryo sac
- (d) micropyle

49. In pinus, each sporophyll of male cone has

- (a) one sporangia
- (b) two sporangia
- (c) four sporangia
- (d) eight sporangia

50. Tropopause separates troposphere from:

- (a) Stratosphere
- (b) Mesosphere
- (c) Thermosphere
- (d) Exosphere

51. "Growth is dependent on amount of food-stuff that is present in- minimum quantity" is a statement of :

- (a) Shelford's law
- (b) Liebig's law
- (c) Vant Hoffs law
- (d) None of the above

52. Which of the following is lotic system ?

- (a) lake
- (b) pond-
- (c) marshes
- (d) stream

53. The most mono-unsaturated fatty acids have double bond between:

- (a) C-8 and C-9
- (b) C-9 and C-10
- (c) C-10 and C-11
- (d) C-12 and C-13

54. Which of the following is sulfur containing amino acid ?

- (a) Leucine
- (b) Tyrosine
- (c) Serine
- (d) None of the above

55. The enzyme that moves along the DNA and separates the strands is

- (a) prnnase
- (b) helicase
- (c) topoisomerase
- (d) ligase

56. When the base composition of DNA from bacterium *Mycobacterium tuberculosis* was determined, 18% of the bases were found to be adenine. What is the [G] + [C] content ?

- (a) 18%
- (b) 32%
- (c) 36%
- (d) 64%

57. Red algae differ from the green algae and brown algae in having

- (a) no chlorophylla •
- (b) no differentiated cells
- (c) no phycocyanin within their cells
- (d) no flagellated stages in their life cycles

58. Oxy en content reduction makes the glycolyse(glycogenesis)intensity increased due

- (a) increase of ADP concentration in cell
- (b) increase of ...~AD+concentration in cell
- (c) increa e 0 ATP concentration in cell
- (d) increase of concentration of peroxides and free radicals

59. A bacterial m-R A ith a length of 360 nucleotides in length codes for a proteirr of :
- (a) roughly 360 amino acids
 - (b) roughly 1080 amino acids
 - (c) exactly 120 amino acids
 - (d) less than 120 amino acid
60. Nitrogen is fixed in ecosystems in ways stated below. One of the statements below is false. Which one?
- (a) by cyanobacteria
 - (b) by electrical discharges in the atmosphere
 - (c) by industrially synthesized fertilizer
 - (d) by denitrification
61. When sunlight is on the chloroplast, pH is the lowest in the
- (a) stroma
 - (b) cytosol
 - (c) space enclosed by the thylakoid membranes
 - (d) space enclosed by the inner and outer membranes
62. Tissues that form long, tough stands, as in the leaf stalk of celery, are
- (a) epidermis
 - (b) collenchyma
 - (c) sclerenchyma
 - (d) parenchyma
63. Which reactions are made with the help of the system of giant axons ? slow differential reactions
64. In the blood of an adult man the total content of haemoglobin is, roughly:
- (a) several hundred gram
 - (b) tens of gram (10-100 g)
 - (c) several gram
 - (d) several hundred milligram
65. A mollusc sample is given to a biologist. After examining the sample he says that it belongs to Bivalvia. Which of the following may be the key that makes him to reach this conclusion ?
- (a) gills
 - (b) absence of radula
 - (c) body symmetry
 - (d) mantle
66. When a muscle cell ha a shortage of oxygen this is associated with a change in pH. What substance is responsible for this change in pH?
- (a) decreased carbon dioxide
 - (b) decreased lactate (lactic acid)

- (c) increased carbon dioxide .
- (d) increased lactate (lactic acid)

67. Which one of the following pairs is *correctly* matched?

- a)chloroplast-storage of enzymes •
- b)peroxisomes-cellular transportation
- c)nucleolus-site 'of ribosomal subunit synthesis
- d)lysosomes-power house of cell

68. The belonging of a human erythrocyte to serotypes A, B, 0 is determined by chemical markers on its surface. These markers are

- a. lipid molecules
- b. oligosaccharides
- c. polypeptides
- d. antibodies

69. C₄-plants can start photo ynthesis with a lower concentration of CO₂ in the atmosphere than C₃-plants. This is because:

- a) respiration of C₄-plants is higher
- b).respiration of C₄-plants is lower
- c) C₄ plants do not have photorespiration
- d) C₄-plants have photorespiration

70. the most important factor regulating seasonal migration is

- a) the change in average air temperature
- b) the change in day length
- c) the reduced availability of food
- d) the increased predator pressure

Section C

31. Current flow in semiconductor depends on the phenomenon of :

- (a) drift
- (b) diffusion
- (c) recombination
- (d) All of the above

32. A transistor connected in common base configuration has

- (a) a low input resistance and high output resistance
- (b) a high input resistance and low output resistance
- (c) a low input resistance and low output resistance
- (d) a high input resistance and high output resistance

33. The Q-point in voltage amplifier is selected in the middle of active region because:

- (a) it gives distortionless output
- (b) the operating point becomes very stable

- (c) the current then requires less number of resistors
- (d) it then requires a small d.c. voltage

34. Tuned voltage amplifiers are *not* used

- (a) in public address system
- (b) in radio receivers
- (c) where a band of frequencies is to be selected and amplified
- (d) in television receivers

35. In AM transmission with $m = 1$, suppression of carrier cuts power dissipation by a factor of :

- (a) 6
- (b) 2
- (c) 3
- (d) 4

36. One of the serious disadvantages of FM transmission is its

- (a) high static noise
- (b) limited line-of-sight range
- (c) expensive equipment
- (d) adjacent channel interference

