BEATS ENGINEERING

INSTITUTE OF ENGINEERING

Model Entrance Exam

(Set-10)

Instructions:

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

Date: 2080/04/20
(August-05)

Duration: 2 hours
Time: 8 AM – 10 AM

Section-A (1 marks)

1) We _____ on picnics whenever we have free time.
a) went b) were going c) go d) are going

2) I must not shout, _____?
a) need I b) shouldn't I c) can't I d) must I

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

4) She _____ her pen when she was walking to school.
a) dropped b) has dropped c) had dropped d) was dropping

5) He talked about the competition as if he _____ part in it.
a) had taken b) took c) takes d) has taken

6) Hold the object _____ arm's length.
a) at b) in c) by d) on

7) Diminutive (Synonym):
a) immense b) colossal c) obstinate d) miniature

8) Jovial (Antonym) :
a) gloomy b) amiable c) buoyant d) convivial

9) The correct passive form of the following sentence is:
"They have spotted me in the crowd."
a) I am spotted by them in the crowd.
b) I will have been spotted by them in the crowd.
c) I would have been spotted by them in the crowd.
d) I have been spotted by them in the crowd.

10) "To give somebody the cold shoulder" means:
a) to snub him b) to mollify him
c) to humiliate him d) to receive him warmly

11) The correct word for the transcription /buˈkeɪ/ is:
a) booking b) bookie c) bouquet d) book

12) Summer is my favorite season. The word 'favorite' is a/an:
a) adverb b) adjective c) verb d) preposition

13) If $\lim_{x\to 0} \frac{\sin px}{\tan 3x} = 4$, then 'p' equals:
a) 6 b) 9 c) 12 d) 4

14) If $y = \log\sqrt{\tan x}$, then the value of $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is:
a) 1 b) 2 c) 1/2 d) 0

15) The minimum value of $9\tan^2\theta + 4\cot^2\theta$ is:
a) 12 b) 13 c) 5 d) 36

16) $\int e^x(\cos x - \sin x)dx =$
a) $e^x \sin x + c$ b) $e^x \cos x + c$
c) $e^x \log x + c$ d) $e^x \cot x + c$

17) $\int_{\pi/6}^{\pi/2} \frac{\cos x}{sin^2 x} dx =$
a) 0 b) 1 c) -1 d) 2

18) If α, β are roots of $x^2 - p(x+1) - q = 0$, then the value of $(\alpha+1)(\beta+1) =$
a) $q-1$ b) $4+q$ c) $1+q$ d) $1-q$

19) If $x = 1 + \frac{2}{1!} + \frac{4}{2!} + \frac{8}{3!} + \cdots$, then $\sqrt{x}$ equals:
a) $\sqrt{e}$ b) e c) e^2 d) e^{-1}

20) The 19^{th} term of the progression $2, 6, 10, \ldots 86$ from end is:
a) 10 b) 14 c) 18 d) 26

21) $\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)^{-3}=$
a) 1 b) -1 c) i d) -i

22) If for matrices A, B; $AB=A$ and $BA=B$, then A^2 equals:
a) I b) A c) B d) 0

23) The number of ways to arrange the letters of the word 'GARDEN' with vowels in alphabetical order is:
a) 360 b) 240 c) 120 d) 480

24) The range of $f(x)=\cos x-\sin x$ is:
a) $(-1,1)$ b) $[-1,1)$ c) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ d) $[-\sqrt{2},\sqrt{2}]$

25) A line joining the points $(1,2,0)$ and $(4,13,5)$ is perpendicular to the plane. Then the coeff. of x, y, z in the equation of the plane respectively is:
a) $5,15,5$ b) $3,11,5$ c) $-3,-11,5$ d) $5,3,2$

26) The cartesian form of the polar equation $\theta=\tan^{-1}3$ is:
a) $x=2y$ b) $y=3x$ c) $x=4y$ d) $y=4x$

27) If the graphs of $x^2=4(y+9)$ and $x+ky=6$ intersect on x-axis, then $k=$
a) 0 b) 6 c) 4 d) any real number

28) The equation $xy=0$ in 3D space represents:
a) a pair of straight-line b) a plane
c) a pair of planes at right angle d) a pair of parallel lines

29) The one which does not represent hyperbola is:
a) $xy=1$ b) $x^2-y^2=5$
c) $(x-1)(y-3)=3$ d) $x^2-y^2=0$

