## M. Tech. (Energy and Environmental Management)

**1.** Which term includes all the others in the list ?

(A) Monosaccharide (B) Carbohydrate

(C) Polysaccharide (D) Starch

**2.** Which of the following is *not* a protein ?

(A) Haemoglobin (B) Cholesterol

(C) An enzyme (D) Insulin

**3.** The structural level of a protein least affected by a disruption in hydrogen bonding is the :

(A) Primary level

(B) Secondary level

(C) Tertiary level

(D) Quaternary level

**4.** Light waves are :

(A) Transverse wave

(B) Longitudinal wave

(C) E.M. wave

(D) Both (A) and (C)

**5.** Which of the following has highest elasticity ?

(A) Rubber (B) Plastic

(C) Steel (D) Copper

6. The maximum value of Poisson's ratio can be :

(A) 1 (B) 0.5

(C) – 0.5 (D) – 1

7. The potential energy per unit volume for a body strained under a longitudinal strain shall be equal to :

(A) 1/2( stress × strain) (B) stress × strain

(C) 1/2 stress × $(strain)^2$ (D) stress × $(strain)^2$

8. If wavelength of light emitted by LED is 600 nm, then band gap of material of LED is around :

(A) 1.0 eV (B) 1.5 eV

(C) 2.0 eV (D) 2.5 eV

9. The energy band in which free electrons exist is the :

(A) First band (B) Second band

(C) Conduction band (D) Valence band

10. A diode that has a negative resistance characteristic is the :

(A) Schottky diode (B) Tunnel diode

(C) Laser diode (D) Hot-carrier diode

11. The JFET is :

(A) a unipolar device

(B) a voltage-controlled device

(C) Both (A) and (B)

(D) a current-controlled device

12. In a common base configuration, if the emitter current is 10 mA and current gain is 0.99, then base current is :

(A) 0.1 mA (B) 9.9 mA

(C) 0.99 mA (D) 10 mA

13. If current gain of a transistor in common base configuration is 0.99, then current gain common emitter configuration will be :

(A) 100 (B) 99

(C) 98 (D) 200

14. Most of the ejected electrons in photoelectric effect are :

(A) K–shell electrons

(B) L–shell electrons

(C) M–shell electrons

(D) Outermost shell electrons

15. Compton wavelength of the electron is :

(A) 0.02426Å (B) 0.02426 nm

(C) 0.02426 μm (D) 0.02426 mm

16. The wavelength associated with an electron subjected to a potential difference of 20V is :

(A) 2.75 nm (B) 2.75Å

(C) 5 nm (D) 5Å

17. If the K.E. of a proton and electron is same, then de-Broglie wavelength of proton is :

(A) Greater than electron (B) Less than electron

(C) Equal to electron (D) Can't say anything

**18.** X-rays are :

(A) Negatively charged particles

(B) Positively charged particles

(C) Neutrons

(D) E. M. radiation

**19.** Using X-rays of 2.29 Å, the first two reflections have Bragg angles of 30.06° and 65.51°, the Bragg's angle for third reflection is :

(A) 68.1° (B) 75.9°

(C) 89.9° (D) No third reflection

**20.** Genetic mutation occurs at :

(A) DNA (B) RNA

(C) Proteins (D) Nucleus

**21.** Which of the following is common to plant and animal cell ?

(A) Chloroplast

(B) Mitochondrion

(C) Wall made up of cellulose

(D) Tonoplast

**22.** Which of the following structure-function pairs is mismatched ?

(A) Nucleolus; ribosome production

(B) Lysosome; intracellular digestion

(C) Ribosome; protein synthesis

(D) Microtubule; muscle contraction

23. Cyanide binds with at least one of the molecules involved in the production of ATP. The following exposure of a cell to cyanide, most of the cyanide could be expected to be found within the :

(A) Mitochondria

(B) Ribosome

(C) Endoplasmic reticulum

(D) Lysosome

24. Which type of cell would probably provide the best opportunity to study Lysosome ?

(A) Muscle cell

(B) Nerve cell

(C) Phagocytic white blood cell

(D) Bacterial cell

25. Which of the following process include all the other ?

(A) Osmosis

(B) Diffusion of solute across a membrane

(C) Passive transport

(D) Facilitated diffusion

26. Which of the following factors would tend to increase membrane fluidity ?

(A) A greater proportion of unsaturated phospholipids

(B) A greater proportion of saturated phospholipids

(C) A lower temperature

(D) A relatively high protein content in the membrane

27. Which of the following provides the best evidence that cell signalling pathways evolved early in the history of life ?