37. An XOR gate produces an output only when its two inputs are

- (a) high
- (b) low
- (c) different
- (d) same

38. A half adder can be constructed from

- (a) two XNOR gates only
- (b) one XOR and one OR gate with their outputs connected in parallel
- (c) one XOR and one OR gate with their inputs connected in parallel
- (d) one XOR gate and one NOR gate

39. A blocking oscillator :

- (a) is a triggered oscillator
- (b) is an amplifier with negative feedback
- (c) generates sinusoidal waves
- (d) produce sharp and narrow pulses

40. A relaxation oscillator is one which

- (a) has two stable states
- (b) relaxes indefinitely
- (c) produce non-sinusoidal output
- (d) oscillates continuously

41. Binary equivalent of octal number 527 is

- (a) 101010111
- (b) 111011010
- (c) 101010101

(d) 111000110

42. Intel 8085 is an :

- (a) 4-bit microprocessor
- (b) 8-bit microprocessor
- (c) 16-bit microprocessor
- (d) 64-bit microprocessor

43.. Which of the following languages is suitable for artificial intelligence ?

- (a) ALGOL
- (b) PASCAL
- (c) PROLOG
- (d) PILOT

44. A conventional electric current flows due east in a high voltage power line.

What would be the direction of the resulting magnetic field directly below the power line ? -

- (a) north
- (b) east
- (c) south
- (d) west

45. An electron travels so that its total energy is twice its rest energy (0.511MeV).

What is the speed of the electron ?

- (a) $V=1/2c$
- (b) $v=3/4c$
- (c) $3/2c$
- (d) $8/9c$

46. An object is placed 60 cm from a convex converging lens. The image produced is inverted and half the size of the object. What would be focal length of the lens?

- {a} 90 cm
- (b) 60 cm
- (c) 45 cm
- (d) 20 c

47. An ideal heat engine takes in heat energy at a high temperature and exhausts energy at a lower temperature. If the amount of energy exhausted at the low temperature is 3 times the amount of work done by the heat engine, what efficiency?

- a) 0.25
- b) 0.33
- c) 0.67
- d) 0.9

48. Consider a simple circuit containing a battery and three light bulbs. Bulb A is in parallel with bulb B and this combination is wired in series with the other two bulbs. What would happen to the brightness of the other two bulbs if bulb A were burned out ?

- a) Only bulb B would get brighter
- b) Both would get brighter
- c) Bulb B would get brighter and bulb C would get dimmer
- d) Bulb B would get dimmer and bulb C would get brighter

49. The root mean square velocity of oxygen gas (atomic mass 16) is v at room temperature. The root mean square velocity of Helium (atomic mass 4) at the same temperature is :

- (a) $4v$
- (b) $2v$
- (c) v
- (d) $v/2$

50. An object is projected straight upward from ground level with a velocity of 50 m/s . Ignoring air resistance, it will return to ground level in approximately

- (a) 2.5 s
- (b) 5.0 s
- (c) 7.5 s
- (d) 10 s

51. The eccentricity of the ellipse $16x^2 + 7y^2 = 112$ is

- (a) $4/3$
- (b) $7/16$
- (c) $3/7$
- (e) $3/4$

52. If $a + b + c = 0$, then the quadratic equation $3ax^2 + 2bx + c = 0$ has

- (a) At least one root in $(0, 1)$
- (b) One root in $[1, 2]$ and other in $(-1, 0)$
- (c) Both roots are imaginary
- (d) None of the above

53. The value of $\int_0^1 |x| dx$ is

- (a) $2/3$
- (b) 1
- (c) 0
- (d) 2

54. If A and B are two non-singular matrices of the same order, then:

- (a) $\text{Adj}(AB) = (\text{Adj}A) (\text{Adj}B)$
- (b) $\text{Adj}(AB) = (\text{Adj}B) (\text{Adj}A)$
- (c) $\text{Adj}(A \cdot A) = A$
- (d) none of the above

55. The function f defined on \mathbb{R} by $f(x) = x$, when x is rational

$\frac{1}{x} = 1 - x$, when x is irrational

$\frac{1}{x}$ is continuous for all x , except at :

$x = 1$

$x = 0$

$x = 0$ and $x = -1$

$x = -1$

56. The region $1 < |z - 4| < |z - 2|$, represents the region given by :

a) $\text{Re}z > 0$

b) $\text{Re}z < 0$

c) $\text{Re}z > 2$

d) None of the above

57. If $f(x, y) = (0, b)$ then at $(0, b)$:

(a) $f_x = 0$

(b) $f_{xy} \neq 0$

(c) $f_{xy} = 0$

(d) $f_{yx} = 0$

58. The polynomial equation $10z^5 + 8z^4 + 6z^3 + 4z^2 + 2z + 1 = 0$ has all roots in:

(a) $|z| < 1$

(b) $|z| > 1$

(c) $|z| = 1$

(d) None of the above

60. For negative skewed distribution :

(a) mean = median < mode

(b) median < mean < mode

(c) mean < median < mode

(d) mode < mean < median

61. The uncertainty in the velocity of a ball of mass 100 g when its uncertainty in position is 1 \AA is :

(a) $3.24 \times 10^{-24} \text{ m/s}$

(b) $5.23 \times 10^{-24} \text{ m/s}$

(c) $6.14 \times 10^{-12} \text{ m/s}$

(d) 10^{-12} m/s

62. Which of the following favours the spontaneity of change?

(a) ΔH is -ve

(b) ΔS is +ve

(c) ΔG is -ve

(d) All of the above

63. E_o for a cell $Zn | Zn^{2+}(aq) || Cu^{2+}(aq) | Cu$ is 1.10 V at 25°C. constant for the reaction $Zn + Cu^{2+}(aq) \rightleftharpoons Cu + Zn^{2+}(aq)$ is of the order of :

