



**FAR WESTERN UNIVERSITY**  
**Faculty of Engineering**  
**Mahendranagar, Kanchanpur, Nepal**  
**[BE Entrance Examination]**

Full Marks: 100

Time: 2 hours

**Attempt all questions:**

Read the following questions and write down the correct option **a**, **b**, **c**, or **d** in the answer sheet provided. Each question carries **1 (one)** mark.

1. If  $A, B$  and  $C$  are the sets of letters needed to spell the words “STUDENT”, “PREPARE” and “ENGINEER”, then the number of elements in  $(A \cup C) \cap B$  is .....  
(a) 6                      (b) 5                      (c) 3                      (d) 2
2. Among the following the logical statement is .....  
(a) Wish you every success in life.  
(b) May god bless you  
(c) The surface of the sun is very cold.  
(d) Hurray ! I passed the entrance exam.
3. The domain of the function  $f(x) = \sqrt{x-1} + \sqrt{8-x}$  is .....  
(a) [1,8]      (b) (-1,8)      (c) [1,8]      (d) (1,8]
4. A matrix  $A = (a_{ij})_{m \times n}$  is said to be a row matrix if .....  
(a)  $m = 1$                       (b)  $n = 1$                       (c)  $m > n$                       (d)  $m < n$
5. If  $A = \begin{pmatrix} 1 & 2 & -1 \\ 0 & 3 & 2 \\ 0 & 0 & 2 \end{pmatrix}$ , then determinant of  $(adj. A)$  is .....  
(a) 6                      (b) -6                      (c) 36                      (d) -36
6. The value of  $\left(\frac{\sqrt{3}+i}{2}\right)^{69}$ , where  $i = \sqrt{-1}$ , is .....  
(a)  $-i$                       (b)  $i$                       (c) 1                      (d)  $-1$
7. If  $\alpha, \beta$  are the roots of the equation  $x^2 - 2x + 2 = 0$ , then the value of  $\alpha^2 + \beta^2$  is .....  
(a) 2                      (b) 0                      (c) 1                      (d) 4
8. If in an infinite G.P., first term is equal to the twice of the sum of the remaining terms, then the common ratio is .....  
(a) 1                      (b)  $\frac{1}{2}$                       (c)  $\frac{1}{3}$                       (d)  $-\frac{1}{3}$
9. The number of three digit numbers between 200 and 500 with distinct digit by using the integers 0,1,2,3,4 and 5 is .....  
(a) 30                      (b) 48                      (c) 60                      (d) 72

