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 : 2081/04/12
(July 27)

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

SECTION – A (1 marks) (1*60 = 60)

1) This journal _____ twice a month.
a) is appearing b) appeared c) had appeared d) appears

2) Choose the most appropriate form of indirect speech for the given sentence.
Saurav says,"I may not come for the practice today."
a) Saurav says that he may not come for the practice today.
b) Saurav says that he might not come for the practice today.
c) Saurav said that he might not come for the practice that day.
d) Saurav told me he won't come to the practice.

3) Transform the following aassertive sentence into interrogative sentence.
"We should not waste time in this fruitless occupation."
a) What should we do of this fruitless occupation?
b) Why will we waste time in this fruitless occupation?
c) Why should we waste time in this fruitless occupation?
d) Why would we waste time in this fruitless occupation?

4) I decided to stay at home last night. I would have gone out if I _____ so tired.
a) wouldn't have been b) hadn't been
c) wasn't d) weren't

5) Select the one which best expresses the given sentence into Passive / Active voice.
"Our assistant was interviewing the new employee."
a) The new employee was taken interview by our assistant.
b) The new employee had interviewed our assistant.
c) The new employee was being interviewed by our assistant.
d) The new employee is being interviewed by our assistant.

6) He is the second man _____ in this way.
a) to stab b) having stabbed
c) stabbed d) to be stabbed

7) I am not good _____ repairing things.
a) at b) for c) of d) in

8) The old obsession with results has <u>to play second fiddle</u> to the future.
a) doing things in a wrong way b) take a subordinate role
c) prepare for a difficult situation d) pay attention

9) Ephemeral (Synonym):
a) Permanent b) Fleeting c) Eternal d) Enduring

10) Magnanimous (Antonym):
a) Generous b) Selfish c) Charitable d) Benevolent

11) Which of the following words has the primary stress on the second syllable?
a) Entertainment b) Bakery c) Celebrate d) Manager

12) Which vowel sound is found in the word "beat"?
a) /I/ b) /i:/ c) /e/ d) /ɛ/

13) The reciprocal of the mean of the reciprocal of n observations is their:
a) A.M. b) G.M. c) H.M. d) A.M. and H.M.

14) The length of latus rectum of the hyperbola $xy = 4$ is:
a) $2\sqrt{2}$ b) $4\sqrt{2}$ c) 8 d) 4

15) Which one cartesian co-ordinates may be suitable for polar co-ordinates $\left(r, \pi - \sec^{-1}\frac{\sqrt{5}}{2}\right)$?
a) $(-1, 2)$ b) $(-3, 9)$ c) $(-2, 2\sqrt{5})$ d) $(-14, 7)$

16) If $log_a x = 0.3$ and $log_a 3 = 0.4$, then $log_3 x$ is:
a) 0.12 b) 0.7 c) 3/4 d) 4/3

17) The possible number of different orders that a matrix can have when it has 16 elements is:
a) 1 b) 4 c) 5 d) 6

18) The number of different garland that can be formed from 'n' different beads is:
a) $n!$ b) $(n-1)!$
c) $\frac{1}{2}(n-1)!$ d) $\frac{n!}{2}$

19) If $y = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$, then $\frac{dy}{dx} =$
a) $\frac{1}{\sqrt{1-x^2}}$ b) $\frac{1}{1+x^2}$ c) $\frac{2}{\sqrt{1-x^2}}$ d) $\frac{2}{1+x^2}$

20 The slope of tangent to the curve $y = \int_0^2 \frac{dx}{1+x^3}$ at the point $x = 1$ is:
a) 1/2 b) 1 c) 1/3 d) 1/4

21) If $\left|\vec{a}+\vec{b}\right|^2 = |\vec{a}|^2 + \left|\vec{b}\right|^2$, then:
a) $|\vec{a}| = \left|\vec{b}\right|$ b) $\left|\vec{a}+\vec{b}\right| = |\vec{a}| + \left|\vec{b}\right|$
c) $\vec{a}$ is parallel to $\vec{b}$ d) $\vec{a}$ is perpendicular to $\vec{b}$

22) In a ΔABC, $\tan A + \tan B + \tan C = 9$, then $\tan A \,.\, \tan B \,.\, \tan C =$
a) 9 b) 1/3 c) 1/9 d) 0

