



PURBANCHAL UNIVERSITY
FACULTY OF ENGINEERING
Biratnagar, Morang

ENTRANCE EXAMINATION MODEL QUESTION- 2079

BE (Biomedical/Civil/Computer/Electrical/Electronics Communication & Automation/ Geomatic) / Bachelor in Architecture

Time: 2 hours

Total Full Marks: 100

Choose the most appropriate answer and **DARKEN** the circle on the attached **ANSWER SHEET**. Answer ALL questions. ALL questions carry equal marks.

1. If $P \cap Q = \emptyset$ then $P - Q =$

- a. P b. Q c. $Q - P$ d. $P \cup Q$

2. If $f(x) = x^2$ and $g(x) = 2x + 1$ then $(f + g)(x) =$

- a. $(x + 1)^2$ b. $(x - 1)^2$ c. $x^2(2x + 1)$ d. $2x^3 + x^2$

3. If $f(x - 1) = x + 3$ then $f(x^2) =$

- a. x^2 b. $x^2 + 3$ c. $x^2 + 4$ d. $x^2 - 1$

4. Inverse function f^{-1} exists if f is:

- a. injective b. surjective c. bijective d. into

5. The function $f(x) = 3^x, x \in \mathbb{R}$ is:

- a) linear function b) trigonometric function c) cubic function d) exponential function

6. If $\begin{pmatrix} 0 & a+2 \\ 5 & 0 \end{pmatrix}$ is a skew-symmetric matrix then a=

- a.-7 b.-5 c.-3 d.-2

7. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ then $AA^T =$

- a.0 b.I c.A d. A^T

8. If a,b,c are in G.P. then $\log a, \log b, \log c$ are in

- a. A.P b.G.P c.H.P d.A.G.P

9. If a,b,c are in A.P; b,c,a are in H.P; then c,a,b are in:

- a.A.P b.G.P c.H.P d.A.G.P

10. How many different numbers of five digits can be formed with the digits 0,1,2,3,4?

- a.120 b.114 c.96 d.60

11. In how many ways 6 students be seated in a round table?

- a.720 b.360 c.120 d.60

12. The value of $4(xy)^3 + (x^3 - y^3)^2$ is:

- a. $(x^3 - y^3)^2$ b) $(x^3 + y^3)^2$ c) $(x^3 + y^3)$ d) $(x^3 - y^3)$

13. If $\vec{a} = 3\vec{i} + 2\vec{j} + 2\vec{k}$ then $|\vec{a}| =$

- a.1 b. $2\sqrt{2}$ c.3 d. $\sqrt{17}$

14. If \vec{a} is a non-zero vector then unit vector in the direction of \vec{a} is:

- a. \vec{a} b. $\frac{\vec{a}}{|\vec{a}|}$ c. $\vec{a}|\vec{a}|$ d. $|\vec{a}|$

15. If $\vec{a} = 3\vec{i} + \vec{k}$ and $\vec{b} = \alpha\vec{i} + \vec{j} + 3\vec{k}$ are orthogonal then $\alpha =$

- a.0 b.1 c.-1 d.2

16. If $\vec{a} = 3\vec{i} + 2\vec{j} - \vec{k}$ and $\vec{b} = 2\vec{i} + 4\vec{j} - 4\vec{k}$ then $\vec{a} \cdot \vec{b} =$

- a.6 b.10 c.14 d.18

17. In triangle ABC, if $a=3, b=4, c=5$, then the value of $\cos \frac{c}{2}$ is

- a. $\frac{1}{\sqrt{2}}$ b. $\frac{1}{2}$ c. $\frac{\sqrt{3}}{2}$ d. $\frac{\sqrt{3}}{4}$

18. $\int \cot x dx =$

- a. $-\operatorname{cosec}^2 x$ b. $\log(\tan x)$ c. $\log(\sin x)$ d. $\log(\cos x)$