10. The coefficient of  $15^{th}$  and  $23^{rd}$  terms in the expansion of  $(1+x)^n$  are equal. Then  $n$  is .....
- (a) 38      (b) 36      (c) 40      (d) 42
11. The sum to infinity of the series  $1 - \log_e 2 + \frac{(\log_e 2)^2}{2!} - \frac{(\log_e 2)^3}{3!} + \dots$  is .....
- (a)  $\frac{1}{2}$       (b)  $-\frac{1}{2}$       (c) 2      (d) -2
12. The value of  $\tan^{-1}(\tan \frac{3\pi}{4})$  is .....
- (a)  $-\frac{\pi}{4}$       (b)  $\frac{\pi}{4}$       (c)  $\frac{3\pi}{4}$       (d)  $-\frac{3\pi}{4}$
13. The principal value of  $\theta$  which satisfies the equations  $\sin \theta = -\frac{\sqrt{3}}{2}$  and  $\cos \theta = \frac{1}{2}$  is .....
- (a)  $\frac{\pi}{3}$       (b)  $\frac{2\pi}{3}$       (c)  $\frac{4\pi}{3}$       (d)  $\frac{5\pi}{3}$
14. If  $\sin^{-1} \frac{x}{5} + \operatorname{cosec}^{-1} \frac{5}{4} = \frac{\pi}{2}$ , then  $x$  is equal to .....
- (a) 4      (b) 5      (c) 1      (d) 3
15. With usual symbols in  $\Delta ABC$ , the value of  $r_1 r_2 + r_2 r_3 + r_3 r_1$  is equal to.....
- (a)  $2s$       (b)  $s^2$       (c)  $2s^2$       (d)  $s$
16. If  $\cot^2 \theta = 3$ , then the general value of  $\theta$  is .....
- (a)  $2n\pi \pm \frac{\pi}{4}$       (b)  $n\pi + (-1)^n \frac{\pi}{6}$       (c)  $2n\pi \pm \frac{\pi}{3}$       (d)  $n\pi \pm \frac{\pi}{6}$
17. The point  $(-4,5)$  is a vertex of a square and one of its diagonals is  $7x - y + 8 = 0$ . The equation of the other diagonal is .....
- (a)  $7x - y + 23 = 0$       (b)  $x + 7y - 31 = 0$       (c)  $x - 7y - 31 = 0$       (d)  $x + 7y + 31 = 0$
18. The value of  $h$  if the equation  $4x^2 + hxy + y^2 = 0$  represents two coincident lines is .....
- (a)  $\pm 3$       (b)  $\pm 5$       (c)  $\pm 4$       (d)  $\pm 6$
19. The length of the tangent from the point  $(2, -3)$  to the circle  $2x^2 + 2y^2 = 1$  is .....
- (a) 5      (b)  $5\sqrt{2}$       (c)  $\frac{5}{\sqrt{2}}$       (d)  $2\sqrt{5}$
20. The line  $3x - 4y = \lambda$  touches the circle  $x^2 + y^2 - 4x - 8y - 5 = 0$  if  $\lambda$  is .....
- (a) 20      (b) 15      (c) 10      (d) 5
21. The focus of the parabola  $x^2 + 8y = 0$  is at .....
- (a)  $(0, -2)$       (b)  $(0, 2)$       (c)  $(2, 0)$       (d)  $(-2, 0)$
22. The eccentricity of the ellipse lies in the interval .....
- (a)  $[0, 1]$       (b)  $(0, 1]$       (c)  $[0, 1)$       (d)  $(0, 1)$
23. The length of the latus rectum of the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$  is .....
- (a)  $\frac{2a^2}{b}$       (b)  $\frac{2b^2}{a}$       (c)  $\frac{b^2}{a}$       (d)  $\frac{a^2}{b}$
24. The ratio in which the line joining  $(2, 4, 5)$  and  $(3, 5, -9)$  is divided by  $yz$ - plane is .....
- (a) 2:3      (b) 3:2      (c) -2:3      (d) -3:2
25. The angle between the planes  $2x - y + z = 6$  and  $x + y + 2z = 7$  is .....
- (a)  $\frac{\pi}{4}$       (b)  $\frac{\pi}{6}$       (c)  $\frac{\pi}{3}$       (d)  $\frac{\pi}{2}$