(A) They are seen in primitive cells such as yeast

(B) Signal transduction molecules found in distantly related organisms are similar

(C) Signal can be sent long distances by cells

(D) Most signals are received by signal receptors

28. Phosphorylation cascades involving a series of protein kinases are useful for cellular signal transduction because :

(A) They are species specific

(B) They amplify the signal manifold

(C) They counter the harmful effect of phosphatases

(D) They always lead to same cellular response

29. Basic unit of proteins are :

(A) Fatty acid (B) Amino acid

(C) Glucose (D) Peptides

30. Myoglobin is :

(A) Protein with primary structure (B) Protein with secondary structure

(C) Protein with tertiary structure (D) Protein with quaternary structure

31. DNA is the genetic material in :

(A) In some viruses, prokaryotes and eukaryotes

(B) Only in eukaryotes

(C) Prokaryotes and eukaryotes

(D) Only in prokaryotes

**32.** The basic repeating unit of DNA is :

(A) Nucleoside (B) Histone

(C) Nucleotide (D) Amino acids

**33.** The synthesis of glucose from fats is known as :

(A) Glycolysis (B) Kerb cycle

(C) Saponification (D) Gluconeogenesis

**34.** Extra nuclear DNA is found in :

(A) Chloroplast

(B) Mitochondria

(C) Chloroplast and mitochondria

(D) Endoplasmic reticulum

**35.** ATP formation takes place in :

(A) Chloroplast (B) Lysosome

(C) Ribosome (D) Mitochondria

**36.** The most abundant molecule on the earth :

(A) Protein (B) Carbohydrate

(C) Fat (D) Nucleic acid

**37.** The average number of neutrons released by the fission of one uranium atom is :

(A) 3 (B) 2.5

(C) 2 (D) 1

**38.** The energy released by the fission of one uranium atom is 200 MeV. The number of fissions per second required to produce 3.2 W power is :

(A) $10^{17}$ (B) $10^{15}$

(C) $10^{13}$ (D) $10^{11}$

**39.** In fission of U-235, the percentage of mass converted into energy is about :

(A) 0.1% (B) 1%

(C) 5% (D) 15%

**40.** What is the main source of energy of sun ?

(A) Fission of heavier unstable element

(B) Combustion of pure carbon present in the Sun

(C) Nuclear fusion of light elements

(D) Energy liberated during the slow contraction of the Sun

**41.** Which layer of atmosphere is nearest to Earth ?

(A) Stratosphere (B) Troposphere

(C) Mesosphere (D) Ionosphere

**42.** The way/s by which heat from the sun reaches the earth is/are :

(A) Conduction (B) Convection

(C) Radiation (D) Both (A) and (C)

