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 : 2081/02/19
(June 01)

Duration : 2 hours
Time : 8 A.M. – 10 A.M.

SECTION – A (1 marks) (1*60 = 60)

1) Mathematics _____ taught to us.
a) are b) was c) have been d) were

2) We _____ notes from the board now.
a) were writing b) wrote c) are writing d) had written

3) Many people are interested _____ better jobs.
a) to finding b) in finding c) for finding d) of finding

4) I would rather that you _____ the work today.
a) not do b) didn't do c) hadn't done d) haven't done

5) We attended a lecture _____ 'World Environmental Protection'.
a) by b) in c) at d) on

6) The two countries finally decided to ***bury the hatchet*** after ten years of war.
a) to disclose information b) to praise one's self
c) to stop fighting d) to accept defeat

7) He asked his teacher, "Need I read this chapter?"
a) He asked his teacher whether there was a need to read this chapter.
b) He asked his teacher whether he needed to read that chapter.
c) He asked his teacher if he had to read that chapter.
d) He asked his teacher if he had needed to read that chapter.

8) Admonish (Synonym):
a) praise b) alert c) commend d) compliment

9) Impediment (Antonym):
a) advantage b) hinder c) interference d) obstruct

10) Which one of the following vowel symbols is used in the word 'sit'?
a) i: b) e c) I d) ə

11) The sentence pattern for the following sentence is:
"Everyone found the book controversial."
a) Subject + Verb + Object + Adjunct
b) Subject + Verb + Direct object + Indirect object
c) Subject + Verb + Complement
d) Subject + Verb + Object + Complement

12) Transform the following sentence into interrogative.
"She will feel better in the morning."
a) Would she feel better in the morning?
b) Will she feel better in the morning?
c) Will she be feeling better in the morning?
d) Would she have felt better in the morning?

13) Increasing the temperature of an aqueous solution will cause:
a) decrease in molality b) decrease in molarity
c) decrease in mole fraction d) decrease in % w/w

14) In the electrolytic cell, flow of electrons is from:
a) cathode to anode in the solution
b) cathode to anode through external supply
c) cathode to anode through internal supply
d) anode to cathode through internal supply

15) In which of the following compounds, nitrogen exhibits highest oxidation state?
a) N_2H_4 b) NH_3 c) N_3H d) NH_2OH

16) Magnetic quantum number for the valence electron of potassium is:
a) 0 b) 1 c) 2 d) 7

17) In which of the following cases, reaction is spontaneous at all temperatures?
a) $\Delta H > 0; \Delta S > 0$ b) $\Delta H < 0; \Delta S > 0$ c) $\Delta H < 0; \Delta S < 0$ d) $\Delta H < 0; \Delta S = 0$

18) Which of the following is paramagnetic?
a) CN^- b) NO^+ c) CO d) O_2^-

19) Which of the following oxides is not an amphoteric oxide?
a) PbO b) ZnO c) MgO d) Al_2O_3

20) The ionic character in H-X bond is highest in:
a) HBr b) HF c) HCl d) HI

21) Hydrated alumina is converted to anhydrous form by:
a) roasting b) Calcination c) smelting d) leaching

22) AgCl is soluble in:
a) aquaregia b) H_2SO_4 c) HCl d) NH_3

23) Among the following, which has highest knocking properties?
a) aromatic hydrocarbons b) branched chain paraffins
c) olefins d) straight chain paraffins

24) Which of the following does not gives aldol condensation?
a) HCHO b) CH_3CHO c) CH_3CH_2CHO d) $CH_3CH_2CH_2CHO$

25) Phenol reacts with chloroform in presence of aq. KOH to give salicylaldehyde. This reaction is called:
a) Riemer-Tiemann reaction b) Carbylamine reaction
c) Cannizzaro's reaction d) Friedel-Craft reaction

26) The most reactive compound towards nitration is:
a) benzene b) chlorobenzene c) toluene d) nitrobenzene

27) 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

28) 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) $\frac{1+x^2}{1-x^2}$

29) If $\sin\theta + \cos\theta = \sin 2\theta + \cos 2\theta$, then θ is equal to:
a) $\pi/6$ b) $\pi/3$ c) $\pi/4$ d) $\pi/2$

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

31) $\lim_{x\to 0}\left(\frac{\sin x - x}{x}\right)\sin\frac{1}{x} =$
a) 0 b) 1 c) 2 d) does not exist

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

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

34) 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) $\frac{\sqrt{3}}{2ak}$

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

36) If x is real, then the value of $x^2 - 6x + 13$ will not be less than:
a) 4 b) 6 c) 7 d) 8

37) In a data, $N = 30 + P, \sum fx = 1320$ and $\bar{X} = 33$, the value of 'P' is:
a) 6 b) 8 c) 9 d) 10

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

39) 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) $1 + \log y$

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

41) 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

42) 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) $5x - 2y = 9$

43) 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) $x^2 + y^2 + 6x + 4y + 5 = 0$

44) The equation of a parabola having focus (-3, 0) and directrix x = 3 is:
a) $y^2 = 12x$ b) $y^2 = -12x$ c) $x^2 = 12y$ d) $x^2 = -12y$

45) 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) $x^2 - y^2 = 0$

46) 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°

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

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

49) Which of the following is correct?
a) $E^2 = p^2 c$ b) $E^2 = p^2 c^2$
c) $E^2 = pc^2$ d) $E^2 = \frac{p^2}{c^2}$