26. The projection of a line segment on the coordinate axes are 12, 4 and 3 respectively. The length of the line segment is .....
- (a) 19      (b) 16      (c) 15      (d) 13
27. The value of the limit  $\lim_{x \rightarrow 3} \frac{|x-3|}{x-3}$  is equal to .....
- (a) 1      (b) -1      (c) 0      (d) does not exist.
28. If the function  $f(x) = \begin{cases} \frac{k \cos x}{\pi - 2x} ; & x \neq \frac{\pi}{2} \\ 3 & ; x = \frac{\pi}{2} \end{cases}$  be continuous at  $x = \frac{\pi}{2}$ , then  $k$  is .....
- (a) 2      (b) 3      (c) 6      (d) 12
29. If  $y = x \sin^{-1} x + \sqrt{1-x^2}$ , then  $\frac{dy}{dx}$  is .....
- (a)  $\sqrt{1-x^2}$       (b)  $-\sqrt{1-x^2}$       (c)  $\frac{\sin^{-1} x}{\sqrt{1-x^2}}$       (d)  $\sin^{-1} x$
30. If  $f(x) = e^x g(x)$  and  $g(0) = 4, g'(0) = 2$ , then  $f'(0)$  is equal to .....
- (a) 1      (b) 2      (c) 3      (d) 6
31. The side of an expanding square increases at the rate of  $1.5 \text{ cm/s}$ . The rate of change of its area when the side is  $20 \text{ cm}$  is .....
- (a)  $30 \text{ cm}^2/\text{s}$       (b)  $60 \text{ cm}^2/\text{s}$       (c)  $45 \text{ cm}^2/\text{s}$       (d)  $75 \text{ cm}^2/\text{s}$
32. The value of  $\int \frac{\sec^2 x}{\sqrt{\tan x}} dx$  is equal to .....
- (a)  $\frac{2}{\sqrt{\tan x}} + c$       (b)  $2\sqrt{\tan x} + c$       (c)  $\sqrt{\tan x} + c$       (d)  $\frac{1}{2\sqrt{\tan x}} + c$
33. The value of  $\int \frac{1+\cos^2 x}{\sin^2 x} dx$  is .....
- (a)  $-\cot x - 2x + c$       (b)  $-2 \cot x - 2x + c$       (c)  $-2 \cot x - x + c$       (d)  $-2 \cot x + x + c$
34. The area of the region bounded by the curve  $y = 2x - x^2$  and  $x$ -axis is .....
- (a)  $\frac{8}{3}$  sq. unit      (b)  $\frac{4}{3}$  sq. unit      (c)  $\frac{7}{3}$  sq. unit      (d)  $\frac{5}{3}$  sq. unit
35. The order and degree of the differential equation  $\frac{d^2 y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/3} + x^{1/4} = 0$  are respectively .....
- (a) 2,3      (b) 3,3      (c) 2,6      (d) 2,4
36. The solution of the differential equation  $x^2 + y^2 \frac{dy}{dx} = 4$  is .....
- (a)  $x^2 + y^2 = 12x + c$       (b)  $x^2 + y^2 = 3x + c$       (c)  $x^3 + y^3 = 4x + c$       (d)  $x^3 + y^3 = 12x + c$
37.  $OACB$  is a parallelogram with  $\vec{OC} = \vec{a}$  and  $\vec{AB} = \vec{b}$ . Then  $\vec{OA}$  is equal to .....
- (a)  $\vec{a} + \vec{b}$       (b)  $\vec{a} - \vec{b}$       (c)  $\frac{1}{2}(\vec{a} - \vec{b})$       (d)  $\frac{1}{2}(\vec{a} + \vec{b})$
38. If  $\vec{a} + \vec{b} = \vec{c}$  and  $|\vec{a}| = 4, |\vec{b}| = 6, |\vec{c}| = 8$ ; then the angle between  $\vec{a}$  and  $\vec{b}$  is .....
- (a)  $\frac{\pi}{3}$       (b)  $\cos^{-1} \frac{1}{3}$       (c)  $\cos^{-1} \frac{1}{4}$       (d)  $\frac{\pi}{4}$