- (a) 10⁻²
- (b) 10⁻³⁷
- (c) 10¹⁸
- (d) 10¹⁷

64. "In a given photochemical reaction, each molecule of a reaction absorbs only one quantum of radiation causing that particular reaction." It is a statement of :

- (a) Stark-Einstein law
- (b) Lambert-Beer's law
- (c) Grotthus-Draper law
- (d) None of the above

65. The decreasing order of stability of carbonium ions is given by

- (a) tertiary > primary > secondary
- (b) primary > secondary > tertiary
- (c) tertiary > secondary > primary
- (d) secondary > primary > tertiary

66. Glucose on warming with excess of phenylhydrazine forms a yellow crystalline compound called

- (a) fructose
- (b) glucosone
- (c) glucosazone
- (d) arabinose

67. The following reaction is an example of
 $C_6H_5CHO \xrightarrow{KOH} C_6H_5COO^-K^+ + C_6H_5CH_2OH$

- (a) Perkin reaction
- (b) Wittig reaction
- (c) Aldol condensation
- (d) Cannizaro reaction

68. Which of the following metal ions is green colored?

- (a) Cr³⁺
- (b) Cu²⁺
- (c) Zn²⁺
- (d) Ti⁴⁺

69. Deficiency of which of the following cause anemia

- (a) Molybdenum
- (b) Cobalt
- (c) Chromium
- (d) Tin

70. XeF₂ involves hybridization

- (a) sp³d

- (b) dsp^2
- (c) $sp^3d,2$
- (d) sp^2

Bio. Tech. 24

BIO-TEGHNOLGY 2007

Section A

1. Two bullets are fired horizontally with different velocities from the same height. Which will reach the ground first?
 - (a) Slower one
 - (b) Faster one
 - (c) Both will reach simultaneously
 - (d) Cannot be predicted

2. Two bodies A and B of equal mass have an elastic collision. Initially B is at rest and A moves with velocity V . After the collision:
 - (a) The body A traces its path back with same speed
 - (b) The body A comes to rest and B moves away in the direction of A's approach with the velocity V
 - (c) The body A comes to rest and B moves away in the direction of A's approach with the velocity $2V$
 - (d) Both the bodies stick and are at rest

3. A cycle tyre bursts suddenly. This represents an
 - (a) Isothermal process
 - (b) Isobaric process
 - (c) Isochoric process
 - (d) Adiabatic process

4. As one penetrates a uniformly charged metallic sphere, the electric field strength E :
 - (a) Increases
 - (b) Decreases
 - (c) Remains the same at the surface
 - (d) Is zero at all points?

5. If a power of 100 W is being supplied across a potential difference of 200 V, the current flowing is
 - (a) 2 A
 - (b) 0.5 A
 - (c) 1 A
 - (d) 20 A

6. Number of unpaired electrons in N_2^+ is :

- (a) 2
- (b) 0
- (c) 1
- (d) 3

7. Hybridisation in CO_2 is :

- (a) sp
- (b) sp^2
- (c) sp^3
- (d) sp^3d

8. Which of the following is the weakest base ?

- (a) NaOH
- (b) $Ca(OH)_2$
- (c) KOH
- (d) $Zn(OH)_2$

9. Which of the following behaves both as electrophile and a nucleophile ?

- (a) CH_3NH_2
- (b) CH_3Cl
- (c) CH_3CN
- (d) CH_3OH

10. Aspirin is:

- (a) Anti-inflammatory
- (b) Analgesic.
- (c) Anticoagulant
- (d) All of the above

11. Life supporting zone of earth is:

- (a) Ecosystem
- (b) Ecosphere
- (c) Hydrosphere
- (d) Lithosphere

12. Insulin may be used as a therapy in

- (a) Type I Diabetes
- (b) Type II Diabetes
- (c) Both type I and type II Diabetes
- (d) Gout

13. A food product rich in fructose is:

- (a) Table sugar
- (b) Honey
- (c) Turnip
- (d) Grapes

14. Global warming is caused by:

- (a) CO₂
- (b) CH₄
- (c) O₃
- (d) All of the above

15. CPR is:

- (a) an imaging technique commonly used in clinical diagnosis
- (b) a physical exercise aimed at restoring heart beat
- (c) a device that records sound wave data
- (d) a ratio of calcium and phosphorous in serum

16. Athlete's foot is a condition caused by:

- (a) Ringworm infection
- (b) Sweat gland abnormality
- (c) Muscular injury
- (d) All of the above

17. Bovine spongiform encephalopathy (BSE) is caused by.

- (a) Severe viral infection
- (b) Septicemia
- (c) Tapeworm infection
- (d) Abnormal protein production

18. The sound we hear during cracking of knuchles is due to

- (a) Grinding of the upper and lower part of the joint
- (b) Burst of muscular contraction and relaxation
- (c) Release of gas from the fluid surrounding the joint
- (d) None of the above