30) The two vectors $\vec{a}=2\hat{\imath}+\hat{\jmath}+3\hat{k},\vec{b}=4\hat{\imath}-\lambda\hat{\jmath}+6\hat{k}$ are parallel, if $\lambda=$
a) 2 b) -3 c) 3 d) -2

31) If $4\sin^{-1}x+\cos^{-1}x=\pi$, then x is equal to:
a) 0 b) 1/2 c) $\sqrt{3}/2$ d) $1/\sqrt{2}$

32) If for real values of x, $\cos\theta=x+\frac{1}{x}$, then:
a) θ is an acute angle b) θ is a right angle
c) θ is an obtuse angle d) no value of θ is possible

33) Oxidation number of nitrogen in NH_4NO_3 is:
a) -3 b) +5 c) -1 d) +1

34) The total number of electrons present in Cl atom having $l=0$ is:
a) 4 b) 6 c) 5 d) 11

35) As the s-character of hybridized orbital increases, the bond angle:
a) increases b) decreases
c) remains same d) becomes zero

36) The substance which causes permanent hardness in water is:
a) NaCl b) $NaHCO_3$
c) $MgCl_2$ d) K_2SO_4

37) When concentrated H_2SO_4 is added to dry KNO_3, brown fumes evolve. These fumes are of:
a) SO_2 b) SO_3 c) NO_2 d) NO

38) Bordeaux mixture is:
a) $CuSO_4+Ca(OH)_2$ b) $Ca_3(PO_4)_2+CaSiO_3$
c) $CaCN_2+C$ d) $CuFeS_2+FeS_2$

39) Which of the following is most soluble in water?
a) $Mg(OH)_2$ b) $Sr(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$

40) Which of the following intermediates have the complete octet around the carbon atom?
a) carbonium ion b) carbanion
c) free radical d) carbene

41) CH_3CH_2OH and $CH_3 - O - CH_3$ are:
a) functional isomers b) chain isomers
c) metamers d) position isomers

42) In which of the following, 1 Faraday of electricity will liberate 1/2 gm atom of the metal?
a) $AlCl_3$ b) $FeCl_3$
c) $CuSO_4$ d) $NaCl$

43) Which of the following has highest electronegativity?
a) Cl b) N c) O d) S

44) A man in a train moving with a constant velocity drops a ball on the platform. The path of the ball as seen by an observer standing on the platform is:
a) straight line b) a circle
c) a parabola d) helix

45) Kinetic energy of a body of mass 10 g and momentum 500 gcm/s is equal to:
a) 1.25×10^3 ergs b) 1.25×10^4 ergs
c) 1.25×10^3 J d) 50,000 ergs

46) Which of the following statement is correct?
a) the value of g is same at all places
b) the value of g is more at the equator than at the poles
c) the value of g is more at the poles than at the equator
d) the value of g is maximum at the center of the earth

47) The force necessary to pull a circular plate of radius 5 cm from the surface of water (surface tension = 75 dynes/cm) is:
a) 375 dynes b) 375π dynes c) 750 dynes d) 750π dynes

48) NC^{-1} has the same dimension as:
a) Volt meter b) Farad meter
c) Farad/meter d) Volt/meter

49) The quality of sound depends upon:
a) Frequency b) Pitch
c) No. of overtones d) Square of amplitude

50) At a place the vertical and horizontal component of earth's magnetic field are equal. The angle of dip at that place is:
a) 30˚ b) 45˚ c) 60˚ d) 90˚

51) Which of the following is a scalar quantity?
a) Electric field b) Electrostatic potential
c) Angular momentum d) Torque

52) Concave mirror:
a) always forms real image b) always forms virtual image
c) forms real image if object is virtual d) forms real image if object is real

53) If a thin metal foil is introduced between the plates of the capacitor, the capacitance:
a) increases b) will be zero
c) decreases d) remains constant

54) If Boron is dopped with an intrinsic semiconductor, then resulting form is:
a) P-type conductor b) N-type semiconductor
c) P-type semiconductor d) N-type conductor

55) A small black spot is present on the metal plate and if the metal plate is heated to red hot and quickly placed in a dark room, then the spot:
a) will appears red while plate appears black
b) will appears white while plate appears red
c) will appears white while plate appears black
d) will appears invisible while plate appears black

