CET(PG)2015

Sr. No. : 215057

Question Booklet Series : A

Important : Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No. *In Figures* *In Words*

O.M.R. Answer Sheet Serial No.

Signature of the Candidate :

Subject : M.E. (Chemical)

Time : 90 minutes **Number of Questions : 75** **Maximum Marks : 75**

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO

INSTRUCTIONS

1. Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point / Black Gel pen.**
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. To open the Question Booklet remove the paper seal gently when asked to do so.
5. Please check that this Question Booklet contains **75** questions. In case of any discrepancy, inform t Assistant Superintendent within 10 minutes of the start of test.
6. Each question has four alternative answers (A, B, C, D) of which only one is correct. For each questic darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer She with **Black Ball Point / Black Gel pen.**
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
9. Negative marking will be adopted for evaluation i.e., 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the sheets marked "Rough Work" at the end of the Question Booklet be used.
12. The Answer Sheet is designed for **computer evaluation**. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e., not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so, would be expelled from the examination.
15. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistance or found giving or receiving assistance or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
16. **Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculator is not allowed.**

SEAL

1. **For protection of aquatic life in a fresh water stream, sewage effluent should never lower the dissolved oxygen content lower than :**

   (A) 15 ppm (B) 10 ppm

   (C) 5 ppm (D) 20 ppm

2. **Kick's law assumes that energy required for size reduction is proportional to the logarithm of the ratio between initial and final diameters. The unit of Kick's constant is :**

   (A) kW sec/kg (B) kWh/kg

   (C) kWh/sec.kg (D) kg/sec

3. **The most efficient equipment for removing the fine dust particles (< 1 micron diameter) from air below its dew point will be :**

   (A) bag filter (B) electrostatic precipitator

   (C) cyclone separator (D) wet scrubber

4. **Alkyl benzene sulphonate is a :**

   (A) detergent (B) rubber

   (C) polyester (D) pesticide

5. **Septic tanks are primarily used for :**

   (A) the aerobic decomposition of deposited sewage waste

   (B) separation of deposited solids

   (C) anaerobic decomposition of deposited solids

   (D) separation of oil and grease scums

6. **Carburettor in a spark ignition engine is used to :**

   (A) mix air-fuel in the desired ratio (B) increase the compression ratio

   (C) adjust the stroke length (D) maintain a constant speed at varying loads

7. **Surface tension has a dimension :**

   (A) FL^{-2} (B) FL

   (C) $F^{-1}L^{3}$ (D) FL^{-1}

8. **Two capillary tubes of different diameters are dipped in water. The rise of water is :**

   (A) greater in the tube of smaller diameter (B) greater in the tube of larger diameter

   (C) same in both tubes (D) zero in both tubes

9. **The viscosity of a gas :**

   (A) increases with increase in temperature (B) decreases with increase in temperature

   (C) remains unaffected with change in temperature (D) is greater than the viscosity of a liquid

10. **An example of Bingham plastic is :**

(A) gas
(B) non-colloidal solution
(C) sewage sludge
(D) quicksand

11. **The mach number may be defined as ratio of inertial forces to :**

(A) elastic forces
(B) gravity forces
(C) pressure forces
(D) viscous forces

12. **For laminar flow in a pipe, the value of kinetic energy correction factor (α) is :**

(A) 1
(B) 1.01
(C) 1.33
(D) 2

13. **A fluid jet discharging from a 50 mm diameter has a diameter of 40 mm at its vena contracta. The coefficient of contraction is :**

(A) 0.8
(B) 1.25
(C) 1.56
(D) 0.64

14. **A plant has a capacity of producing 25000 units per year. The annual fixed cost is Rs. 90000. The variable cost per unit is Rs. 16. The price of the product is Rs. 20 per unit. The break-even point in terms of the capacity of the plant will be :**

(A) 20%
(B) 70%
(C) 80%
(D) 90%

15. **The thermal conductivity is minimum for :**

(A) asphalt
(B) water
(C) petroleum coke
(D) air

16. **The Reynolds analogy :**

(A) applied only to a fluid for which Prandtl number is unity
(B) applies over a range of Prandtl number from 0.6 to 120
(C) can be used for situations where form drag appears
(D) cannot be used for situations where wall drag appears