39. In a set of observation the relation between median , the second quartile  $Q_2$ , the fifth decile  $D_5$  and fiftieth percentile  $P_{50}$  is.....
- (a)  $M = 4 Q_2 = 10 D_5 = 100 P_{50}$                       (b)  $M = Q_2 = D_5 = P_{50}$   
(c)  $M > Q_2 > D_5 > P_{50}$                                       (d)  $M < Q_2 < D_5 < P_{50}$
40. From 30 tickets marked with numbers 1 to 30 , a ticket is drawn at random. The probability that it will be a multiple of 3 or 4 is.....
- (a)  $\frac{1}{3}$               (b)  $\frac{1}{6}$               (c)  $\frac{1}{4}$               (d)  $\frac{1}{2}$
41. The SI unit of work function of a metal used in photoelectric effect is .....
- (a) Joule (J)      (b) Newton (N)      (c) Pascal (Pa)      (d) Hertz (Hz)
42. The distance travelled by an object is directly proportional to the time taken. Its acceleration
- (a) increases              (b) decreases              (c) becomes zero              (d) remains constant
43. A soccer ball is thrown at a 60-degree angle from the ground. It grows to its maximum height in 10 s. Using  $g=10 \text{ m/s}^2$  as the acceleration due to gravity. What is the projected velocity of the object?
- (a) 115.5 m/s              (b) 117 m/s              (c) 120 m/s              (d) 11.55 m/s
44. The centre of mass of a body .....
- (a) Lies always at the geometrical centre  
(b) Lies always inside the body  
(c) Lies always outside the body  
(d) Lies within or outside the body
45. It is difficult to move a cycle with brakes on because.....
- (a) sliding friction is more than rolling friction  
(b) rolling friction is more than sliding friction  
(c) sliding friction opposes motion on road  
(d) rolling friction opposes motion on road
46. A person carrying a box on his head is walking on a level road from one place to another is doing no work. This statement is .....
- (a) Correct              (b) Incorrect              (c) Partially correct              (d) Cannot say
47. A particle moves in a circle of radius 20cm with a linear speed of 10m/s. Its angular velocity in rad/s is.....
- (a) 50              (b) 40              (c) 30              (d) 20
48. In Hooke's law,  $F = -kx$ , the constant k is called the.....
- (a) Velocity              (b) Speed constant              (c) Spring constant              (d) Time
49. If the moment of inertia of a rotating body is increased then what will be the effect on the angular velocity
- (a) It will increase      (b) It will decrease      (c) There will be no effect      (d) First increase and then decrease
50. Which of the following represents viscosity?
- (a) Potential energy stored in fluid  
(b) Resistance of fluid motion  
(c) Roughness of the surface  
(d) The pressure difference between the two fluids

51. Every temperature measuring instrument makes use of a physical property of a substance in order to measure temperature objectively, which physical property is used by mercury in glass thermometer?
- Electromotive force
  - Resistance of a piece of metal
  - Pressure of a fixed mass of gas at constant volume
  - Volume of a fixed mass of liquid
52. A metal ball of mass 0.5 kg falls freely from a height of 10 m and bounces to a height of 5.5 m from the ground. If the dissipated energy in this process is absorbed by the ball (specific heat capacity of material = 450 J/ kgC), the rise in its temperature is.....
- 0.002°C
  - 0.2°C
  - 20°C
  - 2°C
53. A piece of steel has a length of 30 cm at 15°C. At 90°C its length increases by 0.027 cm. Coefficient of linear expansion of steel piece is:
- $6 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$
  - $12 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$
  - $24 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$
  - $36 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}$
54. Heat transmission is directly linked with the transport of medium itself, i.e., there is actual motion of heated particles during .....
- Conduction only
  - Convection only
  - Radiation only
  - Conduction as well as radiation
55. What is the power of the lens, if the far point of a short-sighted eye is 200 cm?
- 0.5 D
  - 2 D
  - 1 D
  - 1.5 D
56. The angle of the prism is equal to the angle of minimum deviation for a prism of refractive index 1.5. What is the value of the angle of the prism?
- 41°
  - 82°
  - 62°
  - 31°
57. Which ray is the least deviated by a prism?
- Violet ray
  - Green ray
  - Red ray
  - Yellow ray
58. Fringe width in Young's double slit experiment increases when .....
- Separation between sources increases
  - Distance between source and screen increases
  - Wavelength of light decreases
  - Do not change
59. Electric lines of force about a negative point charge are .....
- Radial, inward
  - Radial, outward
  - Circular, clockwise
  - Circular, anticlockwise
60. A capacitor consists of .....
- Two insulators separated by a conductor
  - Two conductors separated by an insulator
  - Two insulators only
  - Two conductors only
61. Ohm's law in point form in field theory can be expressed as .....
- $V = RI$
  - $J = E/\sigma$
  - $J = \sigma E$
  - $R = \rho l/A$
62. You are given three bulbs of 25, 40 and 60 watt. Which of them has lowest resistance?
- 25 watt bulb
  - 40 watt bulb
  - 60 watt bulb
  - Information is insufficient

