

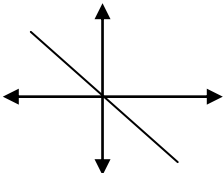
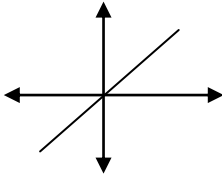
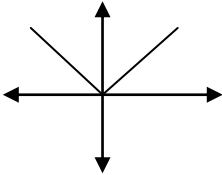
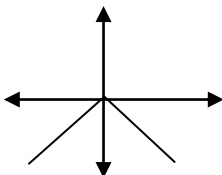
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Model Questions for B.E. Entrance Test (2075)

Set: I (B)

Time: 2 hours

Date: 2075/04/05

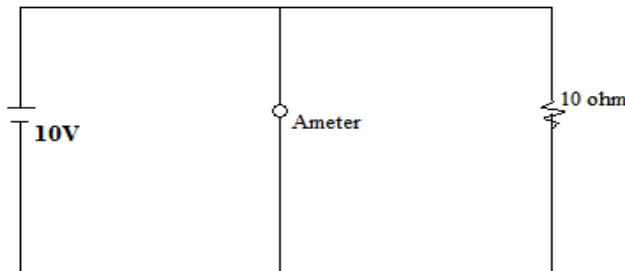
Section: I Select the Best Alternative on the answer sheet given. $60 \times 1 = 60$

1. If $\begin{bmatrix} 0 & 2k-3 \\ 1-k & 0 \end{bmatrix}$ is a skew symmetric matrix, what is the value of k?
(A) -1 (B) 1 (C) -2 (D) 2
2. What is the derivative of $\frac{d}{dx} \log|x|$?
(A) $\frac{1}{|x|}$ (B) $\frac{1}{x}$ (C) $\frac{-1}{|x|}$ (D) $|x|$
3. What is the angle between the lines whose direction ratios are 2, 3, 4 and 1, -2, 1?
(A) $\pi/3$ (B) $\pi/6$ (C) $\pi/2$ (D) $\pi/4$
4. What is the value of k for which the equation $5x^2 - (k+4)x = 20$ has the roots numerically equal but opposite in sign?
(A) 2 (B) -2 (C) -4 (D) 4
5. Which of the following is the graph of $y = |x|$?
(A)  (B) 
(C)  (D) 
6. In which interval the function $f(x) = x^2 - 6x + 4$ is increasing?
(A) $x > 2$ (B) $x < 2$ (C) $x < 3$ (D) $x > 3$
7. What is the gradient of the tangent to the curve $y = x^3 - 12x + 20$ at $x = -2$?
(A) -24 (B) 12 (C) 5 (D) 0
8. How many different sequences of heads and tails are possible if a coin is tossed 5 times?
(A) 32 (B) 8 (C) 16 (D) 2

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9. What is the point of intersection of the line $y = x + 1$ and $y = x^2 - 3x + 4$?
(A) (1, 2) and (3, 4) (B) (1, 2) and (-3, 4)
(C) (1, 2) and (3, -4) (D) (1, -2) and (3, 4)
10. What is the value of $\lim_{x \rightarrow 0} \frac{e^{\sin x} - 1}{x}$?
(A) 0 (B) 1 (C) 2 (D) -1
11. Which of the following is sequential device?
(A) mouse (B) magnetic tape
(C) pen drive (D) printer The OR gate
12. In 2^{32} how many bits are there?
(A) 2 bits (B) 16 bits (C) 64 bits (D) 32 bits
13. Which of the following is other than operating system?
(A) Linux (B) windows (C) Google chrome (D) Mac OS
14. How many Internet are there in the world?
(A) 1 (B) 2 (C) 3 (D) Many
15. What happens in the following circuit?
(A) Ammeter shows 1A (B) Circuit burnt out
(C) Ammeter shows 0A (D) Ammeter shows 10 A



16. What is the unit of electrical energy?
(A) ampere (B) VAR (C) watt (D) watt hour
17. Which of the following hydropower is storage type?
(A) Pharping Hydrpower Plant (B) Sundarijal Hydropower Plant
(C) Sunkoshi Hydropower Plant (D) Kulekhani Hydropower Plant
18. Wattmeter measures.....
(A) active power (B) effective power
(C) apparent power (D) both A and B
19. For a stone to be resistant to fire, it shouldn't be made from.....
(A) Alumina (B) CaCO_3 (C) Silt (D) clay