17. **For the same process temperatures, the ratio of LMTD in parallel flow to the LMTD in counterflow in liquid-liquid heat exchanger is :**

(A) 1
(B) <1
(C) >1
(D) ∞

18. **In a double pipe heat exchanger the outer diameter of inner pipe is d_1 and inner diameter of the outer pipe is d_2. The equivalent diameter of annulus for heat transfer is :**

(A) d_2-d_1
(B) $(d_2- d_1)/4$
(C) $(d_2^2-d_1^2)/d_1$
(D) $(d_2^2-d_1^2)/4d_1$

19. **An reaction in which one of the products of reaction acts as a catalyst is called :**

(A) homogeneous catalytic reaction
(B) heterogeneous catalytic reaction
(C) autocatalytic reaction
(D) biochemical reaction

20. **An aqueous solution containing 100 grams of dissolved $MgSO_4$ is fed to a crystallizer where 80% of the dissolved salt crystallizes out as $MgSO_4 . 6H_2O$ crystals. How many grams of the hexahydrate salt crystals are obtained from the crystallizer ?**

(A) 80.0
(B) 100.0
(C) 151.8
(D) 189.0

21. **Producer gas is obtained by :**

(A) thermal cracking of naphtha
(B) passing steam and air through red hot coke
(C) passing air through red hot coke
(D) passing steam through red hot coke

22. **The principal raw materials for the manufacture of soda ash by Solvay Process are :**

(A) limestone and potassium chloride
(B) dolomite and sodium hydroxide
(C) limestone, brine and coal
(D) coal and caustic soda

23. **Plaster of Paris is :**

(A) $CaSO_4.2H_2O$
(B) $CaSO_4$
(C) $CaSO_4.{}^1/_2H_2O$
(D) $CaSO_4 . 1\frac{1}{2} H_2O$

24. **Permanent hardness of water is caused by the presence of :**

(A) bicarbonates of calcium and magnesium
(B) carbonates of calcium and magnesium
(C) chlorides and sulphates of calcium and magnesium
(D) phosphates of sodium and potassium

25. **Zeolites used in zeolite softening process for the treatment of hard water gets exhausted after certain time of usage but can be regenerated by flushing it with :**

(A) 10 percent calcium chloride solution
(B) 10 percent magnesium sulphate solution
(C) 10 percent magnesium chloride solution
(D) 10 percent sodium chloride solution

26. **Which is not an insecticide ?**

(A) DDT
(B) BHC
(C) TNT
(D) 2,4-Dichlorophenoxyacetic acid

27. **Aniline point of a diesel is a measure of its :**

(A) aromatic content
(B) paraffin content
(C) olefin content
(D) naphthene content

28. The diffusivity D_{AB} for A diffusing in B is the same as the diffusivity D_{BA} for diffusing in A for a binar mixture of :

(A) ideal gases only
(B) real gases only
(C) both ideal and real gases
(D) real liquids only

29. The dew point of an unsaturated mixture of water vapour and air at constant temperature an pressure :

(A) does not change with change in absolute humidity
(B) increases with increase in absolute humidity
(C) decreases with increase in absolute humidity
(D) decreases linearily with increase in absolute humidity

30. At the azeotropic composition :

(A) $y^* > x$
(B) $y^* < x$
(C) $y^* = x$
(D) $x + y^* = 1$

31. Flash distillation operation is suitable for separating components which :

(A) boil at very close temperatures
(B) boil at widely different temperatures
(C) form minimum-boiling azeotrope
(D) form maximum-boiling azeotrope

32. In a distillation total reflux requires :

(A) minimum number of plates
(B) infinite number of plates
(C) minimum reboiler and condenser load
(D) that the flow of fresh feed must continue

33. The flooding in a distillation column is detected by :

(A) a sharp increase in pressure drop
(B) a sharp increase in Murphee plate efficiency
(C) a sharp decrease in pressure drop
(D) a sharp decrease in liquid hold-up in the column

34. Molecular sieves are regenerated by heating to temperatures :

(A) below 100°C
(B) above 800°C
(C) between 200 and 315°C
(D) below 200°C

35. A wet solid is to be dried from 80% to 10% moisture, wet basis. The moisture to be evaporated, pe 1000 kg of dried product is :