63. Which of the following apparatus construction uses electromagnetic induction?  
 (a) Generator      (b) Voltmeter      (c) Galvanometer      (d) Electric Motor
64. Why DC ammeter can't measure an alternating current?  
 (a) AC cannot pass through a DC ammeter  
 (b) AC changes its direction  
 (c) AC is virtual  
 (d) The average value of a complete cycle is zero
65. Two metals A and B have work functions of 2 eV and 5 eV respectively. Which metal has a higher threshold wavelength?  
 (a) Metal A      (b) Metal B      (c) Both      (d) No change in threshold wavelength
66. A beam of X-rays is constructively scattered in second order from the surface of NaCl crystal at an angle of  $30^\circ$  and the spacing between layers of atoms in NaCl crystal is  $4.5 \times 10^{-10}$  m. The wavelength of X-rays is.....  
 (a)  $2.25 \times 10^{-10}$  m      (b)  $1.25 \times 10^{-10}$  m      (c)  $2.50 \times 10^{-10}$  m      (d)  $1.50 \times 10^{-10}$  m
67. The energy gap is much more in silicon than in germanium because .....  
 (a) It has less number of electrons  
 (b) It has high atomic mass number  
 (c) Its crystal has much stronger bonds called ionic bonds  
 (d) Its valence electrons are more tightly bound to their parent nuclei
68. The decay constant of radium is  $4.28 \times 10^{-4}$  per year. Its half life in years will be.....  
 (a) 1240      (b) 1620      (c) 2000      (d) 63
69. If the combination of protons and neutrons in an atom's nucleus results in a mass defect of 0.528 amu, what is the binding energy for this atom?  
 (a)  $1.82 \times 10^{-11}$  J      (b)  $3.53 \times 10^{-10}$  J      (c)  $3.53 \times 10^{-11}$  J      (d)  $7.74 \times 10^{-11}$  J
70. A moderator is used to slow .....  
 (a) Protons      (b) alpha particles      (c) neutrons      (d) beta particles
71. What is the percentage of hydrogen in water?  
 (a) 88.8      (b) 66.66      (c) 25      (d) 11.11
72. Nitrogen combines with oxygen in different proportion to give different oxides which follows the law of...  
 (a) Conservation of mass  
 (b) Constant proportion  
 (c) Multiple proportion  
 (d) Reciprocal proportion
73. The amount of  $\text{CO}_2$  formed from the burning of 1 mol of glucose is .....  
 (a) 1 mol      (b) 67.2 L at STP      (c) 176 g      (d) 265 g
74. Diamond is an example of .....  
 (a) Covalent solid  
 (b) Electrovalent solid  
 (c) Ionic crystal with hydrogen bonding  
 (d) Solid with hydrogen bonding

75. The number of orbitals present in d-subshells are .....
- (a) 1      (b) 3      (c) 4      (d) 5
76. One faraday is the charge of .....
- (a) 1 mol of electron    (b) One electron    (c) 96500 electrons    (d) One coulomb
77. Solubility of NaCl is  $3.049 \times 10^{-4}$ , its  $K_{sp}$  is.....
- (a)  $9.3 \times 10^{-8}$       (b)  $3.049 \times 10^{-4}$       (c)  $3.049 \times 10^{-2}$       (d)  $3.049 \times 10^{-16}$
78. 10 ml of 0.2M  $H_2SO_4$  can completely neutralized by .....
- (a) 10 ml of 0.2M NaOH    (b) 4 ml of 1M NaOH    (c) 5 ml of 1 M NaOH    (d) 20 ml of 0.4N NaOH
79. Which one is correct ?
- (a) The pH of mineral acid solution may be zero  
 (b) The pH of ammonia solution may be 14  
 (c)  $pH = -\log$  of concentration of acid  
 (d)  $pH = 14 + pOH$
80. Which one is the most electronegative element ?
- (a) N      (b) F      (c) O      (d) Cl
81. Which of the following is responsible for heavy water?
- (a) Water formed from tritium  
 (b) Water formed from deuterium  
 (c) Water containing protium  
 (d) Hard water
82. Huber's process is used for the production of .....
- (a) Nitrogen      (b) Nitric acid      (c) Hydrogen      (d) Ammonia
83. Which one is the most inactive metal?
- (a) Au      (b) Sn      (c) Cu      (d) Al
84. Thomas slag is .....containing fertilizer
- (a) Nitrogen      (b) Phosphorous      (c) Potassium      (d) Nitrogen and potassium
85. Magnetite is an ore of .....
- (a) Iron      (b) Silver      (c) Copper      (d) Zinc
86. Which pair can show the functional isomerism?
- (a) Alcohol and ether    (b) Ether and aldehyde    (c) Alcohol and aldehyde    (d) Aldehyde and ester
87. What is the major product obtained by heating sodium benzoate in presence of sodalime?
- (a) Benzene      (b) Toluene      (c) Benzoic acid      (d) Azobenzene
88. Which one is ester?
- (a)  $HCOOR$       (b)  $-C=O$       (c)  $R-O-C$       (d)  $-CO_2-$