**43.** Brass is an alloy, which consists of :

(A) Zinc and Sulphur

(B) Zinc and Copper

(C) Copper and Sulphur

(D) Zinc and Magnesium

44. The absorption of ink by a blotting paper is based on :

(A) Capillary action

(B) Bernoulli's theorem

(C) Newton's third law of motion

(D) Pascal's law

45. The centre of earth is estimated to have a high temperature of about :

(A) 9,000 K (B) 4,000 K

(C) 6,000 K (D) 10,000 K

46. How much is the average temperature at depth of 10 km of earth surface ?

(A) 200°C (B) 900°C

(C) 650°C (D) 20°C

47. A geothermal solution containing appreciable amounts of sodium chloride or other salts is called as :

(A) Fluids (B) Brine

(C) Solvent (D) Magma

48. A spring that shoots jets of hot water and steam into the air is called as :

(A) Mine hole (B) Geyser

(C) Hot spring (D) Mud pot

49. Water boils underground in a hydrothermal when it has pressure of about.....atm and temperature of about.....°C.

(A) 3, 100 (B) 5, 120

(C) 6, 140 (D) 7, 165

**50.** In which of the following type(s) of plant(s) refrigerant is used as working medium ?

(A) Vapor dominated plant

(B) Liquid dominated high temperature plant

(C) Liquid dominated low temperature plant

(D) All of the above

**51.** How much deep the earth should be drilled for reservoirs ?

(A) 1 km (B) 1.5 km

(C) 1.6 km (D) 1.7 km

**52.** Dry steam geothermal energy generator takes steam out of.....in the ground.

(A) Fractures (B) Rocks

(C) Magma (D) Water

**53.** Most of the future geothermal power plants will be of.....type.

(A) Dry stream geothermal plants

(B) Flash geothermal plants

(C) Binary geothermal plants

(D) Neither dry stream nor flash

**54.** Closed cycle systems use the fluid having :

(A) High boiling points

(B) Low boiling points

(C) High viscosity

(D) Low viscosity

55. Warm surface sea water is pumped through a.....to vaporize the fluid.

(A) Heat exchanger (B) Generator

(C) Evaporator (D) Condenser

56. In.....method the sea water enters a vacuum chamber and flash evaporated.

(A) Closed cycle system

(B) Open cycle system

(C) Hybrid OTEC

(D) Neither closed nor open system

57. The Claude cycle is also called as :

(A) Open cycle (B) Anderson cycle

(C) Closed cycle (D) Otto cycle

58. What does oscillatory motion at ocean produce ?

(A) Microseisms (B) Froth

(C) Disturbance of currents (D) Currents

59. Select the correct formula of potential energy in wave energy ?

(A) $PE = 1/4\rho a^2 \times g/gc$

(B) $PE/A = 1/4\rho a^2 \times g/gc$

(C) $A/PE = 1/4\rho a^2 \times g/gc$

(D) $PE/A = 1/4\rho a^2 \times g$

60. Motion of water in a wave is primarily :

(A) Horizontal (B) Vertical

(C) Linear (D) Opposite

**61.** In which wave machine instead of compressing air, the water itself is pressurized ?

(A) High level reservoir wave machine

(B) Dolphin type wave generator

(C) Hydraulic accumulator

(D) Float wave power conversion device

**62.** Which of the following is the *correct* equation for the electrical power generated by the hydroelectric power plant ?

(A) $75 \times 0.736$ wQH$\eta$ Watt

(B) $(7.5/0.736) \times$ wQH$\eta$ Watt

(C) $0.845 \times$ wQH$\eta$ Watt

(D) $8.45 \times$ wQH$\eta$ Watt

**63.** Francis turbine is :

(A) A reaction radial flow turbine

(B) An axial flow turbine

(C) A radial flow turbine

(D) An impulse turbine

**64.** Overall efficiency of a centrifugal pump is the ratio of :

(A) Energy available at the impeller to the energy supplied to the pump by the prime mover

(B) Actual work done by the pump to the energy supplied to the pump by the prime mover

(C) Energy supplied to the pump to the energy available at the impeller

(D) Manometric head to the energy supplied by the impeller per Newton of water

65. For small discharge at high-pressure which of the following pump is preferred ?

(A) Centrifugal (B) Axial flow

(C) Mixed flow (D) Reciprocating

66. The ratio of the normal force of jet of water on a plate inclined at an angle $\theta$ as compared to that when the plate is normal to the jet, is :