56) In Young's experiment, one slit is covered with a transparent blue filter and the other is left as it is, then the interference pattern:
a) will be blue b) will be yellow
c) will be green d) will not be formed

57) A compass needle is allowed to move in a horizontal plane is taken to a geomagnetic pole. It will:
a) stay in north-south direction only b) stay in east-west direction only
c) become rigid showing no movement d) stay in any position

58) Star twinkles due to:
a) refraction b) scattering c) diffraction d) dispersion

59) A body is falling freely under the action of gravity alone in vacuum. Which of the following quantities remain constant during the fall?
a) kinetic energy b) potential energy
c) total mechanical energy c) total linear momentum

60) An electron emitted in beta radiation originates from:
a) inner orbits of atom b) free electrons existing in the nuclei
c) decay of a neutron in a nuclei d) photon escaping from the nucleus

Section-B (2 marks)

Read the following passages and answer the questions given below (61-64):

Greyhound racing is the sixth most popular spectator sport in the United States. Over the last decade, a growing number of racers have been adopted to spend their retirement as household pets, once their racing careers are over.

Many people hesitate to adopt a retired racing greyhound because they think only very old dogs are available. Actually, even champion racers only work until they are about three-and-a-half years old. Because greyhounds usually live to be 12 to 15 years old, their retirement is much longer than their racing careers.

People worry that a greyhound will be more nervous and active than other breeds and will need a large space to run. These are false impressions. Greyhounds have naturally sweet, mild dispositions, and while they love to run, they are sprinters rather than distance runners and are sufficiently exercised with a few daily laps around a fenced-in backyard.

Greyhounds do not make good watchdogs, but they are very good with children, get along well with other dogs (and usually cats as well), and are affectionate and loyal. They are intelligent, well-behaved dogs, usually housebroken in only a few days. A retired racing greyhound is a wonderful pet for almost anyone.

61) According to the passage, adopting a greyhound is a good idea for people who:
a) do not have children. b) live in apartments.
c) do not usually like dogs. d) already have another dog or a cat.

62) Which of the following is implied by the passage?
a) The public is more aware of greyhounds than they used to be.
b) Greyhounds are more competitive than other dogs.
c) Greyhound racing should not be allowed.
d) People who own pet rabbits should not adopt greyhounds.

63) One drawback of adopting a greyhound is that:
a) greyhounds are not good with children.
b) greyhounds are old when they retire from racing.
c) the greyhound's sensitivity makes it temperamental.
d) greyhounds are not good watch dogs.

64) This passage is most like an advertisement because it:
a) uses statistics to prove its point.
b) does not present information to substantiate its claims.
c) says nothing negative about greyhounds.
d) encourages people to do something.

65) An ellipse is described by using an endless string which passes over two pins. If the axes are 6 cm and 4 cm, the distance between the pins in cm is:
a) $2\sqrt{5}$ b) $\sqrt{5}$
c) $4\sqrt{5}$ d) $\sqrt{5}/3$

66) If the two circles $x^2+y^2+2\lambda x+c=0$ and $x^2+y^2-2\mu y-c=0$ have equal radius, then the locus of (λ, μ) is:
a) $x^2+y^2=2c$ b) $x^2-y^2=2c$
c) $y^2-x^2=2c$ d) $x^2+y^2=c$

67) The equations $a^2x^2+2h(a+b)xy+b^2y^2=0$ and $ax^2+2hxy+by^2=0$ represents:
a) two pairs of perpendicular straight lines
b) two pair of parallel straight lines
c) two pair of straight lines which are equally inclined to each other
d) two pair of straight lines which are coincident

68) Two points (a, 3) and (5, b) are the opposite vertices of a rectangle. If other two vertices lie on the line $y=2x+c$ which passes through the point (a, b), then the value of c is:
a) -7 b) -4 c) 0 d) 7

69) If $\sin\left(\frac{\pi}{4}\cot\theta\right)=\cos\left(\frac{\pi}{4}\tan\theta\right)$, then $\theta=$
a) $n\pi+\frac{\pi}{4}$ b) $2n\pi\pm\frac{\pi}{4}$
c) $n\pi-\frac{\pi}{4}$ d) $2n\pi\pm\frac{\pi}{6}$

70) If in ΔABC, $\frac{\sin A}{\sin C}=\frac{\sin(A-B)}{\sin(B-C)}$, then:
a) a, b, c are in A.P. b) a^2, b^2, c^2 are in A.P.
c) a, b, c are in H.P. d) a^2, b^2, c^2 are in H.P.