19. Decimal equivalent of binary number 1010 is

- (a) 2
- (b) 4
- (c) 8
- (d) 10

20. Which of the following is a part of computer hardware?

- (a) Bus
- (b) Register
- (c) RAM
- (d) All of the above

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Section B

21. The median of scores 25, 45, 35, 35, 40, 30 is:

- (a) 45
- (b) 40
- (c) 35

(d) 30

22. What is the probability that a value chosen at random from a particular population is larger than the median of the population:

- (a) 0.25
- (b) 0.5
- (c) 1.0
- (d) 0.67

23. The mean, mode and median are related by the relation (Approximate)

- (a) Mode = 3 median - 2 mean
- (b) Mean = 3 mode - 2 median
- (c) Mode = 3 mean - 2 median
- (d) None of the above

24. For a normal curve with $\mu = 55$ and $\sigma = 10$, how much area will be found under the curve to the right of the value 55

- (a) 1.0
- (b) 0.68
- (c) 0.5
- (d) 0.32

25. For a two tailed test of hypothesis at $\alpha = 0.10$, the acceptance region is the entire region:

- (a) To the right of the negative critical value
- (b) Between the two critical values
- (c) Outside the two critical values
- (d) To the left of positive critical value

26. If sample 1 has 13 elements with $\bar{x}_1 = 17$ and sample 2 has 9 elements with $\bar{x}_2 = 22$, then pooled \bar{x} is:

- (a) 19
- (b) 361
- (c) 367
- (d) 19.5

27. In double sampling we reject the batch if :

- (a) $d_1 > C_2$
- (b) $d_2 > C_2$
- (c) Either (a) or (b)
- (d) Neither (a) nor (b)

28. Assume that chi square test is to be performed on a contingency table with four rows and four columns. How many degrees of freedom should be used?

- (a) 10
- (b) 8
- (c) 9
- (d) 6

29. The sum of first n natural numbers is:

- (a) $n(n + 1)/2$
- (b) $n(n + 1)(2n + 1)/6$
- (c) $n(n + 1)(n + 2)/2$
- (d) n^2

30. The number of proper subsets of a set of order 3 is :

- (a) 3
- (b) 6
- (c) 8
- (d) 9

31. If $f(x) = \log x$, then which of the following is *true*:

- (a) $f(x + y) = f(x) + f(y)$
- (b) $f(x + y) = f(x)f(y)$
- (c) $f(xy) = f(x)f(y)$
- (d) $f(xy) = f(x) + f(y)$

32. $nC_1 + nC_2 + nC_3 + \dots + nC_n =$

- (a) $2nC_1$
- (b) $n + nC_n$
- (c) $2n$
- (d) $2n - 1$

33. If $f(x) = x^2 - 2x + 4$, then $f(x)$ has :

- (a) Minimum at $x = 1$
- (b) Maximum at $x = 1$
- (c) No maximum
- (d) No minimum

34. $\lim_{x \rightarrow 0} \frac{\sin 2x}{x}$

34.

- (a) 0
- (b) 1
- (c) 1/2
- (d) 2

35. The range of the function $y = \ln x$ is :

- (a) $x > 0$
- (b) $x < 0$
- (c) $-1 < x < 1$
- (d) $x > 0, x < 0$

36. One root of the equation $5x^2 + 13x + K = 0$ is the reciprocal of the other, if:

- (a) $K = 0$
- (b) $K = 5$
- (c) $K = 6$

(d) $K = 1/6$

37. Number of covalent bonds in P_4O_{10} is

- (a) 10
- (b) 12
- (c) 14
- (d) 16

38. The bond order of H_2 , H_2^+ and He_2^+

- (a) 1, 0.5 and 0.5
- (b) 1, 0.5 and 1.5
- (c) 1.5, 0.5 and 1
- (d) 0.5, 0.5 and 1

39. When reduced with lithium aluminium hydride, amino acids form

- (a) Amines
- (b) Amino alcohols
- (c) Salts
- (d) Esters

40. The relationship between diethyl ether and methyl propyl ether is that they are:

- (a) Metamers
- (b) Functional isomers
- (c) Position isomers
- (d) Chain isomers

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41. The Van't Hoff factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is:

- (a) 91.3%
- (b) 87%
- (c) 100%
- (d) 74%

42. An example of double salt is

- (a) Bleaching powder
- (b) $K_4Fe(CN)_6$
- (c) Hypo
- (d) Potash alum

43. The dry cell has an e.m.f. of 1.5 V and internal resistance of 0.5 Ω . If the cell sends a current of 1A through an external resistance, the p.d. of the cell will be

- (a) 1.5 V
- (b) 1V
- (c) 0.5 V
- (d) 0 V

44. The expression of magnetic induction inside a solenoid of length L, carrying a current I and having N number of turns. is

- (a) $\frac{\mu_0 I N}{4\pi} \times \frac{Ml}{r^2}$
- (b) $\frac{\mu_0 I N}{4\pi} \times \frac{Ml}{r^3}$
- (c) $\frac{\mu_0 I N}{4\pi} \times \frac{2Ml}{r^2}$
- (d) $\frac{\mu_0 I N}{4\pi} \times \frac{2Ml}{r^3}$

45. The Fermi level lies midway between conduction and valence bands in

- (a) Intrinsic semiconductor
- (b) P-type semiconductor
- (c) N-type semiconductor
- (d) Extrinsic semiconductor

46. Zener breakdown occurs:

- (a) Mostly in Germanium junctions
- (b) Due to rupture of covalent bonds
- (c) In lightly doped junctions
- (d) Due to thermally generated minority carriers