23) If a, b, c, d, e, f are in A.P., then $e - c$ is equal to:
a) $2(c-a)$ b) $2(f-d)$ c) $2(d-e)$ d) $d-e$

24) If the roots of $ax^2 + b = 0$ are real and distinct, then:
a) $ab > 0$ b) $a = 0$ c) $ab < 0$ d) $a > 0, b > 0$

25) In a triangle ABC, $a(b\cos C - c\cos B) =$
a) a^2 b) $b^2 - c^2$ c) 0 d) $a^2 - b^2$

26) A person has three children. The probability that all three are boys is:
a) 1/6 b) 1/4 c) 2/3 d) 1/8

27) The equation of line $y - 3 = m(x-5)$ represents:
a) family of parallel lines b) family of perpendicular lines
c) family of concurrent lines d) family of coincident lines

28) The circle $x^2 + y^2 + 6(x+y) + 9 = 0$:
a) touches both axes b) cuts both axes
c) touches x-axis and cuts y-axis d) cuts x-axis and touches y-axis

29) $\lim_{n\to\infty} 5\left[1 + \left(\frac{4}{n}\right)^n\right]^{1/n} =$
a) 4 b) 5 c) 0 d) e

30) If $y = e^{log_e x^5}$, then $\frac{dy}{dx} =$
a) x b) $5x^4$ c) 0 d) $e^{\log x^5}.5x^4$

31) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}dx =$
a) $e^{\sqrt{x}} + c$ b) $\frac{e^{\sqrt{x}}}{2} + c$ c) $2e^{\sqrt{x}} + c$ d) $\sqrt{x}.e^{\sqrt{x}} + c$

32) The distance between parallel planes $x + y + z + 3 = 0, 2x + 2y + 2z + 5 = 0$ is:
a) $\frac{1}{\sqrt{3}}$ b) $\frac{2}{\sqrt{3}}$ c) $\frac{1}{\sqrt{2}}$ d) $\frac{1}{2\sqrt{3}}$

33) A body of 10 kg is acting by two forces of magnitude 10 N at 60° with each other, then acceleration of body will be:
a) $2\sqrt{3}\ m/s^2$ b) $\sqrt{3}\ m/s^2$ c) $3\sqrt{3}\ m/s^2$ d) $4\sqrt{3}\ m/s^2$

34) A particle is moving in a circle of radius 'r' with speed 'v'. If radius is doubled, then the centripetal force to keep the same speed is:
a) twice the initial one b) half
c) one fourth d) remain same

35) In order that the heat flows from one part of a solid to another part, what is required?
a) uniform density b) uniform temperature
c) temperature gradient d) density gradient

36) When a capacitor having charge Q is immersed in oil tank and oil is pumped out, then the electric field between plates:
a) increases b) decreases c) remains same d) become zero

37) Two cells of emf E and internal resistance r are connected in parallel across a resistance 'R', then power delivered to R is maximum when:
a) $R = r$ b) $R = r/2$ c) $R = 2r$ d) $R = 0$

38) In a movie hall, the distance between the projector and the screen is increased by 1%, then illumination on the screen is:
a) increased by 1% b) decreased by 1%
c) increased by 2% d) decreased by 2%

39) A source of light is at a distance r and cut off potential is 'V'. If the distance between source and photocell is made double, then cut off potential will be:
a) $V/4$ b) $V/2$ c) V d) $2V$

40) Point on the surface of Earth about its axis increases when weight of body at equator will:
a) increases b) decreases
c) remain unchanged d) may increase or decrease

41) A capillary tube immersed in water in a state of weightlessness will:
a) not rise in tube b) rise to maximum available height
c) rise to normal height d) rise to lesser than normal height

42) If two waves of intensities I and 4I produce interference, then the ratio of intensity at maxima to the minima will be:
a) 5:3 b) 1:2 c) 1:9 d) 9:1

43) Two copper spheres of same radii, one hollow and other solid are charged to same potential. Tha charge will be:
a) more in solid b) more in hollow c) equal in both d) cannot be predicted

44) Material suitable for electric fuse must have:
a) high melting point and high specific resistance
b) high resistance and low melting point
c) high resistance and high melting point
d) low resistance and low melting point

45) The series limit of Bbalmer series is:
a) 215 nm b) 365 nm c) 465 nm d) 656 nm

