BEATS ENGINEERING

INSTITUTE OF ENGINEERING

Model Entrance Exam

(Set-2)

Instructions:

There are 100 multiple-choice questions, each having four choices of which only one choice is correct.

Date: 2080/02/27
(June-10)

Duration: 2 hours
Time: 8 AM – 10 AM

Section-A (1 marks)

1) None of the problems _____ discussed.
a) were b) has been c) is d) was

2) She has _____ lifting the load.
a) difficulty at b) difficulty in c) difficulty for d) difficulty of

3) They _____ on a picnic tomorrow.
a) will go b) will be going c) will have gone d) had been

4) The manager would rather _____ at his office than stayed at home last week.
a) have worked b) work c) had worked d) working

5) He is famous _____ his acting skills.
a) over b) of c) for d) by

6) He had to cut a sorry figure for accepting bribes in public.
a) to be proud b) to be cheated c) to be ignored d) to be ridiculed

7) Select the option that expresses the given sentence in passive voice.
"Are fossil fuels not impacting human health?"
a) Did human health not being impacted by fossil fuel?
b) Was human health not being impacted by fossil fuel?
c) Is human health not impacted by fossil fuel?
d) Is human health not being impacted by fossil fuel?

8) Assuage (Synonym):
a) mitigate b) intensify c) augment d) provoke

9) Insatiable (Antonym):
a) requiring b) unsatisfied c) appeasing d) gluttonous

10) The word 'robbery' has a stress primarily on its _____ syllable.
a) first b) second c) third d) fourth

11) The sooner you leave, _____ you reach.
a) the quickest b) quicker c) the quicker d) the more quicker

12) I'd prefer _____ for the next bus rather than travel on a crowded one because I have difficulty standing up for long.
a) waiting b) to wait c) wait d) to be waiting

13) A dimensionless quantity:
a) never has a unit b) always has a unit c) may have a unit d) does not exist

14) The area under acceleration-time graph represents:
a) initial velocity b) final velocity c) change in velocity d) distance travelled

15) If the force acting on a body is inversely proportional to its speed, then its kinetic energy is:
a) linearly related to time
b) inversely proportional to time
c) inversely proportional to the square of time
d) a constant

16) The escape velocity of a body from the Earth depends on:
(i) the mass of the body
(ii) the location from where it is projected
(iii) the direction of projection
(iv) the height of the location from where the body is launched
a) (i) and (ii) b) (ii) and (iv) c) (i) and (iii) d) (iii) and (iv)

17) For a perfectly rigid body:
a) Young's modulus is infinite and bulk modulus is zero
b) Young's modulus is zero and bulk modulus is infinite
c) Young's modulus is infinite and bulk modulus is also infinite
d) Young's modulus is zero and bulk modulus is also zero

18) The total energy of a simple harmonic oscillator is proportional to:
a) amplitude b) square of amplitude
c) frequency d) velocity

19) The latent heat of vaporization of a substance is always:
a) greater than its latent heat of fusion b) greater than its latent heat of sublimation
c) equal to its latent heat of sublimation d) less than its latent heat of fusion

20) Pressure of a gas at a constant volume is proportional to:
a) total internal energy of the gas
b) average kinetic energy of the molecules
c) average potential energy of the molecules
d) total energy of the gas

21) Sound waves in air cannot be polarized because:
a) their speed is small b) they require medium
c) they are longitudinal d) their speed is temperature independent

22) A sphere encloses an electric dipole within it. The total flux across the sphere is:
a) zero b) half that sue to a single charge
c) double that due to a single charge d) dependent on the position of dipole

23) The direction of the flow of current through electric circuit is:
a) from low potential to high potential b) from high potential to low potential
c) does not depend upon potential value d) current cannot flow through circuit

24) Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond Curie temperature, then it will show:
a) anti ferromagnetism b) no magnetic property
c) diamagnetism d) paramagnetism

25) When an ac voltage of 220 V is applied to the capacitor C, then:
a) the maximum voltage between plates is 220 V
b) the current is in phase with the applied voltage
c) the charge on the plate is not in phase with the applied voltage
d) power delivered to the capacitor per cycle is zero

26) Mirage is a phenomenon due to:
a) refraction of light b) reflection of light
c) total internal reflection of light d) diffraction of light

27) A converging lens is used to form an image on a screen. When the upper half of the lens is covered by an opaque screen:
a) half the image will disappear b) complete image will disappear
c) intensity of image will decrease d) intensity of image will increase