(A) 630 kg
(B) 3888.89 kg
(C) 700 kg
(D) 3500 kg

36. **Cylindrical pressure vessels in horizontal condition is generally supported on a :**

(A) lug support (B) skirt support

(C) saddle support (D) guy wire support

37. **The value of "a" for which the following set of equations have non-trivial solution, is :**

$y + 2z = 0$

$2x + y + z = 0$

$ax + 2y = 0$

(A) 0 (B) 8

(C) -2 (D) 3

38. **A vessel has two components A and B containing H_2 and O_2 respectively both at one atmospheric pressure. If the wall separating the two components is removed :**

(A) the pressure will remain unchanged (B) the pressure will increase in A

(C) the pressure will increase in B (D) the pressure will increase both in A and B

39. **A substance above its critical temperature exists as :**

(A) solid (B) liquid

(C) gas (D) saturated vapour

40. **Specific heat of a gas for a reversible adiabatic process :**

(A) is zero (B) is infinity

(C) is negative (D) varies between zero and infinity

41. **In reversible isothermal expansion of an ideal gas :**

(A) $\Delta U = Q$ (B) $Q = W$

(C) $\Delta U = P\Delta U$ (D) $\Delta U = Q + P\Delta U$

42. **If heat contents of CH_4, C_2H_4 and C_3H_8 are -17.9, 12.5 and -24.8 kcal/mole respectively, then ΔH for the reaction $CH_4(g) + C_2H_4(g) \Leftrightarrow C_3H_8(g)$ will be**

(A) -19.4 kcal (B) -30.2 kcal

(C) 55.2 kcal (D) -55.2 kcal

43. **Entropy of an ideal gas is :**

(A) a function of temperature only (B) a function of pressure only

(C) a function of temperature as well as pressure (D) independent of temperature and pressure only

44. **Which of the following shows a heating effect when stretched reversibly and adiabatically ?**

(A) Rubber string (B) Copper wire

(C) Nickel wire (D) Aluminium wire

45. **Which of the following has dimensions ?**

(A) Fugacity coefficient
(B) Activity coefficient
(C) Fugacity
(D) Activity

46. **A nozzle is a device which :**

(A) reduces kinetic energy and increases pressure
(B) increases kinetic energy and decreases pressure
(C) increases kinetic energy as well as pressure
(D) reduces kinetic energy as well as pressure

47. **Refrigerator works on the principle of :**

(A) zeroth law of thermodynamics
(B) first law of thermodynamics
(C) second law of thermodynamics
(D) third law of thermodynamics

48. **The volume of oxygen at STP required for the complete combustion of 2 litres of CO at STP is :**

(A) ½ litre
(B) 1 litre
(C) 2 litres
(D) 4 litres

49. **All the organic liquids are combustible except :**

(A) benzene
(B) carbon tetrachloride
(C) toluene
(D) cyclohexane

50. **1.6 kg of an organic compound on combustion gave 4.4 kg of CO_2. The percentage of C in the organ compound is about :**

(A) 30%
(B) 40%
(C) 75%
(D) 60%

51. **Which of the following has minimum calorific value in Kcal/m^3 ?**

(A) LPG
(B) Water gas
(C) Producer gas
(D) Coke oven gas

52. **The biogas is mainly composed of :**

(A) CH_4 and CO_2
(B) CO_2 and CO
(C) H_2 and O_2
(D) C_2H_6 and O_2

53. **The excess energy of the reactant required to dissociate into products is :**

(A) activation energy
(B) threshold energy
(C) binding energy
(D) thermal energy

54. **Liquid A decomposes by irreversible first-order kinetics and the half-life period of this reaction is 1 min. The time required for 75% conversion of A is :**

(A) 21 min
(B) 16 min
(C) 24 min
(D) 18 min

55. **For certain first-order reaction A → P, the slope of a plot of $\log_{10}(C_A)$ versus t would be equal to :**

(A) –(k/2.303) (B) –(k/0.693)

(C) (k/2.303) (D) –(2.303/k)