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20. When water is added to cement.....
(A) heat is absorbed (B) heat is generated
(C) chemical reaction is absorbed (D) impurities are wash out
21. Width of zebra crossing is.....
(A) 2m (B) 3.5m (C) 2.5m (D) 4.5m
22. Solar cell is
(A) biased (B) unbiased (C) alternating (D) none
23. Which unit is used to measure power in micro hydropower?
(A) Kilowatt (B) Mill watt per hour
(C) HP (D) Megha watt
24. Ignition quality of Petrol is expressed by.....?
(A) octane no. (B) cetane no. (C) choke (D) all of the above
25. Which one of the following can be used as primary standard solution?
(A) KMnO_4 (B) $\text{Na}_2\text{S}_2\text{O}_3$ (C) Na_2CO_3 (D) NaOH
26. Azimuthal quantum number gives
(A) size of orbital (B) spin of orbital
(C) shape of orbital (D) orientation of orbital
27. The isomerism shown by alkyl cyanide and alkyl isocyanide is
(A) Tautomerism (B) Position (C) Functional (D) Metamerism
28. Ethyne on ozonolysis forms
(A) ethanol (B) ethanone (C) ethanediol (D) ethanedial
29. Bleaching action of sulphur dioxide is due to
(A) oxidation (B) reduction (C) hydrolysis (D) dehydration
30. Which one of the following is not ore of copper?
(A) Limonite (B) Cuprite (C) Azurite (D) Malachite
31. Which of the following does not participate in the Solvay's process for the manufacture of Na_2CO_3 ?
(A) H_2SO_4 (B) NaCl solution (C) CO_2 (D) NH_3
32. When ammonia is passed over heated CuO , it is oxidised to
(A) NO_2 (B) HNO_3 (C) N_2O (D) N_2
33. The character of hydrogen which is different from halogen is
(A) electronegativity (B) ionization energy
(C) electropositive nature (D) reaction with alkali metals
34. Oxidation number of chromium in potassium dichromate is
(A) +4 (B) +6 (C) +8 (D) +12
35. In cell, oxidation takes place at
(A) cathode (B) anode (C) electrolyte (D) none of these

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36. 4 liters of water are added to 2 liters of 6 M HCl. The molarity of resulting solution is
(A) 4 M (B) 3M (C) 2M (D) 5 M
37. The word 'cushion' has
(A) three vowels and two consonants
(B) three consonants and two vowels
(C) four consonants and three vowels
(D) one vowel and three consonants
38. The word 'Never-the-less' gets its primary stress on its syllable.
(A) fourth (B) third (C) second (D) first
39. A vivacious person is one who is
(A) lively (B) kind (C) talkative (D) well-dressed
40. The parties should not escape.
(A) harmless (B) condign (C) tractable (D) culpable
41. He is the devil and the deep sea.
(A) into (B) under (C) between (D) with
42. He said, "How amazing is the spirit of man!"
(A) He exclaimed the spirit of man was amazing.
(B) He exclaimed with amazement that the spirit of man was amazing.
(C) He asked with surprise if the spirit of man was amazing.
(D) He told in excitement that the spirit of man was amazing.
43. Which of the following is a complex sentence?
(A) The girl who is in black is soft-spoken.
(B) The girl in black is soft-spoken.
(C) The girl is in black and she is soft-spoken.
(D) The girl is in black but she is soft-spoken.
44. The acceptable negative of 'There must be a mistake' is
(A) There cannot be a mistake.
(B) There mustn't be a mistake.
(C) There must not be a mistake.
(D) Cannot be a mistake.
45. Which of the following is not a passive sentence?
(A) The book sells well. (B) His words sound harsh.
(C) I have appeared in the examination. (D) Let it be done.
46. You can write a letter
(A) if you learnt to do so (B) unless you learn to do so
(C) if you learn to do so (D) if you would learn to do so
47. Ten kilometers a great distance.
(A) were (B) are (C) was (D) is