28) In photoelectric effect, the photoelectric current is independent of:
a) intensity of incident light
b) potential difference applied between the two electrodes
c) the nature of emitter material
d) frequency of incident light

29) Which of the following spectral series falls within the visible range of electromagnetic radiation?
a) Lyman series b) Balmer series c) Paschen series d) Pfund series

30) In triangle ABC, if $a = 13$, $b = 14$ and $c = 15$, then radius of ex-circle r_1 is:
a) 4 b) 10.5 c) 13.5 d) 17.5

31) If $A = \tan^{-1} x$, then $\sin 2A =$
a) $\frac{2x}{\sqrt{1-x^2}}$ b) $\frac{2x}{1+x^2}$ c) $\frac{2x}{\sqrt{1+x^2}}$ d) $\frac{1+x^2}{1-x^2}$

32) If $sin^2\theta = \frac{1}{4}$, then the general value of θ is:
a) $2n\pi \pm \frac{\pi}{3}$ b) $n\pi \pm \frac{\pi}{3}$ c) $2n\pi \pm \frac{\pi}{6}$ d) $n\pi + (-1)^n \frac{\pi}{6}$

33) The value of expression $3\cos\theta + 4\sin\theta$ lies between:
a) $[-3,3]$ b) $[-4,4]$ c) $[-5,5]$ d) $[-1,1]$

34) $\lim_{n\to\infty} \frac{1+2+3+\cdots+n}{n^2} =$
a) 1/2 b) ¼ c) 1/3 d) 1/6

35) $\frac{d}{dx}\cos^{-1}(\sin x) =$
a) x b) -1 c) $-\tan x$ d) $-\cot x$

36) $\int_0^{\frac{1}{\sqrt{2}}} \frac{dx}{\sqrt{1-x^2}} =$
a) $\pi/2$ b) $\pi/3$ c) $\pi/6$ d) $\pi/4$

37) The side of an equilateral triangle is 'a' units and is increasing at the rate of 'k' units/sec. Rate of increase of its area is:
a) $\frac{2}{\sqrt{3}}k$ b) $\sqrt{3}\,ak$ c) $\frac{\sqrt{3}}{2}ak$ d) $\frac{\sqrt{3}}{2ak}$

38) The value of $\sqrt{7+24i} + \sqrt{7-24i} =$
a) 8 b) $2\sqrt{2}$ c) 4 d) $6\sqrt{2}$

39) The value of k for which the sum of the roots of the equation $(k-2)x^2 + (k-5)x - 5 = 0$ is 3 is:
a) $k = \frac{11}{4}$ b) $k = \frac{3}{2}$ c) $k = \frac{9}{7}$ d) $k = -4$

40) If A and B are square matrices of same order and AB = 3I, then $A^{-1} =$
a) A/3 b) 3A c) B/3 d) 3B

41) $A - (B \cap C) =$
a) $A - (B - C)$ b) $(A-B) \cup (A-C)$
c) $(A-B) \cap (A-C)$ d) $(A-B) \cap C$

42) If $y = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{2} + \cdots + \infty$, then $x =$
a) $e^y - 1$ b) $1 + e^y$ c) $\log y - 1$ d) $1 + \log y$

43) The domain of the function $f(x) = \frac{x}{2+x^2}$ is:
a) $(0,\infty)$ b) $(-1,-\infty)$ c) $(-\infty,\infty)$ d) $R - \{2\}$

44) If $\vec{a} = (2i + j + 2k)$ and $\vec{b} = (5i - 3j + k)$, then the projection of $\vec{b}$ upon $\vec{a}$ is:
a) 3 b) 4 c) 5 d) 6

45) The equation of the line which makes x-intercept three times the y-intercept and passes through (1,2) is:
a) $x + 3y = 7$ b) $3x - y = 5$ c) $2x + 4y = 1$ d) $5x - 2y = 9$

46) The equation of the circle having radius 5 and concentric with the circle $x^2 + y^2 - 6x - 4y - 3 = 0$ is:
a) $x^2 + y^2 - 6x - 4y + 18 = 0$ b) $x^2 + y^2 - 6x - 4y - 1 = 0$
c) $x^2 + y^2 - 6x - 4y - 12 = 0$ d) $x^2 + y^2 + 6x + 4y + 5 = 0$

47) If the parabola $y^2 = 4ax$ passes through $(-3,2)$, then the length of the latus rectum is:
a) 2/3 b) 4/3 c) 8 d) 4