46) Number of water molecules present in 1120 mL of water is (Density of water = 1):
a) $0.5 \times N_A$ b) N_A
c) $11.2 \times N_A$ d) $62.22 \times N_A$

47) For d-electron, the orbital angular momentum is:
a) $\frac{\sqrt{6}h}{2\pi}$ b) $\frac{\sqrt{2}h}{2\pi}$ c) $\frac{h}{2\pi}$ d) $\frac{2h}{\pi}$

48) The coordination number of a metal crystallizing in a hexagonal close packed (hcp) structure is:
a) 6 b) 12 c) 8 d) 4

49) For the process; Dry ice $\rightarrow CO_2$ (g):
a) ΔH is +ve and ΔS is -ve b) ΔH and ΔS both are -ve
c) ΔH and ΔS both are +ve d) ΔH is -ve while ΔS is +ve

50) Variable valency is due to:
a) lone pair effect b) inert pair effect
c) high m.p. d) high b.p.

51) Water softening by Clarke's process uses:
a) calcium bicarbonate b) sodium bicarbonate
c) potash alum d) calcium hydroxide

52) Which of the following salts does not impart colour to the flame?
a) LiCl b) KI c) $MgCl_2$ d) $CaCl_2$

53) Oxidizing agent utilized in Open Hearth process is:
a) O_2 b) Fe_2O_3 c) CO_2 d) SiO_2

54) Metamerism is possible in:
a) same polyvalent functional group b) same monovalent functional group
c) different polyvalent functional group d) different monovalent functional group

55) The most suitable regent for the conversion of $RCH_2OH \rightarrow RCHO$ is:
a) $KMnO_4$ b) $K_2Cr_2O_7$ c) CrO_3 d) PCC

56) Metallic silver may be obtained from AgCl by:
a) heating it in the current of H_2 b) fusing it with sand
c) treating with carbon monoxide d) fusing it with Na_2CO_3

57) The product formed when phosphorous trioxide is dissolved in water is:
a) HPO_3 b) H_3PO_4 c) H_3PO_3 d) HPO_2

58) The alloy containing a non-metal as a constituent in it is:
a) Invar b) Steel c) Bell metal d) Bronze

59) The correct IUPAC name of the given compound $HCONHCH_2CH_3$ is:
a) N-formyl aminoethane b) N-ethyl formylamine
c) N-ethyl methanamide d) ethyl aminomethanal

60) A catalyst alters, which of the following in a chemical reaction?
a) Entropy b) Enthalpy
c) Activation Energy d) Internal Energy

SECTION – B (2 marks) (2*40=80)

Read the following passage and answer the questions given below (61-64):
A pioneering scheme has been started recently in Southampton on England's south coast to educate motorists who have been convicted of drunken driving.
The penalty for drunken driving might be the loss of a driving licence and a heavy fine. But under the new scheme, convicted drivers do not pay the fine. Instead they have to attend eight training sessions—one a week organized by the local authority probation service.
Designed to demonstrate the damage alcohol can do, the scheme was devised by senior probation officer John Cook. He said about a quarter of the people who came to him had a drink problem, but had not realized how much they were drinking.
One way of getting the message across was to make the drivers pour out their usual ration of alcohol and then measure it. Almost everyone pours out not a single measure but a double at least an example of how easy it is to have more than just one drink and to encourage other people to do the same.
The instructors on the course are giving clinical evidence of the effects of alcohol on the body and brain. The sober truth is that drinking badly affects driving skills, although the drinker might like to believe otherwise.

61) The Southampton scheme requires convicted drivers:
a) to pay a heavy fine
b) to attend eight driving sessions–one a week
c) to undergo a probation service
d) to surrender their driving licence

62) John Cook devised the scheme:
a) as a demonstration technique for driving
b) to demonstrate the harmful effects of alcohol
c) to show that Southampton was concerned about drivers
d) to prove that alcohol does influence driving

63) The problem with a quarter of the people who went to John Cook was that they:
a) did not want to stop drinking
b) were unaware of the fact that they could get drunk
c) would not admit that they had a drinking problem
d) did not know how much they were drinking

64) Most drivers start off with at least
a) a double measure
b) a single measure
c) a little less than a single measure
d) two doubles

65) Solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = \sin x$ is:
a) $x(y + \cos x) = \sin x + c$
b) $x(y - \cos x) = \sin x + c$
c) $x(y.\cos x) = \sin x + c$
d) $x(y - \cos x) = \cos x + c$