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48. Pick out the most correct option for “The dangerous dog bit me”.
- (A) I had been bitten by the dangerous dog.
 - (B) Me bitten by the dangerous dog.
 - (C) The dangerous dog was bitten by me.
 - (D) I was bitten by the dangerous dog.
49. Queen Mary sailed off at 10 today.
- (A) A
 - (B) The
 - (C) An
 - (D) no article
50. Which of the following is correct?
- (A) When since you have been working for her?
 - (B) Since when have you been working for her?
 - (C) Since have you been working for her?
 - (D) When have you been working for her since?
51. In forward bias, the width of potential barriers in a P-N junction diode
- (A) decreases
 - (B) increases
 - (C) remains constant
 - (D) first increases & then decreases
52. If a copper rod carries a direct current, the magnetic field associated with the current will be
- (A) only inside the rod
 - (B) both inside & outside the rod
 - (C) only outside the rod
 - (D) neither inside nor outside the rod
53. If a soap bubble is charged with negative charge, its radius
- (A) will decrease
 - (B) will remain same
 - (C) will increase
 - (D) data is not sufficient
54. When the length of a microscope tube increases, its magnifying power
- (A) zero
 - (B) decrease
 - (C) does not change
 - (D) increase
55. A convex lens is dipped in a liquid whose refractive index is equal to the refractive index of the lens. Then its focal length will
- (A) become zero
 - (B) become small but non-zero
 - (C) remain unchanged
 - (D) become infinite
56. When light passes from one medium to another medium, the physical quantity which remains unchanged is
- (A) velocity
 - (B) wavelength
 - (C) frequency
 - (D) refractive index
57. In the production of beats by 2 waves of same amplitude and nearly same frequency, the maximum intensity to each of the constituent waves is
- (A) Same
 - (B) 4 times
 - (C) 2 times
 - (D) 8 times
58. Absolute temperature can be calculated by
- (A) mean square velocity
 - (B) motion of the molecule
 - (C) direction of the molecule
 - (D) none of these

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59. In gravity free space, the liquid in a capillary tube will rise to
(A) infinite height (B) less height as on earth
(C) lightly move height than that on earth (D) same height as on earth
60. The square root of the product of inductance and capacitance has the dimension of
(A) time (B) mass (C) length (D) no dimension

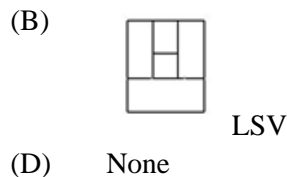
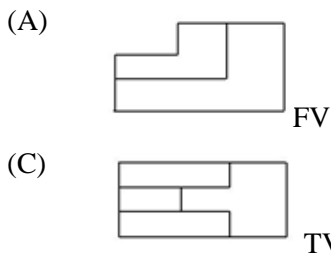
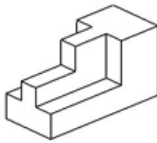
Section: II Select the Best Alternative on the answer sheet given. $40 \times 2 = 80$

61. What is the value of $\lim_{x \rightarrow \infty} \frac{2^{x+1} - 3^{x+1}}{2^x - 3^x}$?
(A) 1 (B) -1 (C) 3 (D) 2
62. If $\vec{a} + \vec{b} + \vec{c} = 0$, $|\vec{a}| = 5$, $|\vec{b}| = 4$, $|\vec{c}| = 3$ then what is the angle between \vec{b} and \vec{c} ?
(A) 30° (B) 60° (C) 90° (D) 45°
63. The value of $\int \sqrt{\frac{1+x}{1-x}} dx$ is
(A) $2\sin^{-1}x - \sqrt{1-x^2} + c$ (B) $\frac{1}{2}\sin^{-1}x - \sqrt{1-x^2} + c$
(C) $\sin^{-1}x + \sqrt{1-x^2} + c$ (D) $\sin^{-1}x - \sqrt{1-x^2} + c$
64. The volume of a cylinder is given by the formula $V = \pi r^2 h$. What is the greatest value of V if $r + h = 6$?
(A) 44π (B) 36π (C) 40π (D) 32π
65. What is the smaller area enclosed between the circle $x^2 + y^2 = 4$ and the line $x + y = 2$?
(A) $\pi - 1$ (B) $\pi - 2$ (C) π (D) $-\pi$
66. What is the value of $\int_{-1}^1 \sec x \log\left(\frac{1+x}{1-x}\right)$
(A) 1 (B) 0 (C) -1 (D) 2
67. What are the equations of the directrices to the ellipse $3x^2 + 2y^2 = 6$?
(A) $x = \pm \frac{3}{4}$ (B) $x = \pm 3$ (C) $y = \pm \frac{3}{4}$ (D) $y = \pm 3$
68. What is the co-efficient of x^6 in the expansion of $(1+x)^{25} + (1+x)^{26} + \dots + (1+x)^{40}$?
(A) $\binom{41}{6} - \binom{25}{7}$ (B) $\binom{40}{7} - \binom{25}{7}$
(C) $\binom{41}{7} - \binom{25}{7}$ (D) $\binom{41}{7} - \binom{25}{6}$