(A) $1/\sqrt{2}$ (B) $\frac{1}{2}$

(C) 2 (D) $\sqrt{2}$

67. Discharge of a centrifugal pump is proportional to impeller diameter (D) as :

(A) $D^2$ (B) $D^3$

(C) $1/D^3$ (D) $1/D^2$

68. Which type of turbine is commonly used in tidal energy ?

(A) Francis turbine (B) Kaplan turbine

(C) Pelton wheel (D) Gorlov turbine

69. What type of tide is it if the difference between high and low tide is greatest ?

(A) Diurnal tide (B) Neap tide

(C) Spring tide (D) Ebb tide

70. One Terra-watt is equal to :

(A) 1 trillion-watts (B) 100 trillion-watts

(C) 5 trillion-watts (D) 10 trillion-watts

71. The standard height of a standard rain gauge, is :

(A) 30 cm (B) 20 cm

(C) 10 cm (D) 40 cm

72. The relationship between power generation 'P' and water discharge 'Q' in a Hydropower project is :

(A) $P \alpha Q$ (B) $P \alpha Q^2$

(C) $P \alpha Q^3$ (D) $P \alpha Q^4$

73. Production of producer gas from coke requires.....moles of nitrogen.

(A) 3.76 (B) 3.71

(C) 3.89 (D) 3.49

74. What are the first products in Fischer-Tropsch process ?

(A) $CO + H_2$ (B) $CO_2 + H_2$

(C) Coke + $H_2O$ (D) Coke

75. The overall efficiency of a power plant is given by :

(A) 3600/NTO (B) 3600/AP

(C) 3600/HHV (D) 3600/NPHR

76. Which of the following modes is *not* used to liquefy coal ?

(A) hydrogenation (B) catalytic conversion

(C) hydro pyrolysis (D) coal gasification

77. The caloric value of producer gas is :

(A) 500–600 kcal (B) 600–800 kcal

(C) 1000–1300 kcal (D) 2000–2500 kcal

78. Bio-diesel is derived from which of the following ?

(A) Sunflower seed oil (B) Rapeseed oil

(C) Jatropha curcas (D) All of these

79. A continuous movement of water in specific direction is called as :

(A) Float (B) Waves

(C) Current (D) Tides

80. An impulse turbine is used for :

(A) Low head of water (B) High head of water

(C) Medium head of water (D) High discharge

81. Which of the following is a disadvantage of most of the renewable energy sources ?

(A) Highly polluting (B) High waste disposal cost

(C) Unreliable supply (D) High running cost

82. The strength of weak nuclear force relative to Electromagnetic force is of the order of :

(A) $10^{-13}$ (B) $10^{-11}$

(C) $10^{13}$ (D) $10^{11}$

83. *Parsec* is unit of :

(A) Mass (B) Length

(C) Time (D) Frequency

84. If radius of earth contracts by 2% of its actual value and mass of earth remains same, then the acceleration due to gravity will :

(A) Decrease by 2% (B) Decrease by 4%

(C) Increase by 2% (D) Increase by 4%

**85.** The position of an object moving along X-axis is given by $x = A + Bt^2$, where A = 10 m, B = 2.5 $ms^{-2}$, and $t$ is measured in seconds. The average velocity of this object between $t = 1$ $s$ and $t = 3$ $s$ is :

(A) 10 $ms^{-1}$ (B) 15 $ms^{-1}$

(C) 20 $ms^{-1}$ (D) 25 $ms^{-1}$

**86.** A ball is thrown at a speed 28 $ms^{-1}$ in a direction 30° above the horizontal. The maximum height attained by the ball will be :

(A) 25 m (B) 20 m

(C) 10 m (D) 5 m

**87.** A small insect enters the eye of person riding a bike, the person then applies sudden brakes to his bike without rubbing his eye and he found that the small insect got out of his eye. By which law of physics the small insect got out of eye ?

(A) Newton's third law of motion

(B) Newton's second law of motion

(C) Newton's first law of motion

(D) Newton's law of Gravitation

**88.** Mechanical analogue of inductance is :

(A) Displacement (B) Velocity

(C) Energy (D) Mass

**89.** The classification of Electromagnetic spectrum is roughly based upon :

(A) How the waves are produced

(B) How the waves are detected

(C) Both (A) and (B)

(D) Wavelength of waves

**90.** If the atmosphere of earth suddenly disappears, then duration of day will :

(A) Increase by 4 minutes

(B) Decrease by 4 minutes

(C) No change

(D) Can't be predicted

**91.** The blue colour of sky is due to :

(A) Reflection of light

(B) Refraction of light

(C) Scattering of light

(D) Diffraction of light

**92.** Nuclear force between two nucleons depends on their :

(A) Mass (B) Charge

(C) Spin (D) Both (B) and (C)