50) 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

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

52) 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

53) 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

54) 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

55) 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

56) 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

57) A wavefront is a locus of:
a) constant amplitude b) constant intensity
c) constant phase d) same wavelength

58) 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

59) 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

60) The impurity atom with which pure silicon is doped to make p-type semiconductor is:
a) Indium b) Phosphorous c) Antimony d) Arsenic

SECTION – B (2 marks) (2*40=80)

Read the following passages and answer the questions given below (61-64):
If I had been asked in my early youth whether I preferred to have dealings only with men or only with books, my answer would certainly have been in favour of books. In later years this has become less and less. Not that I have had so much better experiences with men than with books, on the cotrary delightful books even now come my way more often than purely delightful men. But the many bad experiences with men have nourished the meadow of my life as the noublest book could not do.

61) The author says that in later years his love of books diminished because:
a) he did not get many delightful books to read.
b) he had better experiences with men than with books.
c) he had given up the habit of reading books.
d) even the bad experiences he had with men were more valuable than what the noblest books could give.

62) Which one of the following statements best reflects the main arguments of the passage?
a) Books are always better than men.
b) There are more purely delightful men than purely delightful books.
c) It is the experience with other human beings that nourishes one's life and not necessarily books.
d) Neither men nor books give any worth while experience.

63) Which one of the pairs of phrases best helps to bring out the metaphorical meaning of the meadow of my life?
a) Pure and healthy life b) Vast and rich life
c) Well nourished but dull life d) poor but simple life

64) In his early youth, the author:
a) liked to have more dealings with books than with men.
b) preferred to have dealings with men than with books.
c) liked to have more dealings with men than with books.
d) liked to have dealings more with men than with books.

65) $A \xrightarrow{PCl_5} B \xrightarrow{alc.KCN} C \xrightarrow{H_2O/\,H^+} D$. Identify D in the given reaction where A is a 1° alcohol which gives positive Iodoform test.
a) CH_3COOH b) CH_3CH_2COOH c) CH_3CH_2CN d) $CH_3CH_2CH_2OH$

66) Electrolytic reduction of Nitrobenzene in strongly acidic medium gives:
a) aniline b) azoxybenzene c) p-aminophenol d) Hydrazobenzene

67) The relation between K_p and K_c for the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ is:
a) $K_p = K_c(RT)$ b) $K_c = K_p(RT)^{-2}$
c) $K_c = K_p(RT)$ d) $K_p = K_c(RT)^{-2}$

68) The maximum number of molecules is present in:
a) 5L of N_2 gas at NTP b) 0.5 g of H_2 gas
c) 10 g of O_2 gas d) 15L of H_2 gas at STP

69) For the reaction, R → P, a graph of [R] against time is found to be a straight line with negative slope. What is the order of reaction?
a) second order b) third order
c) first order d) zero order

70) A cell constructed by coupling a standard copper electrode and a standard magnesium electrode has emf of 2.7 volts. If the standard reduction potential of copper electrode is +0.34 V, that of magnesium electrode is:
a) +3.04 V b) -0.34 V c) +2.36 V d) -2.36 V

71) The species $Ar, K^+ \; and \; Ca^{2+}$ contain the same number of electrons. In which order do their radii increase?
a) $Ar < K^+ < Ca^{2+}$ b) $Ca^{2+} < Ar < K^+$
c) $Ca^{2+} < K^+ < Ar$ d) $K^+ < Ar < Ca^{2+}$

72) A solid compound 'X' on heating gives CO_2 gas and a residue. The residue mixed with water forms 'Y'; on passing an excess of CO_2 through 'Y' in water, a clear solution 'Z' is obtained. On boiling 'Z' compound 'X' is reformed. The compound 'X' is:
a) $Ca(HCO_3)_2$ b) $CaCO_3$ c) Na_2CO_3 d) K_2CO_3

73) 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}

74) 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

75) 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) $\frac{\omega_0}{6}$

76) 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

77) 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) $\frac{10}{13}t$

78) 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

79) 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

80) 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) $\frac{C}{4}(V_1 + V_2)^2$

81) 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

82) 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}

83) 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

84) 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) $0.45 \times 10^{-4}\ m$

85) 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

86) A bag contains 6 red, 5 green and 4 yellow-coloured balls. 2 balls are drawn at random, after one another without replacement, then what is the probability that at least one ball is green?
a) 2/3 b) 4/5 c) 3/8 d) 4/7

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

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

89) If $xe^{xy} = y + sin^2 x$, then at $x = 0, \frac{dy}{dx}$ is equal to:
a) -1 b) 1 c) 0 d) $\frac{y}{x}$

90) $\int \frac{dx}{\tan x+\cot x} =$

a) $\frac{\cos 2x}{4} + c$ b) $\frac{\sin 2x}{4} + c$

c) $-\frac{\sin 2x}{4} + c$ d) $-\frac{\cos 2x}{4} + c$

91) 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) $\frac{7\pi}{4}\ cm^2/sec$

92) 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

93) 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

94) 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

95) 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) $\frac{80}{3}$

96) 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

97) 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) $af + bg = c$

98) 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

99) 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) $\frac{x^2}{25} + \frac{y^2}{40} = 1$

100) 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) $\frac{1}{3}, -\frac{2}{3}, \frac{4}{3}$

❖❖❖❖ Thank You!!! ❖❖❖❖