47. Which of the following is unipolar device?

- (a) P-N junction
- (b) Zener diode
- (c) Tunnel diode
- (d) Schottky diode

48. The ripple factor of half wave rectifier is

- (a) 1.21
- (b) 1.11
- (c) 0.48
- (d) 0.406

49. In a transistor, the resistance of base region is of the order of:

- (a) 1 Ω
- (b) 100 Ω
- (c) 1 k Ω
- (d) 100 k Ω

50. FET can be used as

- (a) Variable capacitor
- (b) Variable resistor
- (c) Constant voltage source
- (d) Negative resistance

51. An ideal amplifier has noise factor of :

- (a) 0 db
- (b) More than 0 db

- (c) Unity
- (d) None of the above

52. Turn off time of thyristor :

- (a) Depends upon junction temperature and forward current
- (b) Is a constant
- (c) Depends on load
- (d) All of the above

53. If H is Hubble's constant, the age of universe is

- (a) $V = Hr^2$
- (b) $V = Hr$
- (c) $V = Hfr$
- (d) $V = H/r^2$

54. The velocity of projection of a body is increased by 2%. Other factors remaining unchanged, what will be the percentage change in the maximum height attained?

- (a) 1%
- (b) 2%
- (c) 4%
- (d) 8%

55. Maximum value of static friction is called:

- (a) Limiting fraction
- (b) Rolling friction
- (c) Normal friction
- (d) Coefficient of friction

56. The work done in moving a body up a rough inclined plane is given by

- (a) $mg \sin \alpha \times S$
- (b) $mg \cos \alpha \times S$
- (c) $(mg \sin \alpha + \mu mg \cos \alpha) \times S$
- (d) $(mg \sin \alpha - \mu mg \cos \alpha) \times S$

57. A body of mass 0.5 kg executes S.H.M. of frequency 4 Hz. The amplitude of S.H.M. is 1 cm. The maximum restoring force is (take $n^2 = 10$)

- (a) 0.32 N
- (b) 3.2 N
- (c) 32 N
- (d) 320 N

58. For measuring temperature near absolute zero, the thermometer used is :

- (a) Thermo-electric thermometer
- (b) Radiation thermometer
- (c) Magnetic thermometer
- (d) Resistance thermometer

59. The maximum wavelength of radiation emitted at 200 K is 4 μm . What will be the maximum wavelength of radiation emitted at 2400 K.

- (a) 3.33 μm
- (b) 0.66 μm
- (c) 1 μm
- (d) 1 m

60. Positive rays are

- (a) Ions
- (b) electrons
- (c) neutrons
- (d) electromagnetic waves

Section C

61. Which of the following shows correct order of decreasing inductive effect?

- (a) $\text{F} > \text{Cl} > \text{Br} > \text{I}$
- (b) $\text{I} > \text{Br} > \text{Cl} > \text{F}$
- (c) $\text{Cl} > \text{F} > \text{I} > \text{Br}$
- (d) $\text{Br} > \text{I} > \text{F} > \text{Cl}$

62. Number of chiral carbons in tartaric acid is

- (a) 1
- (b) 2
- (c) 3
- (d) 4

63. Which of the following methods is *not* employed in the preparation of dicarboxylic acids?

- (a) Oxidation of glycols and hydroxy acids using $\text{K}_2\text{Cr}_2\text{O}_7$
- (b) Subjecting dicyanides to hydrolysis
- (c) Hydrolysis of malonic esters
- (d) Oxidation of cyclic alkenes

64. Which of the following is used in the determination of R.M. value of fat?

- (a) 1.5 N KOH
- (b) 1.0 N KOH
- (c) 0.1 N KOH
- (d) 0.005 N KOH

65. The compound in which C^* uses *sp* hybridisation for bond formation is:

- (a)
- (b)
- (c)
- (d)

66. Oxidation number of S in SO_3 is :

- (a) 2
- (b) 3
- (c) 4
- (d) 5

67. Calgon, used as water softener is :

- (a) $\text{Na}_2[\text{Na}_4(\text{P}_3\text{O}_6)_6]$
- b) $\text{Na}_4[\text{Na}_2(\text{P}_3\text{O}_6)_6]$
- (c) $\text{Na}_2[\text{Na}_4(\text{P}_4\text{O}_{10})_5]$
- (d) $\text{Na}_4[\text{Na}_4(\text{P}_4\text{O}_{10})_6]$

68. Mark the smallest atom:

- (a) F
- B) Cl**
- (c) Br
- (d) I

69. Which of the following is standard amino acid ?

- (a) Ornithine
- (b) Homocysteine**
- (c) Citrulline
- (d) None of the above

70. Proteins absorb light in:

- (a) Visible range
- (b) IR range
- (c) UV range
- (d) All of the above

71. In Lineweaver Burk plot, when $1/v$ is plotted against $1/[S]$

- (a) Straight line is obtained
- (b) Sigmoidal curve is obtained
- (c) Hyperbolic curve is obtained
- (d) None of the above

72. Concentrated acids cause dehydration of sugars to

- (a) Trans-enediol
- (b) Cis-enediol
- (c) Furfural
- (d) Furanose

73. Sphingosine is :

- (a) Branched sugar
- (b) Fatty acid
- (c) Amino alcohol
- (d) Ceramide

74. Terminator gene technology exploits the use of:

- (a) Promoter sequence
- (b) Operator sequence
- (c) Repressor
- (d) Transcription terminator

75. Glucose and fructose can be distinguished by

- (a) Molish test.
- (b) Acetyl Chloride
- (c) Phenylhydrazine
- (d) Concentrated solution of alkali