**93.** Chemical shift of protons lies in the ppm range :

(A) 0-200 (B) 0-20

(C) 0-10 (D) 0-5

**94.** Which will *not* give positive Lassaign's test for nitrogen ?

(A) Hydroxyl amine

(B) Urea

(C) Phenyl hydrazine

(D) Benzamide

**95.** Which is the strongest base ?

(A) $HC = C_3^-$ (B) $CH_3^-$

(C) $NH_2^-$ (D) $OH^-$

**96.** Cis and trans-declalins are :

(A) Structural isomers (B) Atropiromers

(C) Enantiomers (D) Diastereomers

**97.** Which is the *correct* order of acidity ?

(A) Phenol > Water > Ethyl alcohol

(B) Ethyl alcohol > Water > Phenol

(C) Ethyl alcohol > Phenol > Water

(D) Ether > Phenol > Ethyl alcohol

**98.** Which of these is *not* present in RNA ?

(A) Uracil (B) Ribose

(C) Thiamine (D) Phosphate

**99.** Which protons in NMR are most deshielded ?

(A) $CH_3 - CH_3$ (B) $C_6H_6$

(C) $CH_2 = CH_2$ (D) $CH \equiv CH$

**100.** Delocalization of electrons involving $\sigma$ bonds is called :

(A) Hyperconjugative effect

(B) Mesomeric effect

(C) Tautomeric effect

(D) Electronic effect

## GENERAL APTITUDE

**101. Direction :** Read the given instructions carefully and answer the question below :

A + B (5) = A is 10 m to the North of B

A – B (7) = A is 12 m to the South of B

A * B (12) = A is 17 m to the East of B

A/B (11) = A is 16 m to the West of B.

R/P (13), P/Q (19), S + Q (5), U/S (19), U – T (5)

If a point V is located 28 m to the South of T, then what is the distance between V and P ?

(A) 16 m (B) 8 m

(C) 5 m (D) 3 m

**102.** Complete the series :

11 53 93 129 159 ?

(A) 162 (B) 174

(C) 181 (D) 206

**103. Direction :** Study the following information carefully and answer the question given below :

'B + A' means 'A is son of B'

'B × A' means 'A is father of B'

'A % B' means 'A is son-in-law of B'

'B – A' means 'A is wife of B'

'A * B' means 'B is brother of A'

'A # B' means 'B is the only sister of A'

Which symbol will come in place of question marks in the following equation to show that L is paternal aunt of P ?

P × Q × R + S ? L

(A) # (B) ×

(C) – (D) Either (A) or (C)

**104. Direction :** Read the following information carefully and answer the question given below :

"Backlog disc live heavily" is coded as "2$A 4#I 8$E 12#I"

"Innocent band actress salute" is coded as "2#A 1$C 9%N 19&A"

"Notify selfish model change" is coded as "14&O 13!O 19$E 3&H"

"Langer hill external limelight" is coded as "12&A 12@I 8#I 5%X"

Find the code for "Travel with wander" ?

(A) 20&R 23#I 23#A (B) 20&R 23&I 23&A

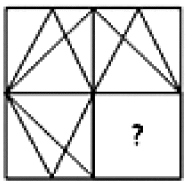
(C) 23&R 23#I 23&A (D) 20&R 23#I 23&A

**105.** Feta : Greek :: Provolone : .....

(A) Salad (B) Swiss

(C) Blue (D Italian

**106. Direction :** Which answer figure will complete the pattern of the given incomplete figure ?




(A) 

(B) 

(C) 

(D) 

107. **Direction :** Read the following information carefully and answer the question given below :

Certain number of persons (that does not exceed 15) are standing in a straight linear row facing towards the north. 5 persons stand between B and E, who is third to the left of A. U is to the right of A. Not more than 3 persons stand between U and T. B is third to the left of U. I is fifth to the right of T. 2 persons stand between E and F, who is sitting at the extreme left end of the row. Three persons stand between A and L, who is towards the right of E.

What is the position of E with respect to L ?