48) Which one of the following does not represent a hyperbola?
a) $xy = 1$ b) $x^2 - y^2 = 5$
c) $(x-1)(y-3) = 3$ d) $x^2 - y^2 = 0$

49) The angle between the pair of planes $x + 2y + 3z = 5$ and $3x - 3y + z = 1$ is:
a) 30° b) 60° c) 90° d) 45°

50) Which of the following is the correct order of size of the given species?
a) $I > I^- > I^+$ b) $I^+ > I^- > I$ c) $I > I^+ > I^-$ d) $I^- > I > I^+$

51) The hybridization of C involved in acetylene is:
a) sp^2 b) sp^3 c) sp d) dsp^2

52) Which of the following hydrogen bonds is the strongest?
a) $F - H \ldots F$ b) $O - H \ldots O$ c) $O - H \ldots F$ d) $O - H \ldots N$

53) Which of the following has highest p^H value?
a) CH_3COOK b) Na_2CO_3 c) NH_4Cl d) $NaNO_3$

54) Which of the following has least boiling point?
a) n-hexane b) n-pentane
c) 2-methyl butane d) 2,2-dimethyl propane

55) Calgon is:
a) $Na_2Al_2Si_2O_8.xH_2O$ b) $Na_2[Na_4(PO_3)_6]$
c) Na_3PO_4 d) $Ca_2Al_2Si_2O_8.xH_2O$

56) Oxidation number of P in PO_4^{3-} ion is:
a) -3 b) +7 c) +5 d) +3

57) Solvay process is used for the manufacture of:
a) NaOH b) Na_2CO_3 c) NH_3 d) NaCl

58) Purest form of iron is:
a) pig iron b) last iron c) steel d) wrought iron

59) The normality of 0.3 M phosphorous acid (H_3PO_3) is:
a) 0.1 b) 0.9 c) 0.3 d) 0.6

60) 1 atom of an element weighs 1.8×10^{-22} g. The atomic weight of the element is:
a) 29.9 b) 18 c) 108 d) 154

Section-B (2 marks)

Read the following passages and answer the questions given below.

A well-dressed young man entered a big textile shop one evening. He was able to draw the attention of the salesmen who thought him rich and likely to make heavy purchases. He was shown the superior varieties of suit lengths and sarees. But after casually examining them, he kept moving to the next section, where readymade goods were being sold and further on to the hosiery section. By them, the salesmen had begun to doubt his intentions and drew the attention of the manager. The manager asked him what exactly he wanted and he replied that he wanted courteous treatment. He explained that he had come to the same shop in casual dress that morning and drawn little attention. His pride was hurt and he wanted to assert himself. He had come in good dress only to get decent treatment, not for getting any textiles. He left without making any purchase.

61) The young man was well-dressed because:
a) it was his habit to dress well
b) it was his wedding day
c) he wanted to meet the manager of the shop
d) he wanted to impress the salesmen

62) The salesman in the shop are described as people who pay attention to:
a) only young men and women b) pretty women
c) only rich customers d) regular customers

63) The young man moved away to the hosiery section because he:
a) was not interested in purchasing anything now
b) did not like the readymade clothes
c) wanted better clothes
d) was restless

64) The young man left without making purchases because he:
a) did not have money
b) could not find any item of his choice
c) had come only to make a point about the indifferent attitude of the salesmen towards casually dressed customers
d) decided to come to make the purchases later on

65) An insect trapped in a circular groove of radius 12 cm moves along the groove steadily and completes 7 revolutions in 100 s. The linear speed of the insect is:
a) 4.3 cms^{-1} b) 5.3 cms^{-1} c) 6.3 cms^{-1} d) 7.3 cms^{-1}

66) A block of mass 1 kg lies on a horizontal surface in a truck. The coefficient of static friction between the block and the surface is 0.6. If the acceleration of the truck is 5 ms^{-2}, the frictional force acting on the block is:
a) 10 N b) 5 N c) 2.5 N d) 20 N

67) A child is standing with his two arms outstretched at the centre of a turntable that is rotating about its central axis with an angular speed ω_0. Now, the child folds his hands back so that moment of inertia becomes 3 times the initial value. The new angular speed is:
a) $3\omega_0$ b) $\frac{\omega_0}{3}$ c) $6\omega_0$ d) $\frac{\omega_0}{6}$

68) A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of water in the capillary tube is 5 g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is:
a) 2.5 g b) 5.0 g c) 10 g d) 20 g