66) The area of the parallelogram whose diagonals are represented by the vectors $3\vec{\imath} + \vec{j} - 2\vec{k}$ and $\vec{\imath} - 3\vec{j} + 4\vec{k}$ is:
a) $10\sqrt{3}$ b) $5\sqrt{3}$ c) $20\sqrt{3}$ d) 10

67) Number of solution of $7 \sin x = x$ is:
a) 0 b) 1 c) 2 d) 3

68) If the lines represented by $x^2 + 2hxy + y^2 = 0$ make angles 30° and 60°with x-axis, then $h =$
a) $-1/2$ b) $-2/\sqrt{3}$ c) $-\sqrt{3}/2$ d) $-1/\sqrt{3}$

69) In a series $t_n = \frac{n}{(n+1)!}$, then $\sum_{n=1}^{20} t_n$ is equal to:
a) $\frac{20!-1}{20!}$ b) $\frac{21!-1}{21!}$ c) $\frac{1}{2.20!}$ d) $\frac{21!+1}{21!}$

70) The number of terms in the expansion of $(a + b - c)^6$ is:
a) 7 b) 21 c) 28 d) 56

71) If $\int e^x[f(x) - f'(x)]dx = \phi(x)$, then $\int e^x(f(x))\,dx =$
a) $\phi(x) + e^x(f(x))$
b) $\phi(x) - e^x(f(x))$
c) $\frac{1}{2}[\phi(x) + e^x(f(x))]$
d) $\frac{1}{2}[\phi(x) + e^x f'(x)]$

72) If $x + 3y = 12$, the maximum value of xy is:
a) 6 b) 12 c) 3 d) 0

73) The probability that at least one of the events A and B occur is 3/5. If A and B occur simultaneously with probaility 1/5, then $P(\bar{A}) + P(\bar{B}) =$
a) 2/5 b) 4/5 c) 6/5 d) 7/5

74) If the focus of the parabola $x^2 - ky + 3 = 0$ is (0, 2), then the value of k is:
a) 2 b) 8 c) -1 d) -2

75) If α, β are the roots of the equation $x^2 - 2x + 4 = 0$, then a value of $\alpha^6 + \beta^6 =$
a) 64 b) 128 c) 256 d) -64

76) The mean deviation from the arithmetic mean of the following data 20, 22, 27, 30, 31, 32, 35, 40, 45, 48 is:
a) 7 b) 7.2 c) 8.1 d) 6.4

77) The area of the region between the curve $x^2 = 4y$, the line $x = 2$ and the x-axis is:
a) 1 b) 2/3 c) 4/3 d) 8/3

78) The value of $\cot^{-1} 3 + \text{cosec}^{-1}\sqrt{5}$ is:
a) $\pi/3$ b) $\pi/2$ c) $\pi/4$ d) $\pi/6$

79) A variable plane at a distance of 2 units from the origin cuts the co-ordinate axes at A, B and C. If the centroid $D(x, y, z)$ satisfies the relation $x^{-2} + y^{-2} + z^{-2} = k$, then the value of k is:
a) 3/4 b) 3/2 c) 9/2 d) 9/4

80) A particle moves along a straight line. The distance covered is related with time by $x = 40 + 12t - t^3$, then the distance travelled by particle before coming to rest is:
a) 56 m b) 16 m c) 24 m d) 40 m

81) Two cars A and B are moving with same speed of 45 km/hr along same direction. If third car 'C' is moving in opposite direction with 36 km/hr meets two cars in 5 minutes. The separation of car is:
a) 6.75 km b) 7.25 km c) 4.75 km d) 8.35 km

82) A monkey of 20 kg is holding a vertical rope. The rope can break when a mass of 25 kg is suspended from it. The maximum acceleration of monkey by which it can climb up the rope is:
a) 2.5 m/s^2 b) 5 m/s^2 c) 7 m/s^2 d) 10 m/s^2

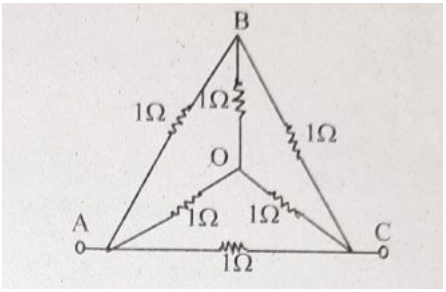
83) Hot water cools from 60˚C to 50˚C in 10 minutes and to 42˚C in next 10 minutes. The temperature of surrounding is:
a) 10˚C b) 15˚C c) 20˚C d) 30˚C