19. $\int \frac{1}{x^2+a^2} dx$ is equal to

- a. $\log(x^2+a^2)$ b. $\frac{1}{a} \tan^{-1} \frac{x}{a}$ c. $\frac{1}{x} \tan^{-1} \frac{a}{x}$ d. $\frac{1}{2} \log(x^2 + a^2)$

20. The maximum value of $f(x)=1+\sin x+\cos x$ is

- a.2 b. $\sqrt{2} + 1$ c. $\sqrt{2}$ d. $2\sqrt{2}$

21. If the function $f(x) = \begin{cases} 3x - 4, & \text{for } x \leq 2 \\ 2x + k, & \text{for } x > 2 \end{cases}$ is continuous at $x=2$, then the value

of k is

- a.2 b.-2 c.4 d.-4

22. The last two digits of the number 3^{400} is

- a.39 b.29 c.01 d.43

32. If $z=2+i$ and $w=3$ then $|3z-4w|$ =

- a. $\sqrt{45}$ b. $\sqrt{53}$ c. $\sqrt{91}$ d. $\sqrt{101}$

33. If $(x+2) + yi = (3+i)(1-2i)$ then x =

- a. -3 b. 3 c. 5 d. -5

34. The absolute value of $\frac{3-4i}{3+4i}$ is:

- a. 5 b. $1/5$ c. 1 d) 0

35. If $\begin{pmatrix} 0 & a+2 \\ 5 & 0 \end{pmatrix}$ is a skew-symmetric matrix then a =

- a. -7 b. -5 c. -3 d. -2

36. Calculate the mean of the given data set:

3,8,12,17,16,14,6,8,16,10 is

- a. 11 b. 12 c. 13 d. 14

37. Calculate the variance of given data set: 4,7,6,3,7,3

- a. 2 b. 4 c. 6 d. 8

38. Find the standard deviation of the given data sets 7,47,8,42,47,95,42,96,3

- a. 29.09 b. 30.09 c. 31.09 d. 32.09

39. What will be the probability of getting odd numbers if a dice is thrown?

- a. $1/2$ b. 2 c. $4/2$ d. $5/2$

40. What is the probability of getting 1 and 5 if a dice is thrown once?

- a. $1/6$ b. $1/3$ c. $2/3$ d. $1/36$

41. The dimensional formula of velocity gradient is:

- a. $[M^0L^0T^{-1}]$ b. $[MLT^{-1}]$ c. $[ML^0T^{-1}]$ d. $[M^0LT^{-2}]$

42. The distance 's' of a particle is increasing linearly with time 't' as $s=bt$. Then the acceleration of the particle is:

- a. Zero b. Infinite c. b d. -b

43. The moment of inertia of a thin rod (mass M, Length L) about an axis passing through center and perpendicular to the rod is,

- a. ML^2 b. $ML^2/2$ c. $ML^2/3$ d. $ML^2/12$

44. The temperature of a patient is 40°C , his temperature on Fahrenheit Scale will be

- a. 104°F b. 72°F c. 96°F d. 100°F

45. When the distance between two charged particles is halved, the coulomb force between them becomes

- a. One half b. One- Fourth c. Double d. Four times

46. The idea of displacement current was introduced by

- a. Maxwell b. Hertz c. Marconi d. Base

47. Two coherent sources produce a dark fringe when the phase difference between interfering waves is

- a. Zero b. 2π c. $2n\pi$ d. $(2n-1)\pi$, where $n=1,2,3,4,\dots$

48. The total energy of a particle executing S.H.M

- a. Fluctuates inconsistently b. Follows a sine curve
c. remains constant d. None of these

49. The resultant of two forces $3P$ and $2P$ is R . If the first force is doubled then the resultant is also doubled? The angle between the two forces is