69) A cup of coffee cools from 90˚C to 80˚C in t minutes, when the room temperature is 20˚C. The time taken by a similar cup of coffee to cool from 80˚C to 60˚C at a room temperature same at 20˚C is:
a) $\frac{5}{13}t$ b) $\frac{13}{10}t$ c) $\frac{13}{5}t$ d) $\frac{10}{13}t$

70) A monoatomic gas is adiabatically compressed to $\frac{1}{4}^{th}$ of its original volume, the final pressure of gas in terms of initial pressure P is:
a) 7.08 P b) 8.08 P c) 9.08 P d) 10.08 P

71) The fundamental node produced by a closed organ pipe is of frequency v. The fundamental note produced by an open organ pipe of same length will be of frequency:
a) v/2 b) v c) 2v d) 4v

72) Two identical capacitors have the same capacitance C. One of them is charged to potential V_1 and the other to V_2. The negative ends of the capacitors are connected together. When the positive ends are also connected, the decrease in energy of the combined system is:
a) $\frac{C}{4}\left({V_1}^2 - {V_2}^2\right)$ b) $\frac{C}{4}\left({V_1}^2 + {V_2}^2\right)$ c) $\frac{C}{4}(V_1 - V_2)^2$ d) $\frac{C}{4}(V_1 + V_2)^2$

73) Three resistors 2Ω, 4Ω and 5Ω are combined in parallel. This combination is connected to a battery of emf 20 V and negligible internal resistance. The total current drawn from the battery is:
a) 10 A b) 15 A c) 19 A d) 23 A

74) A circular coil of 70 turns and radius 5 cm carrying a current of 8A is suspended vertically in a uniform horizontal magnetic field of magnitude 1.5 T. The field lines make an angle of 30˚ with the normal of the coil, then the magnitude of the counter torque that must be applied to prevent the coil from turning is:
a) 33 Nm b) 3.3 Nm c) 3.3×10^{-2} Nm d) 3.3×10^{-4} Nm

75) A current of 1 A through a coil of inductance of 200 mH is increasing at a rate of 0.5 As^{-1}. The energy stored in the inductor per second is:
a) 0.5 Js^{-1} b) 5 Js^{-1} c) 0.1 Js^{-1} d) 2.0 Js^{-1}

76) A ray of light is incident at 60˚ on one face of a prism of angle 30˚ and the emergent ray makes 30˚ with the incident ray. The refractive index of the prism is:
a) 1.732 b) 1.414 c) 1.5 d) 1.33

77) The fringe width in a Young's double slit interference pattern is $2.4 \times 10^{-4}\, m$, when red light of wavelength 6400 Å is used. How much will it change, if blue light of wavelength 4000 Å is used?
a) $9 \times 10^{-4}\, m$ b) $0.9 \times 10^{-4}\, m$ c) $4.5 \times 10^{-4}\, m$ d) $0.45 \times 10^{-4}\, m$

78) A light of wavelength 600 nm is incident on a metal surface. When light of wavelength 400 nm is incident, the maximum kinetic energy of the emitted photoelectrons is doubled. The work function of the metal is:
a) 1.03 eV b) 2.11 eV c) 4.14 eV d) 2.43 eV

79) If $\theta + \beta = \frac{\pi}{2}$, then the maximum value of $\cos\theta . \cos\beta$ is:
a) 1 b) $\sqrt{2}$ c) $\frac{1}{2}$ d) $\frac{1}{\sqrt{2}}$

80) If $\cot^{-1} x + \cot^{-1} y = \frac{\pi}{2}$, then $xy =$
a) 1 b) -1 c) 0 d) 1/2

81) $\lim_{x\to 0} \frac{1-\cos x}{x^2}$ is equal to:
a) 1 b) 0 c) ∞ d) 1/2

82) If $y = e^{\sqrt{2x}}$, then $\frac{dy}{dx} =$
a) $\frac{e^{\sqrt{2x}}}{\sqrt{2x}}$ b) $e^{\sqrt{2x}}$ c) $\frac{e^{\sqrt{2x}}}{\sqrt{2}}$ d) $\sqrt{2}e^{\sqrt{2x}}$

83) $\int \frac{dx}{\tan x + \cot x} =$
a) $\frac{\cos 2x}{4} + c$ b) $\frac{\sin 2x}{4} + c$ c) $-\frac{\sin 2x}{4} + c$ d) $-\frac{\cos 2x}{4} + c$

84) A circular plate of metal expands by heat so that its radius increases at the rate of 0.25 cm/sec. Then, the rate at which the surface area is increasing when the radius is 7 cm is:
a) $\frac{5\pi}{2}\ cm^2/sec$ b) $15\ cm^2/sec$ c) $11\ cm^2/sec$ d) $\frac{7\pi}{4}\ cm^2/sec$