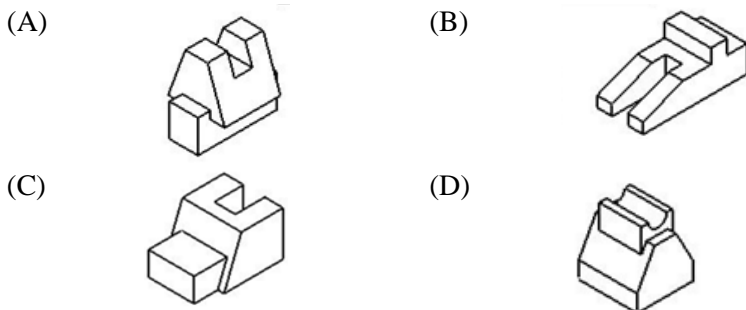
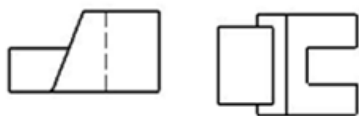
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69. For $x \neq 0$, what is the value of $\tan\left(\frac{\pi}{4} - \frac{1}{2}\cos^{-1}x\right) + \tan\left(\frac{\pi}{4} + \frac{1}{2}\cos^{-1}x\right)$?
 (A) $\frac{1}{x}$ (B) $\frac{2}{x}$ (C) $\frac{1}{1+x}$ (D) $\frac{2}{1+x}$
70. What is the angle between the tangents drawn from the origin to the parabola $y^2 = 4a(x - a)$?
 (A) $\frac{\pi}{2}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{4}$ (D) π
71. Which of the following is the correct representation for $x^2 + 9y^2 - 6xy + 3x - 9y = 0$?
 (A) A pair of parallel lines (B) A pair of perpendicular lines
 (C) A hyperbola (D) An ellipse
72. In a triangle ABC if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$ and $b = \frac{8}{\sqrt{3}}$, what is the area of the triangle ABC
 (A) $16\sqrt{3}$ sq. units (B) $\frac{8}{\sqrt{3}}$ sq. units (C) $\frac{16}{\sqrt{3}}$ sq. units (D) 8 sq. units
73. If $2x - 3y = 0$ is the equation of the common chord of the circle $x^2 + y^2 + 4x = 0$ and $x^2 + y^2 + 2\alpha y = 0$, what is the value of α ?
 (A) 1 (B) 2 (C) 4 (D) 3
74. If $\frac{\sqrt{3}}{2}$ is the geometric mean between $\cos \theta$ and $\sin \theta \cdot \tan \theta$, what is the value of θ ?
 (A) 0° (B) 60° (C) 30° (D) 150°
75. If $(x - a)$ is a factor of $x^2 - 3x - 4 = 0$, what is the value of a ?
 (A) -1 or 4 (B) -1 or -4 (C) 1 or -4 (D) 1 or 4
76. Which orthographic projection is incorrect?



77. Which is the correct solid object for the given orthographic projection?



78. Excess amount of the gas formed by heating a mixture of ammonium chloride and slaked lime is passed into copper sulphate solution forms
 (A) bluish white ppt. (B) blue ppt.
 (C) red ppt (D) deep blue solution
79. An organic compound formed by dehydration of ethanol with concentrated H_2SO_4 on treatment with Baeyer's reagent forms
 (A) ethylene glycol (B) glycerol
 (C) oxalic acid (D) formic acid
80. 0.1978g of copper is deposited by a current of 0.2 ampere in 50 minutes. The electrochemical equivalent of copper is
 (A) 0.000987 (B) 0.0007764 (C) 0.0003296 (D) 0.00984
81. The amount of Pure H_2SO_4 present in 250 ml of 0.1N H_2SO_4 is
 (A) 3.15 gm (B) 1.225 gm (C) 2.5 gm (D) 1.35g

Read the passage and answer the questions from 82 to 85.