76. An example of water soluble vitamin is

- (a) Vitamin- A
- (b) Vitamin C
- (c) Vitamin D
- (d) Vitamin E

77. Suppose you delete operator site from lac operon of *E. coli*. Which of the following effects would be observed ?

- (a) No expression of lac gene
- (b) Constitutive expression of lac gene
- (c) Regulated expression of lac gene
- (d) Basal expression of lac gene

78. Which of the following binds amino acid ?

- (a) Acceptor arm
- (b) D arm
- (c) Anticodon arm
- (d) T_ψC-arm

79. In lac and Gal operons, CAP is responsible for :

- (a) De-repression
- (b) Constitutive activation
- (c) Regulated activation
- (d) None of the above

80. Si-RNA is an important tool to study:

- (a) Translation regulation
- (b) Gene silencing
- (c) Gene simulation
- (d) Gene amplification

81 Which of the following antibiotics inhibits translation?

- (a) Tetracycline
- (b) Puromycin
- (c) Chloramphenicol
- (d) All of the above

82. DNA fragment of interest can be detected by

- (a) Western blotting
- (b) Northern blotting

- (c) outhern blotting
- (d) DNA fingerprinting

83. Which of the following could be a co-translational modification?

- (a) Phosphorylation
- (b) Glycosylation
- (c) Methylation
- (d) Acetylation

84. Immunoglobulin released in allergies is

- (a) IgA
- (b) IgG
- (c) IgD
- (d) IgE

85. Test cross is used to test:

- (a) Whether an individual is homozygous or heterozygous
- (b) Whether an individual is dominant or recessive
- (c) Whether parents were true breeding
- (d) All of the above

86. Which is *not* a non-degradable pollutant?

- (a) **DDT**
- (b) Sewage
- (c) Plastics
- (d) Heavy metals

87. A direct food relation between two species of animals in which one animal kills and feeds on another is referred to as :

- (a) Predation
- (b) Parasitism
- (c) Symbiosis
- (d) Scavenging

88. Cycas differs from pteris in having

- (a) Vessels and tracheids
- (b) Motile sperms
- (c) Pollen tube
- (d) Archegonia

89. Crassulacean acid metabolism (CAM) makes it possible for plants to survive in:

- (a)
- (b)
- (c)
- (d)

90. The genotypic ratio of F₂ progeny of dihybrid cross is

- (a) 1:2:1
- (b) 9:3:3:1

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

91. In areas where the incidence of malaria is high, healthier individuals should be:

- (a) Heterozygous for Hb^s
- (b) Homozygous for Hb^s
- (c) Either (a) or (b)
- (d) Neither (a) nor (b)

92. Rhesus monkey belongs to

- (a) Even toed ungulates
- (b) Odd toed ungulates
- (c) Edentates
- (d) Primates

93. Study of molluscs is called:

- (a) Malacology
- (b) Conchology
- (c) Mycology
- (d) Phycology

94. Heart of amphibians is:

- (a) Two chambered
- (b) Three chambered
- (c) Four chambered
- (d) Without chamber

95. Tube-within-tube plan is shown by

- (a) Coelentrates
- (b) Flatworms
- (c) Roundworms
- (d) Sponges

96. Hepatic portal vein is formed by

- (a) Lineogastric vein
- (b) Deodenal vein
- (c) Anterior mesenteric vein
- (d) All of the above

97. The optic nerve pierces through the retina, choroids and sclera at

- (a) Fovea
- (b) Blind spot
- (c) Pupil
- (d) Cornea

98. Removal of parathyroid results in

- (a) Calcium deficiency
- (b) Bone fracture

- (c) Death of the individual
- (d) Retardation of teeth formation

99. Lower aquatic animals are:

- (a) Ammonotelic
- (b) Ureotelic
- (c) Uricotelic
- (d) Can be all the above depending upon climatic conditions

100. Conversion of fibrinogen into fibrin is catalysed by:

- (a) Prothrombin
- (b) Thromboplastin
- (c) Thrombin
- (d) Thrombinase

BIO-TEGHNOLOGY 2008

1. The contents of these chips are lost when the computer is switched off?

- (A) RAM chips
- (B) DRAM chips
- (C) ROM chips
- (D) None of the above

2. What would the binary number 1011 be in decimal notation?

- (A) 10
- (B) 11
- (C) 12
- (D) 13

3. Heat required to melt 1 g of ice is 80 cal. A man melts 60 g of ice by chewing in 1 min. His power is :

- (A) 4800 W
- (B) 336 W
- (C) 1.33 W
- (D) 0.75 W

5. If 5 mL of 0.15 M NaCl is diluted to a final volume of 5 L what is the final concentration of NaCl?

- (A) 0.00015 M
- (B) 0.0015 M
- (C) 15000 M
- (D) None of the above

4. If $f(x) = xn$ then $d/dx f(x)$ is :

- (A) $xn - 1$
- (B) $xn + 1$
- (C) $nXn - 1$
- (D) None of the above

6. Why does the vapor pressure of a solution decrease when an ionic compound is added to it ?

- (A) The mole fraction of solvent is higher, causing a lower vapor pressure.
- (B) There are fewer solvent molecules at the surface, so fewer can vaporize and leave the solution.
- (C) Most solutes have a positive heat of solvation, causing the temperature of the solution to decrease.
- (D) none of the above