71) If $\vec{a}$ and $\vec{b}$ are unit vectors such that $\vec{a}-4\vec{b}$ is at right angle to $7\vec{a}-2\vec{b}$, then the angle between $\vec{a}$ and $\vec{b}$ is:
a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{4}$

72) The area between the curve $y=sin^2x$, x-axis and the ordinate $x=0$ and $x=\frac{\pi}{2}$ is:
a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{8}$ d) π

73) $\int\frac{\cos 2x-\cos 2y}{\cos x-\cos y}dx=$
a) $2(\sin x+\sin y)+c$ b) $-2(\sin x+\sin y)+c$
c) $2(\sin x+x\cos y)+c$ d) $2(\sin x-x\cos y)+c$

74) The point on the curve $y=x^2-3x+2$, where tangent is perpendicular to $y=x$ is:
a) $(0,2)$ b) $(1,0)$ c) $(-1,6)$ d) $(2,-2)$

75) If $x=\frac{2at}{1+t^3}$ and $y=\frac{2at^2}{(1+t^3)^2}$, then $\frac{dy}{dx}=$
a) ax b) $\frac{x}{a}$ c) $\frac{a}{x}$ d) $-ax$

76) $\lim_{x\to 0}\frac{2^x-1}{(1+x)^{1/2}-1}=$
a) 1 b) 0 c) $\log 2$ d) $\log 4$

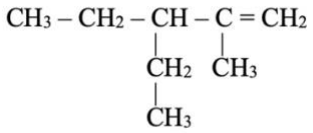
77) Let $f: R\to\left[0,\frac{\pi}{2}\right)$ be defined by $f(x)=\tan^{-1}(x^2+x+a)$. Then the set of values of a for which f is onto is:
a) $[0,\infty)$ b) [2,1]
c) $\left[\frac{1}{4},\infty\right)$ d) $\left(-\infty,\frac{1}{4}\right]$

78) If in the expansion of $\left(x^2+\frac{k}{x}\right)^5$, the coefficient of x is 270, then $k=$
a) 3 b) 4 c) 5 d) 7

79) If $A = \begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$ and $A(adj\ A) = \lambda \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, then $\lambda =$
a) 0 b) 1 c) 2 d) 3

80) The hydrocarbon which does not decolourise alkaline $KMnO_4$ solution and also does not give any precipitate with ammoniacal silver nitrate is:
a) benzene b) acetylene c) propyne d) 1-butyne

81) The IUPAC name of the following compound is:



a) 2-methyl-3-ethyl-1-pentene b) 3-ethyl-4-methyl-4-pentene
c) 3-ethyl-2-methyl-1-pentene d) 3-methyl-2-ethyl-1-pentene

82) A gaseous hydrocarbon gives upon combustion 0.72 g of water and 3.08 g of CO_2. The empirical formula of the hydrocarbon is:
a) C_2H_4 b) C_3H_6 c) C_6H_5 d) C_7H_8

83) The hybridization of atomic orbitals of nitrogen in ${NO_2}^+, {NO_3}^-$ and ${NH_4}^+$ are respectively:
a) sp, sp^3 and sp^2 b) sp, sp^2 and sp^3 c) sp^2, sp and sp^3 d) sp^2, sp^3 and sp

84) If 20 ml of 0.4 N NaOH solution completely neutralizes 40 ml of a dibasic acid, the molarity of the acid solution is:
a) 0.1 M b) 0.2 M c) 0.3 M d) 0.4 M

85) p^H of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product, K_{sp} of $Ba(OH)_2$ is:
a) 3.3×10^{-7} b) 5×10^{-7} c) 4×10^{-6} d) 5×10^{-6}

86) Sodium metal reacts with Al_2O_3 at high temperature to give a sodium compound (X); which reacts with carbon dioxide in water to form Na_2CO_3. The compound (X) is:
a) Na_2O_2 b) Na_2O c) Na_2CO_3 d) $NaAlO_2$

87) The frequency of the first line of Balmer series in hydrogen atom is v_0. The frequency v of the line emitted by doubly ionized lithium atom (Li^{++}) is:
a) $2v_0$ b) $4v_0$ c) $9v_0$ d) v_0