The fact that everyone is selfish may mean that selfishness is natural, but it does not follow that it is needful. The very evils it creates should be enough to make us realize, it is not in the interest of the individual or of his society. In fact the men who are completely self-centred have to be kept away from their fellow men in institutions provided for the purpose. We have not yet found a wave of dealing with completely self-centred nations. Is it possible for ordinary man consistently to prefer others to himself - to live to make the other fellow great? To be genuinely more concerned with the welfare of people than with profits? To consider seriously and intelligently the needs and feelings of other classes, races and nations as well as his own? Can men live above differences of party, class, race, point of view and

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national advantage? If the answer is 'yes' a new world society and philosophy uniting all men can be constructed.

82. The writer presupposes that:
(A) Selfishness is inhuman. (B) Selfishness is natural.
(C) Selfishness is inborn. (D) Man is selfish.
83. The writer means to say that man cannot
(A) consistently prefers others to himself (B) persistently prefers himself
(C) always prefer others to himself (D) none of these
84. Construction of new world society depends on
(A) nothing (B) recognition of needs
(C) many things (D) a few conditions
85. "Genuinely more concerned" means
(A) really worried (B) sincerely more troubled
(C) dependable concern (D) really related
86. The kinetic energy of a satellite in its orbit around the earth is E. What should be the kinetic energy of the satellite so as to enable it escape from the gravitational pull of the earth?
(A) 4 E (B) E (C) $\sqrt{2}$ E (D) 2E
87. Two wires of same material and length but diameter in the ratio 1:2 are stretched by the same force. The potential energy per unit volume for the two wires when stretched will be in the ratio
(A) 4 : 1 (B) 16:1 (C) 2:1 (D) 1:1
88. Two soap bubbles have radii in the ratio 2:1. What is the ratio of excesses pressure inside them?
(A) 1:4 (B) 2 : 1 (C) 1:2 (D) 4:1
89. The 22 gm of CO₂ at 27°C is mixed with 16 gm of O₂ at 37°C. the temperature of the mixture is
(A) 30°C (B) 32°C (C) 27°C (D) 37°C
90. The heat required to raise temperature from 30°C to 35°C for 2 moles of an ideal gas is 70 cal at constant pressure, then heat required for the same gas to raise the temperature of the same range but at constant volume will
(A) 30 cal (B) 70 cal (C) 50 cal (D) 60 cal
91. If the tube length of astronomical telescope is 105 cm and magnifying power is 20 for normal setting. The focal length of objective is
(A) 10 cm (B) 100 cm (C) 20 cm (D) 25 cm
92. In Young's experiment, the ratio of maximum to minimum intensities of the fringe system is 4:1. The amplitude of the coherent sources are in the ratio
(A) 4 : 1 (B) 2 : 1 (C) 3:1 (D) 1 : 1

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93. A capacitor of capacitance $6\mu\text{ F}$ is charged to 100 volt. The energy stored in the capacitor is
(A) 0.6 J (B) 0.03 J (C) 0.06 J (D) 0.3 J
94. The period of oscillations of a magnetic needle in a magnetic field is 1.0 s. If the length of the needle is halved by cutting it then the time period will be
(A) 1.0 s (B) 2.0 s (C) 0.25 s (D) 0.5 s
95. Input power at 22000 V is to be stepped down to 220 V by a transformer with a winding of 4400 turns in the primary, what should be the number of turns in the secondary of the transformer?
(A) 44 (B) 440 (C) 220 (D) 200
96. A pendulum is undergoing simple harmonic motion. The velocity of bob in mean position is v . If now its amplitude is doubled, keeping the length same, its velocity in mean position will be
(A) $\frac{v}{2}$ (B) v (C) $4v$ (D) $2v$
97. Given that in a hydrogen atom the energy of the n^{th} orbit $E_n = -\frac{13.6}{n^2} \text{ eV}$.
The amount of energy required to send electron from first orbit to second orbit is
(A) 10.2 eV (B) 2.1 eV (C) 13.6 eV (D) 3.4 eV
98. A radio-active material has a half-life of 10 days. What fraction of the material would remain after 30 days?
(A) 0.125 (B) 0.25 (C) 0.5 (D) 0.33
99. When the speed of a car is v , the minimum distance over which it can be stopped is s . If the speed becomes nv , what will be the minimum distance over which it can be stopped during same time
(A) $\frac{s}{n}$ (B) ns (C) $\frac{s}{n^2}$ (D) n^2s
100. The sum of two Vectors A and B is at right angles to their difference, then
(A) $A = 2B$ (B) $A = B$ (C) $B = 2A$ (D) $A = B / \sqrt{2}$