7. The molecular weight of glucose is 180. Express a blood glucose concentration of 80 mg per 100 ml in molarity.

- (A) 0.44 M
- (B) 0.044 M
- (C) 0.0044 M
- (D) 04.40 M

8. Which of the following is the closest to the pH of a solution that contains 5 millimoles per litre of H^+ ions?

- (A) 1.2
- (B) 2.3
- (C) 3.7
- (D) 6.5

9. What is the pKa of triethyl-ammonium in water, if the base ionization constant K_b for triethylamine is 7.4×10^{-5} ? (Log $7.4 \times 10^{-5} = 4.13$)

- (A) -4.13
- (B) 2.87
- (C) 4.13
- (D) 9.17

10. Which of the following is *not* a chaotropic agent?

- (A) Lithium chloride
- (B) Urea
- (C) Sodium chloride
- (D) Aluminium chloride

11. Solution properties of a phospholipid most appropriately match that of :

- (A) Glutamic acid
- (B) A purine base
- (C) Starch
- (D) All of the above

12. In its hydrogen bonding capacity water is followed by

- (A) Methanol

- (B) Urea
- (C) Chloroform
- (D) Glycerol

13. Phosphorolysis is a form of:

- (A) Hydrolysi
- (B) Pho phorylation
- (C) Electrolytic breakdown of ATP
- (D) Spontaneous accumulation of inorganic phosphate

14. Microsatellite sequence is:

- (A) A small palindrome
- (B) Extrachromosomal DNA
- (C) Short repetitive DNA
- (D) Looped-DNA

15. A DNA fragment is 5.7 kilo bases, if the entire fragment codes for polypeptide, the approximate number of amino acids in polypeptide would be

- (A) 1900
- (B) 2500
- (C) 5700
- (D) 170

16. In humans, right-handedness is dominant to left-handedness and the gene is autosomal. If A right-handed man, whose father was left-handed, married a left-handed 'woman, which .of the following statements is *true*?

- (A) Man was homozygous and his wife was heterozygous
- (B) Man was heterozygous, his father was homozygous.
- (C) Man and his father were both homozygous
- (D) Man and his wife were both heterozygous

17. Small lipid soluble molecules move in and out of the cells by

- (A) Simple diffusion
- (B) Active transport
- (C) Facilitated diffusion
- (D) Pinocytosis

18. Plasmodesmata most closely resemble which of the following structure in animal cells?

- (A) Desmosomes
- (B) Gap junctions
- (C) Tight junctions
- (D) Ion channels

19. During which of the following stages of the cell cycle will a diploid cell contain twice the amount of DNA found in a gamete?

- (A) Prophase
- (B) Entire S phase

- (C) Entire G1 phase
- (D) Entire G2 phase

20. All of the following amino acids are converted to succinyl -CoA, *except*

- (A) Methionine
- (B) Isoleucine
- (C) Valine
- (D) Histidine

21. Major objective of glucose breakdown by glycolysis is

- (A) Energy production
- (B) Production of pyruvate
- (C) Production of 3 carbon intermediates
- (D) Regeneration of oxidized NAD⁺

22. A vitamin that has an important role in the formation of collagen fibers is :

- (A) Thiamine
- (B) Tocopherol
- (C) Ascorbic acid
- (D) Riboflavin

23. When human immunodeficiency virus (HIV) attaches to a host cell, what material is released into the host cell cytoplasm?

- (A) Viral toxins
- (B) RNA
- (C) DNA
- (D) Proteins

24. The main determinant of blood pressure is

- (A) Blood volume
- (B) Elasticity of arteries
- (C) Cardiac output
- (D) Peripheral resistance

25. The blood flows in the body because of :

- (A) Beating of the heart
- (B) Establishment of a pressure gradient
- (C) Contraction and relaxation of peripheral muscles
- (D) Elasticity of arteries

26. All of the following are associated with inspiration in mammals *except*

- (A) Increase in thoracic pressure
- (B) Contraction of external intercostal muscles
- (C) Lowering of diaphragm
- (D) Relaxation of internal intercostal muscles

27. In an acid environment oxygen splits more readily from haemoglobin. This is governed by :

- (A) Dalton's Law
- (B) Henry's Law
- (C) Charles' Law
- (D) Bohr Effect

28. Cardio-acceleratory centre is located in

- (A) Cerebrum
- (B) Pons
- (C) Medulla
- (D) Wall of the right atrium

29. Urine formation requires which of the following?

- (A) Glomerular filtration and tubular secretion only
- (B) Glomerular filtration and tubular reabsorption only
- (C) Glomerular-filtration, tubular reabsorption, and tubular secretion'
- (D) Tubular reabsorption and secretion only

30. Ethylene oxide finds an important use in Medical and Biological research as a

- (A) Long-term preservative
- (B) Respiratory aid.
- (C) Sterilizing agent
- (D) Anaesthetic agent

31. If an enzyme has a small value of K_M , (Michaelis Menten constant) then it achieves maximal catalytic efficiency at

- (A) High substrate concentration
- (B) Low substrate concentration
- (C) Intermediate substrate concentration
- (D) None of the above

32. Which of the following element is least likely to be found on any + strand viral genomic RNA?

- (A) A cap
- (B) A packing site
- (C) A binding site for RNA Polymerase II
- (D) A binding site for ribosomes

33. Guttation in plants is favoured by

- (A) High humidity and dim light
- (B) Low humidity and dim light
- (C) Dim light only
- (D) None of the above

34. Which form of phytochrome pigment predominates during the day light in plant ?

- (A) **PR** (phytochrome red)
- (B) PFR (phytochrome far red)