84) 175 calories of heat is required to raise the temperature of 5 moles of an ideal gas at constant pressure from 30˚C to 35˚C. The amount of heat energy required to raise the same temperature from 30˚C to 35˚C at constant volume will be:
a) 75 cal b) 125 cal c) 150 cal d) 250 cal

85) A sonometer wire is in resonance with tuning fork. The length of wire is decreased by 1 cm, then it produces 8 beats/sec with same fork. The frequency of fork is:
a) 256 Hz b) 384 Hz c) 480 Hz d) 512 Hz

86) The dielectric strength of a medium is 2 kv/mm. Maximum potential difference that can be set up across 50μm specimen without puncturing it is:
a) 10 V b) 100 V c) 1000 V d) 10000 V

87) The resistance across AC is:



a) 1/2 Ω b) 1 Ω c) 3/2 Ω d) 2 Ω

88) A magnetic field of 20 T is acting normal to coil to 100 turns and area 10^{-2} m^2. If coil is removed from magnetic field in 2 ms, then induced emf is:
a) 2 kV b) 5 kV c) 7 kV d) 10 kV

89) An ac is connected across R, L and C placed in series across which voltage obtained is 10 V, 18 V and 8 V respectively, then applied voltage is:
a) 36 V b) 10 V c) $10\sqrt{2}$ V d) 16 V

90) A short linear object of length b lies along the axis of concave mirror of focal length 'f' at a distance 'u' from pole of mirror. The size of image will be:
a) $\left(\frac{f}{u-f}\right)b$ b) $\left(\frac{f}{u-f}\right)^2 b$ c) $\left(\frac{f}{u-f}\right)b^2$ d) $\frac{f}{u-f}$

91) The half life of source of mass number 226 is 1602 years. The activity of 0.1 g of sample will be:
a) 3.6×10^6 disintegration/s b) 3.6×10^8 disintegration/s
c) 3.6×10^9 disintegration/s d) 3.6×10^{10} disintegration/s

92) A beam of 450 nm incident on metal of work function 2 eV. If the most energetic electron enters in a magnetic field perpendicularly and describe a cricle of radius 20 cm. The flux density is:
a) 1.5×10^{-5} T b) 1.5×10^{-3} T
c) 1.5×10^{-2} T d) 1.5 T

93) The number of moles of $KMnO_4$ reduced by one mole of KI in alkaline medium is:
a) 1/5 b) 5 c) 1 d) 2

94) Which of the following pairs of molecules will have permanent dipole moments for both members?
a) SiF_4 and NO_2 b) NO_2 and CO_2 c) NO_2 and O_3 d) SiF_4 and CO_2

95) The compounds A and B are mixed in equimolar proportions to form the products C and D, $A + B \rightleftharpoons C + D$. At equilibrium, one third of A and B are consumed. The equilbrium constant for the reaction is:
a) 0.5 b) 4.0 c) 2.5 d) 0.25

96) A certain current liberates 0.504 g of hydrogen in 2 hours. How many grams of oxygen can be liberated by the same current in same time?
a) 2.0 g b) 0.4 g c) 4.0 g d) 8.0 g

97) An aqueous solution of zinc chloride is treated with sodium hydroxide solution, a white precipitate appears which dissolves on adding excess of NaOH. The resulting solution contains zinc as:
a) cation b) anion
c) both as cation and anion d) atom

98) Which of the following will displace Br_2 from an aqueous solution containing bromide ions?
a) Cl_2 b) I^- c) I_2 d) Cl^-

99) The most reactive nucleophile among the following is:
a) CH_3O^- b) $C_6H_5O^-$
c) $(CH_3)_2CHO^-$ d) $(CH_3)_3CO^-$

100) An aromatic amine (A) was treated with alcoholic potash and another compound (Y) when a foul smelling gas was formed with formula C_6H_5NC. (Y) was formed by reacting a compound (Z) with Cl_2 in presence of slaked lime. The compound (Z) is:
a) $C_6H_5NH_2$ b) CH_3OH c) CH_3COCH_3 d) $CHCl_3$

❖❖❖❖ **Thank You!!!** ❖❖❖❖