(A) 4th to the left

(B) 7th to the left

(C) 6th to the right

(D) 5th to the left

108. In the following question, there is a statement followed by two arguments I and II. Read carefully and choose the right option from the given possible answers :

Given answers :

(a) Only argument I is strong

(b) Only argument II is strong

(c) Either I or II is strong

(d) Neither I nor II is strong

**Statement :** Should India go for computerization in Industry ?

**Arguments :**

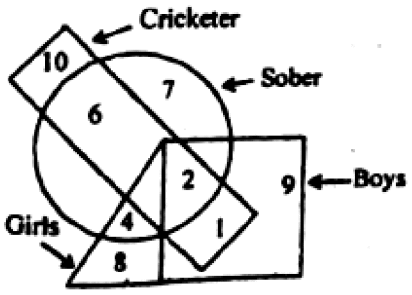
I. No, computerization demands a lot of money. We should not waste money on it.

II. Yes, when advanced countries are introducing computers in various areas, how can we afford to lag behind.

(A) a (B) b

(C) c (D) d

**109.** In the following figure, the boys who are cricketer and sober are indicated by which number ?




(A) 6 (B) 5

(C) 4 (D) 2

**110.** Arrange the words given below in a meaningful sequence :

1. Police 2. Punishment 3. Crime 4. Justice 5. Judgement

(A) 1, 2, 3, 4, 5 (B) 3, 1, 2, 4, 5

(C) 3, 1, 4, 5, 2 (D) 5, 4, 3, 2, 1

## GENERAL ENGLISH

**111. Direction :** Which of the phrases given below should replace the phrase given in bold in the following sentence to make the sentence grammatically correct ?

A person qualified enough to be a secondary school teacher is **most likely to look after** other full-time employment, and it naturally follows that the teacher shortage is the worst at the college level.

(A) most likely to look into
(B) more likely to look for
(C) unlikely to look out
(D) much likely to look at

**112.** The sentences given in this question, when properly sequenced, form a coherent paragraph. Decide on the proper order for the sentences and key in this sequence as your answer :

1. The woodland's canopy receives most of the sunlight that falls on the trees.
2. Swifts do not confine themselves to woodlands, but hunt wherever there are insects in the air.
3. With their streamlined bodies, swifts are agile flyers, ideally adapted to twisting and turning through the air as they chase flying insects–the creatures that form their staple diet.
4. Hundreds of thousands of insects fly in the sunshine up above the canopy, some falling prey to swifts and swallows.

(A) 1432
(B) 1234
(C) 1324
(D) 1243

**113.** Fill in the blank :

He is thoroughly conversant.....the situation.

(A) about
(B) of
(C) around
(D) with

114. **Direction :** Select the option which contains the part of the sentence which has an error (spelling, grammatical or contextual) :

Ravi Shankar's performance was given (A)/a standing ovation by the (B)/ people who has come to hear him. (C)/No error (D)

(A) Ravi Shankar's performance was given

(B) a standing ovation by the

(C) people who has come to hear him.

(D) No error

115. **Direction :** The following question has two blanks, each blank indicating that something has been omitted. Choose the set of words for each blank that best fits in the context of the sentence :

The need is to.....housing stock to a level where people do not have to spend a large slice of their income on rent and to have sensible rent laws that foster a market for rented accommodation, rather than hoarding of empty houses by owners fearful of losing possession of their investment to permanent..... .

(A) augment, shareholders

(B) explain, builders

(C) expand, companies

(D) boost, tenants

116. Find the correctly spelt word :

(A) Callibration

(B) Calliberation

(C) Calibration

(D) Colliberation

**117.** In the following question, out of the four alternatives, select the alternative which best expresses the meaning of the idiom/phrase.

**In a jiffy**

(A) In an appropriate manner

(B) To fall in love

(C) Fail to win appreciation

(D) Something that is done very quickly

**118.** Out of the four alternatives choose the one which can be substituted for the given words/sentence in the question :

**The use of many words where only a few are necessary.**

(A) Circumscription

(B) Circumlocution

(C) Circumspection

(D) Circumvention

**119.** Find the antonym of GERMANE :

(A) Irrelevant

(B) Indifferent

(C) Impartial

(D) Improvident

**120.** Find the synonym of EDUCE :

(A) Demand

(B) Elicit

(C) Ideal

(D) Unlawful