- (C) Both are predominate
- (D) None of the above

35. Which of the following effects is brought about by gibberellins but not by auxins?

- (A) Breaking of dormancy in leaf buds
- (B) Stimulation of cambial activity
- (C) Inhibition of leaf abscission
- (D) Stimulation of fruit development

36. Many organisms which are morphologically complex have much lesser genome than those which looks morphologically simple, this is called:

- (A) P-value paradox
- (B) C-value paradox
- (C) D-value paradox
- (D) G-value paradox

37. When the helices of a double the linking number stranded circular DNA molecule' are opened,

- (A) Decreases
- (B) Increases
- (C) Does not change
- (D) Is always zero

38. Intrinsic torsion potential' refers to :

- (A). Freedom of rotation around a C-C single bond
- (B) Restriction of rotational freedom around C-N single bond in a nucleotide
- (C) Accommodation of some rotation around peptide bond
- (D) Reflection rotational capacity around ϕ and ψ angles

39. Protein solubilization by salting in is associated with :

- (A) Excessive heat loss
- (B) Protein denaturation
- (C) Increase in protein ionization
- (D) All of the above

40. "A" form of DNA can be converted to "B" form by

- (A) Denaturation
- (B) Dehydration
- (C) De-salting
- (D) De-proteination

41. Which of the following *cannot* have a helical structure?

- (A) *r-RNA*
- (B) Protein
- (C) *m-RNA*
- (D) None of the above

42. The following are known to exist as a stable triple helix in nature?
- (A) Few forms of DNA
 - (B) Some types of RNA
 - (C) A few proteins
 - (D) Specialized polysaccharides
43. In molecular sieve chromatography, separating multiple species the internal volume:
- (A) Is uniformly accessible to all species
 - (B) Is predominantly accessible to a species with highest concentration
 - (C) Is predominantly accessible to a species with least molecular size
 - (D) Is not accessible to any of the species
44. In gel filtration chromatography, smaller molecules will be fractionated in a
- (A) Larger elution volume
 - (B) Smaller elution volume
 - (C) Elution volume is not dependent on size
 - (D) Smaller molecules come into void volume
45. Ionic detergents can increase the solubility of a species by
- (A) Increasing the dielectric constant of the solvent
 - (B) Binding the hydrophobic portion of the species
 - (C) Reducing the solute-solute interaction
 - (D) All of the above
46. SDS-PAGE separates proteins based on the principle of :
- (A) Iso-electric focussing
 - (B) Passage of current through an electrolyte
 - (C) Gel filtration chromatography
 - (D) Electromotive force
47. A solution shows transmittance of 10 on spectrophotometer, what is the absorbance of the solution ?
- (A) 1.0
 - (B) 0.1
 - (C) 10
 - (D) 0.01-
48. If a RNA solution is heated the absorbance will
- (A) Increase
 - (B) Decrease
 - (C) Will first increase and then decrease
 - (D) Will not change
49. Base paring in nucleic acid strands is studied using a technique
- (A) X-ray diffraction
 - (B) Infrared spectroscopy

- (C) MALDI
- (D) Scanning electron microscopy

50. χ (chi) is the angle of rotation between:

- (A) Various bonds in phosphate group of nucleic acid backbone
- (B) C5' and the phosphate
- (C) C1' and the nitrogenous base
- (D) C1' and oxygen of the sugar

51. An E.coli strain lacking DNA polymerase I would be deficient in DNA

- (A) Repair
- (B) Methylation
- (C) Transcription
- (D) All of the above

52. Water of highest purity used in Molecular Biology research is indicated by the absence of :

- (A) Salt ions
- (B) Nucleases
- (C) Bacteria
- (D) Viruses

53. Isopropyl thiogalactoside is a

- (A) Physiological inducer
- (B) Repressor
- (C) Gratuitous inducer
- (D) None of the above

54. With respect to the *mRNA* start site, promoter of a gene can be located:

- (A) Upstream
- (B) Downstream
- (C) Either upstream or downstream
- (D) May not be present

55. Alkaline breakdown of nucleic acid is prevented by

- (A) Double stranded nature
- (B) 2'OH group
- (C) Deoxyribose sugar
- (D) Proteins associated with nucleic acid

56. When DNA is extracted from cells of E.coli and analyzed for base composition, it is found that 38% of the bases are cytosine. What percent of the bases are adenine ?

- (A) 12%
- (B) 24%
- (C) 38%
- (D) 62%

57. A severe winter storm kills many chicks. An investigation comparing the body size of dead birds with that of survivors reveals that the dead birds included mainly the largest and the smallest members of the population. This winter storm exemplifies:

- (A) Kin selection
- (B) Stabilizing selection
- (C) Directional selection
- (D) Balanced selection

58. Which of the following IS NOT characteristic of all VIRUSES with DNA genome?

- (A) Replication occurs only in a living cell
- (B) Replication involves translation on cellular ribosomes
- (C) The viral nucleocapsid is surrounded by lipid envelope
- (D) The viral genome is surrounded by protein coat

59. Incubation of Gram-negative bacteria' with lysozyme in an isotonic medium causes rod shaped bacteria to assume a spherical shape. The cause of this phenomenon is :

- (A) Absorption of water
- (B) Destruction of the cell wall
- (C) Destruction of the cytoskeleton
- (D) .Damage to the plasma membrane

60. Which of the following six-membered ring compounds, has the most planar structure?

- (A) Glucose
- (B) Cytosine
- (C) Cyclohexane
- (D) Mannose