85) The area bounded by the curve $y = x(1-x)^2$ and x-axis is:
a) 1/12 b) 1/6 c) 3/4 d) 5/7

86) If the sum of an infinite G.P. and sum of the squares of its terms are each equal to 3, then the common ratio of the 1st series is:
a) 1 b) 1/2 c) 2/3 d) 3/2

87) If $xyz + 1 = 0$, then $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} =$
a) $4xyz$ b) $x + y + z$ c) $1 + x + y + z$ d) 0

88) The term independent of x in the expansion of $\left(2x + \frac{1}{3x}\right)^6$ is:
a) $\frac{160}{9}$ b) $\frac{80}{9}$ c) $\frac{160}{27}$ d) $\frac{80}{3}$

89) There are 5 roads between cities A and B and 4 roads between cities B and C. In how many ways can a person drive from A to C and return by different roads?
a) 240 b) 480 c) 156 d) 400

90) If the pair of lines $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ intersect on y-axis, then:
a) $f^2 = bc$ b) $g^2 = ac$ c) $f^2 + g^2 = 1$ d) $af + bg = c$

91) If $2x - 3y = 0$ is the equation of common chord of the circle $x^2 + y^2 + 4x = 0$ and $x^2 + y^2 + 2\lambda y = 0$, then the value of λ is equal to:
a) 0 b) 1 c) 2 d) 3

92) The equation of an ellipse in which the distance between the foci is 8 units and the distance between the directrices is 18 units and its axes being the same as the co-ordinate axes is:
a) $\frac{x^2}{36} + \frac{y^2}{20} = 1$ b) $\frac{x^2}{36} + \frac{y^2}{25} = 1$ c) $\frac{x^2}{24} + \frac{y^2}{12} = 1$ d) $\frac{x^2}{25} + \frac{y^2}{40} = 1$

93) If P(2,3,5), Q(-1,3,2) and R(3,5,-2) are the vertices of the ΔPQR, then dc's of the side QR is:
a) $\frac{1}{2}, -\frac{1}{2}, \frac{3}{2}$ b) $\frac{2}{3}, \frac{1}{3}, -\frac{2}{3}$ c) $-\frac{4}{3}, \frac{1}{3}, \frac{2}{3}$ d) $\frac{1}{3}, -\frac{2}{3}, \frac{4}{3}$

94) Which of the following set of quantum numbers is correct for an electron in 4f- orbital?
a) $n = 4, l = 3, m = +1, s = +\frac{1}{2}$ b) $n = 4, l = 4, m = -4, s = -\frac{1}{2}$
c) $n = 4, l = 3, m = +4, s = +\frac{1}{2}$ d) $n = 3, l = 2, m = -2, s = -\frac{1}{2}$

95) Identify Z in the following series:
$C_2H_5I \xrightarrow{alc.KOH} X \xrightarrow{Br_2} Y \xrightarrow{KCN} Z$
a) Br-CH_2-CH_2-CN b) CH_3-CH_2-CN
c) CN-CH_2-CH_2-CN d) Br-CH=CH-CN

96) The IUPAC name of $CH_3C{\equiv}CCH(CH_3)_2$ is:
a) 4-Methylpent-2-yne b) 4,4-Dimethylbut-2-yne
c) Methyl isopropyl acetylene d) 2-Methylpent-4-yne

97) The volume of water required to be added to 0.5 N NaOH solution to prepare 400 ml of 0.1 N NaOH solution?
a) 80 ml b) 320 ml
c) 160 ml d) 200 ml

98) 2.67 g of a metal chloride on reaction with H_2SO_4 gave 3.42 g of metal sulphate. The equivalent weight of metal is:
a) 4.5 b) 7
c) 9 d) 12

99) The correct order of the following boron halides according to their acidic strength is:
(i) BF_3 (ii) BCl_3 (iii) BBr_3 (iv) BI_3
a) (i) > (ii) > (iii) > (iv) b) (iv) > (iii) > (ii) > (i)
c) (ii) > (iii) > (iv) > (i) d) (iv) > (ii) > (i) > (iii)

100) When 0.1 mol MnO_4^{2-} is oxidized, the quantity of electricity required to completely oxidize MnO_4^{2-} to MnO_4^{-} is:
a) 96500 C b) 2 × 96500 C
c) 9650 C d) 96.50 C

Thank You!!!!!!