88) 1 mg radium has 2.68×10^{18} atoms. Its half life is 1620 years. How many radium atoms will disintegrate from 1 mg of pure radium in 3240 years?
a) 2.01×10^9 b) 2.01×10^{18}
c) 1.01×10^9 d) 1.01×10^{18}

89) A parallel plate capacitor has a uniform electric field E in the space between the plates. If the distance between the plates is d and area of each plate is A, the energy stored in the capacitor is:
a) $\frac{1}{2}\varepsilon_0 E^2$ b) $\frac{E^2 Ad}{\varepsilon_0}$ c) $\frac{1}{2}\varepsilon_0 E^2 Ad$ d) $\varepsilon_0 E^2 Ad$

90) The e.m.f. of a generator is 6 volt and internal resistance is 0.5 kΩ. The reading of a voltmeter having an internal resistance of 2.5 kΩ is:
a) 10^{-3} V b) 10 V c) 5 V d) 1 V

91) A permanent magnet in the shape of a thin cylinder of length 50 cm has intensity of magnetization $10^6\ A/m$. The magnetization current is:
a) 5×10^5 A b) 6×10^5 A c) 5×10^4 A d) 6×10^4 A

92) A Carnot engine absorbs 750 J of heat energy from a reservoir at 137˚C and rejects 500 J of heat during each cycle, then the temperature of sink is:
a) 0.25˚C b) 0.33˚C c) $0.44^\circ C$ d) $0.54^\circ C$

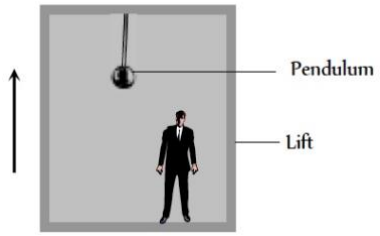
93) One end of a 0.25 m long metal bar is in steam and the other is in contact with ice. If 12 g of ice melts per minute, then the thermal conductivity of the metal is (cross-section of the bar $= 5 \times 10^{-4}\ m^2$ and latent heat of ice = 80 $cal\ g^{-1}$):
a) 20 $cals^{-1}m^{-1}{}^\circ C^{-1}$ b) 10 $cals^{-1}m^{-1}{}^\circ C^{-1}$
c) 40 $cals^{-1}m^{-1}{}^\circ C^{-1}$ d) 80 $cals^{-1}m^{-1}{}^\circ C^{-1}$

94) The Young's modulus of the material of rod is $2 \times 10^{11} N/m^2$ and its density is $8000\ kg/m^3$. The time taken by sound wave to transverse 1 m of the rod is:
a) 1×10^{-4} s b) 2×10^{-4} s c) 4×10^{-4} s d) 16×10^{-4} s

95) Fringe width between two consecutive fringes is 11780 Å and the slit separation is 0.1 mm. If the distance between screen and slit is 0.2 mm then wavelength of light used is:
a) 5890 Å b) 58900 Å c) 589 Å d) 8950 Å

96) Real image of an object is formed at a distance of 20 cm from a lens. On putting another lens in contact with it, the image is shifted 10 cm towards the combination. The power of the lens is:
a) 2 D b) 3 D c) 6 D d) 10 D

97) A man measures the period of a simple pendulum inside a stationary lift and finds it to be T sec. If the lift accelerates upwards with an acceleration g / 4 , then the period of the pendulum will be:



a) T b) $\frac{T}{4}$ c) $\frac{2T}{\sqrt{5}}$ d) $2T\sqrt{5}$

98) A body is sliding down an inclined plane having coefficient of friction 0.5. If the normal reaction is twice that of the resultant downward force along the incline, the angle between the inclined plane and the horizontal is:
a) 30˚ b) 60˚ c) 45˚ d) 90˚

99) A capillary tube when immersed vertically in liquid records a rise of 3 cm. If the tube is immersed in the liquid at an angle of 60˚ with the vertical. The length of the liquid column along the tube is:
a) 9 cm b) 6 cm c) 3 cm d) 2 cm

100) Two parallel rail tracks run north-south. On one track, train A moves north with a speed of 54 km/hr and on the other track, train B moves south with a speed of 90 km/hr. The velocity (in m/s) of train A with respect to train B is:
a) 10 b) 15 c) 25 d) 40

Thank You!!!!!!