- a. 90° b. 180° c. 60° d. 120°

50. A ray of light travels in optical fiber is due to

- a. refraction b. Total internal reflection c. reflection d. Polarization

51. The unit of pole strength is

- a. Amp-metre² b. Amp-meter c. Amp/meter
d. Amp/meter²

52. The angle of prism is 30°. The ray incident at 60° at one refracting face suffers a deviation of 30°. Then the angle of emergence is

- a. 0° b. 30° c. 60° d. 90°

53. Sound waves differ from light waves because they do not exhibit the phenomenon of

- a. refraction b. interference c. diffraction d. Polarization

54. The magnetic force(F) on a current carrying conductor of length L placed in a magnetic field B at angle(θ) with direction is:

- a. $BIL\sin\theta$ b. $BIL\cos\theta$ c. $B\sin\theta/IL$ d. $I^2LB^2\sin^2\theta$

55. A string stretched at both ends is under a tension of 100 N. If mass of string is 4×10^{-6} kg/cm, the velocity of transverse waves in string is

- a. 330 m/s b. 50 m/s c. 500 m/s d. 5000 m/s

56. Which of the following is maximum

- a. rolling friction b. Kinetic friction c. Static Friction d. All of the above

57. $[MLT^{-1}]$ is the dimensional formula of

- a. Power b. Force c. Work d. Linear Momentum

58. The unit of electric permittivity of free space ϵ_0 is

- a. coulomb²/newton -meter²
b. newton – meter²/coulomb²
c. coulomb²/newton - meter

d. coulomb²/newton - meter²

59. A copper wire is stretched to make it 0.1 % longer, what is the percentage change in its resistance?

- a. 0.1 % b. 0.2 % c. 0.3 % d. 0.4%

60. Two soap bubbles have radii in the ratio 2:1, the ratio of excess pressure inside than is

- a. 1:2 b. 2:1 c. 1:4 d. 4:1

61. Two lenses of power +12 and -2 diopter, are placed in contact. What will be the focal length of the combination?

- a. 10 cm b. 12.5 cm c. 16.6 cm d. 8.33 cm

62. The surface tension of soap solution is 25×10^{-3} N/m. The excess pressure inside a soap bubble of diameter 1cm is

- a. 5 Pa b. 10 Pa c. 20 Pa d. 40 Pa

63. The temperature at which the speed of sound in air becomes three times of its value at 27°C is

- a. 81°C b. 9°C c. 2427°C d. -264°C

64. The critical angle for a ray of light travelling from glass ($\mu_g = 1.5$) to water ($\mu_w = 1.33$) is

- a. 22.7° b. 42.7° c. 52.7° d. 62.7°

65. The minimum distance between an object and its real image formed by a thin convex lens of focal length 'f' is

- a. 4f b. 2f c. f d. f/2

66. The tip of a needle does not give a sharp image on the screen. This is due to

- a. Polarization b. Interference c. Diffraction d. Refraction

67. The no. Of electrons flow per second through an electric bulb rated 220 V, 100 Watt is

- a. 2.84×10^{18} electrons / second b. 2.84×10^{-18} electrons/second
c. 2.84×10^{19} electrons /second d. 2.84×10^{-19} electron / second

68. The inductive time constant is

- a. LR b. L/R c. $\sqrt{(L/R)}$ d. R/L

69. The phenomenon of photo electric effect was explained by

- a. Planck b. Maxwell c. Einstein d. Bohr

70. Light propagates rectilinearly, due to

- a. wave nature b. wavelengths c. velocity d. frequency

71. Which one of the following properties of an element is not variable?

- a. Valency b. Atomic mass c. equivalent mass d. all of the above

72. A gas is termed an ideal gas if it obeys the equation of state $PV = nRT$. Other show deviation from ideality,

- a. At low pressure b. At low temperature
c. At low pressure and high temperature d. At high pressure and low temperature

73. The existence of two unpaired electron in a silicon atom is an accordance with

- a. Aufbau peinciple b. Hund's rule
c. uncertainty principle d. Pauli's exclusion principle