56. **For identical feed composition, flow rate, conversion and for all positive reaction orders, the ratio of volumes of mixed reactor to plug flow reactor is :**

(A) always one (B) always less than one

(C) always greater than one (D) equal to the order of the reaction

57. **For a steady-state mixed reactor the space time is equivalent to the holding time for :**

(A) constant fluid density system (B) variable fluid density system

(C) non-isothermal gas reactions (D) gas reactions with changing number of moles

58. **The catalyst activity of enzymes is due to their capacity to :**

(A) lower the potential energy (B) lower the kinetic energy

(C) increase the activation energy (D) lower the activation energy

59. **What temperature has the same numerical value in Fahrenheit and Centrigrade scales ?**

(A) 32° (B) 0°

(C) 100° (D) –40°

60. **Invar is a an :**

(A) iron-nickel alloy containing about 36% nickel

(B) copper-nickel alloy containing about 36% nickel

(C) zinc-nickel alloy containing about 36% nickel

(D) tin-nickel alloy containing about 36% nickel

61. **Bolometer is used for the measurement of :**

(A) temperature (B) flow rate

(C) e.m.f. (D) current

62. **Flow rate of sludge is commonly determined by :**

(A) orifice meter (B) venturimeter

(C) open weir (D) rotameter

63. **Time constant of a first order system is defined as the time taken for the system output to reach 63.2% of its ultimate value after :**

(A) a step change in input (B) an impulse change in input

(C) a ramp change in input (D) a sinusoidal change in input

64. **The reaction in which rate equation corresponds to a stoichiometric equation is called :**

(A) elementary reaction
(B) parallel reaction
(C) non-elementary reaction
(D) autokinetic reaction

65. **For critically damped second-order response, damping coefficient (ξ) is :**

(A) equal to zero
(B) equal to 1
(C) less than 1
(D) greater than 1

66. **U-tube manometer filled with mercury is an example of :**

(A) undamped second-order system
(B) overdamped second-order system
(C) underdamped second-order system
(D) critically damped

67. **Offset is defined as :**

(A) steady-state error in controlled variable
(B) unsteady-state error in controlled variable
(C) highest maximum deviation in controlled variable
(D) lowest maximum deviation in controlled variable

68. **Which of the following controllers requires maximum stabilizing time ?**

(A) P-controller
(B) P-I controller
(C) P-D controller
(D) P-I-D controller

69. **The emf (mV) of a thermocouple maintained at two junctions at different temperatures is as follows :**

Hot	Cold	emf
1000°C	0°C	41.32
30°C	0°C	1.20
1000°C	30°C	?

(A) 41.32
(B) 40.12
(C) 21.26
(D) 42.56

70. **Rate of a gaseous phase reaction is given by**

$$\frac{dp_A}{dT} = K.p_A^2$$

The unit of rate constant is :

(A) $(atm)^{-1}$
(B) $(hr)^{-1}$
(C) $(atm)^{-1}.(hr)^{-1}$
(D) $atm.(hr)^{-1}$

71. **LPG :**

(A) is a mixture of saturated and unsaturated hydrocarbons in C_3 and C_4 range

(B) is a mixture of methane and carbon dioxide

(C) is a mixture of methane and hydrogen

(D) is a mixture of saturated and unsaturated hydrocarbons in C_6 and C_7 range

72. **Viscosity index of an oil :**

(A) indicates the rate of change of viscosity with temperature

(B) indicates the viscosity at 100°F

(C) indicates the rate change of viscosity with pressure

(D) indicates the rate change of specific gravity with pressure

73. **In the UDEX process for the extraction of aromatics from reformed naphtha the solvent used is :**

(A) liquid sulphur dioxide

(B) a mixture of diethylene glycol and water

(C) a mixture of methyl ethyl ketone and benzene

(D) iron

74. **HETP is numerically equal to HTU only when operating line :**

(A) lies below the equilibrium line

(B) lies above the equilibrium line

(C) is parallel to the equilibrium line

(D) is far from the equilibrium line

75. **Break even point is the point where :**

(A) fixed and variable cost lines intersect

(B) fixed and total cost lines intersect

(C) variable and total cost lines intersect

(D) sales revenue and total expenditure lines intersect