89. Ozonolysis of acetylene gives .....
- (a) Methanol            (b) Ethanol            (c) Ethanedial            (d) Oxalic acid
90. The reagent that reacts with both aldehyde and ketone is .....
- (a) Fehling's reagent            (b) Tollen's reagent            (c) Schiff's reagent            (d) Grignard's reagent
91. The synonym of the underlined word in the sentence "He hardly works" is .....
- (a) strenuously            (b) scarcely            (c) mostly            (d) arduously
92. The expression 'to smell a rat' means.....
- (a) a bad smell            (b) to misunderstand            (c) to hide            (d) to suspect
93. Hari said, "I went to Delhi long ago."
- (a) Hari said that I went to Delhi long ago.  
 (b) Hari said that he had gone to Delhi long before.  
 (c) Hari said that he went to Delhi long ago.  
 (d) Hari said that I had gone to Delhi long ago.
94. Do you imitate others?
- (a) Are others imitated by you?  
 (b) Are others being imitated by you?  
 (c) Were others imitated by you?  
 (d) Have others been imitated by you?
95. The phonemic transcription of 'home' is.....
- (a) / hɔ:m/            (b) / hʌɔm/            (c) / hoʊm/            (d) / həʊm/
96. Which one of the following is correctly punctuated?
- (a) These books are theirs'.  
 (b) These books are their's.  
 (c) These books are theirs.  
 (d) These books are their.

**Read the following passage carefully, and find out the correct option for each of the questions given below (Q.N. 97-100).**

The greatest enemy of mankind, as people have discovered is not science, but war. Science merely reflects the social forces by which it is surrounded. It is found that when there is peace, science is constructive, and when there is war, science is perverted to destructive ends. The weapons which science gives us do not necessarily create war; these make war increasingly more terrible. Until now, it has brought us to the doorstep of doom. Our main problem, therefore, is not to curb science, but to stop war, to substitute law for force, and international government for anarchy in the relations of one nation with another. That is a job in which everybody must participate, including the scientists. But the bomb of Hiroshima suddenly woke us up to the fact that we have very little time. The hour is late and our work has scarcely begun. Now we are face to face with this urgent question: "Can education and tolerance, understanding and creative intelligence run fast enough to keep us abreast with our own mounting capacity to destroy?" That is the question which we shall have to answer one way or the other in this generation. Science must help us in the answer, but the main decision lies within ourselves.



97. An appropriate title for the passage would be .....
- (a) Science and the new generation
  - (b) Science and social forces
  - (c) Science and the horrors of war
  - (d) Science and world peace
98. The expression 'keep us abreast' in the passage means .....
- (a) prevent from escaping
  - (b) hold out a challenge
  - (c) keep at a side
  - (d) keep side by side
99. According to the writer, the main problem we are faced with is to .....
- (a) prevent scientists from participating in destructive activities
  - (b) abolish war
  - (c) stop scientific activities everywhere
  - (d) stop science from reflecting social forces
100. Which of the following statements is not implied in the passage?
- (a) Science is misused for destructive purposes.
  - (b) Neither science nor the weapons it invents add to the horrors of war.
  - (c) People needlessly blame science for war.
  - (d) The role of science in ensuring world peace is subsidiary to that of man.