74. The conversion of lead carbonate to lead sulphate is

- a. Oxidation b. reduction
c. both oxidation and reduction d. neither oxidation nor reduction

75. A compound that is not a lewis acid is

- a. BF_3 b. $AlCl_3$
c. $BeCl_2$ d. $SnCl_4$

76. The weight of silver deposited from AgNO_3 solution by 0.5 Faraday of electricity ($A_g = 108$) is

- a. 54 gm b. 10.8 gm c. 21.6 gm d. 108 gm

77. The half life of a first order reaction is 10 min. if initial amount is 0.08M and concentration at some instant is 0.01M, then $t =$

- a. 10 min b. 30 min c. 20 min d. 40 min

78. A reaction occurs spontaneously with

- a. ΔG is positive and ΔS is positive b. ΔG is negative and ΔS is positive
c. ΔH is positive and ΔS is negative d. Both ΔH and ΔS are positive

79. Which of the following contain least percentage of iron?

- a. Wrought iron b. steel
c. pig iron d. cast iron

80. Excess of Zn reacts with dilute nitric acid produce

- a. NO_2 b. NO
c. NH_4NO_3 d. N_2O_3

81. Zeolite are used as

- a. Gem b. ion-exchanger
c. pigment d. lubricant

82. Ammonia can be dried by

- a. Conc. H_2SO_4 b. P_2O_5
c. Anhydrous CaCl_2 d. none of above

83. Sodium metal cannot be kept in

- a. Benzene b. Alcohol
c. Kerosene d. Toluene

84. Which of the following minerals does not contain Al?
- a. Cryolite
 - b. mica
 - c. feldspar
 - d. fluorspar
85. The IUPAC name of HCOOC_2H_5 is
- a. Ethoxy formate
 - b. Ethyl formate
 - c. Ethyl methanoate
 - d. Ethoxy methanoat
86. Hydrocarbon which is liquid at room temperature is
- a. Propane
 - b. butane
 - c. pentane
 - d. ethane
87. Which of the following has higher boiling points?
- a. Diethyl ether
 - b. n-butyraldehyde
 - c. n-propyl chloride
 - d. n-butyl alcohol
88. Acetaldehyde on treatment with Tollens reagent gives a precipitate of
- a. Ag
 - b. AgNO_3
 - c. Cu_2O
 - d. None of these
89. Nitriles can be prepared by
- a. The hydration of amine
 - b. the dehydration of acid
 - c. the reduction of acid
 - d. the dehydration of amide
90. Which of the following compound is used as an antiknock compound?
- a. Ethyllithium
 - b. tetraethyllead
 - c. ethyl acetate
 - d. lead acetate
91. The word _____ consist of /w/ sound in the initial position
- a. whom
 - b. sweet
 - c. calm
 - d. water
92. If you _____ a bike, You **wouldn't have to** walk everywhere.
- a. bought
 - b. have bought
 - c. had bought
 - d. would have bought

93. People who fear with water called
a. Soliloquist b. Aquaphobia c. agoraphobia d. sinecure
94. The passive form of “Please close the door”?
a. You have to close the door.
b. You are ordered to closed the door.
c. You are requested to close the door.
d. Can you close the door?
95. The treaty was signed _____ the NATO countries that they would help Ukraine _____ Russia.
a. between / against b. among / against
b. c. amongst / opposite d. between / opposite
96. The word ‘epidemic’ is antonymous with
a. pandemic b. endemic c. academic d. none of them
97. Although they are not rich, they always wear..... Clothes.
a. respective b. respected c. respectable d. none
98. The synonyms of “incredible” is
a. trustworthy b. unbelievable c. believable d. likely
99. There was some _____ agreement over the bill.
a. dis b. mis c. un d. in
100. “You are my true friend, and you will be forever”. It is a
a. Compound sentence
b. Compound-complex sentence
c. Simple sentence
c. None of the above