POST GRADUATE COMMON ENTRANCE TEST-2018

DATE and TIME	COURSE	SUBJECT
14-07-2018 2.30 p.m. to 4.30 p.m.	ME/M.Tech/M.Arch/ courses offered by VTU/UVCE/UBDTCE	CHEMICAL ENGINEERING

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
100	150 Minutes	120 Minutes

MENTION YOUR PGCET NO.					QUESTION BOOKLET DETAILS	
					VERSION CODE	SERIAL NUMBER
					A	105065

DOs :

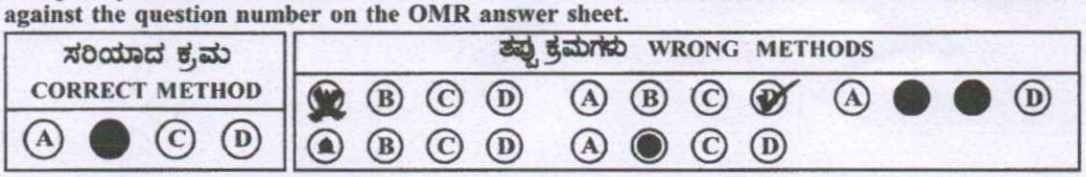
1. Candidate must verify that the PGCET number & Name printed on the OMR Answer Sheet is tallying with the PGCET number and Name printed on the Admission Ticket. Discrepancy if any, report to invigilator.
2. This question booklet is issued to you by the invigilator after the **2nd bell i.e., after 2.25 p.m.**
3. The Version Code of this Question Booklet should be entered on the OMR Answer Sheet and the respective circle should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll without any mistakes.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'Ts :

1. **The timing and marks printed on the OMR answer sheet should not be damaged / mutilated / spoiled.**
2. The **3rd Bell rings at 2.30 p.m., till then;**
   - Do not remove the paper seal / polythene bag present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 75 (items) questions and each question will have one statement and four answers. (Four different options / responses.)
2. After the **3rd Bell is rung at 2.30 p.m.,** remove the paper seal / polythene bag on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 120 minutes :
   - Read each question (item) carefully.
   - Choose one correct answer from out of the four available responses (options / choices) given under each question / item. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **only one response** for each item.
   - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**



4. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
5. After the **last Bell is rung at 4.30 p.m.,** stop marking on the OMR answer sheet and affix your **left hand thumb impression** on the OMR answer sheet as per the instructions.
6. Handover the **OMR ANSWER SHEET** to the room invigilator as it is.
7. After separating the top sheet (KEA copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
8. Preserve the replica of the OMR answer sheet for a minimum period of **ONE year.**
9. Only **Non-programmable** calculators are allowed.

Marks Distribution

PART-1 : 50 QUESTIONS CARRY ONE MARK EACH (1 TO 50)
PART-2 : 25 QUESTIONS CARRY TWO MARKS EACH (51 TO 75)

CH - A

CHEMICAL ENGINEERING

PART – 1

(Each question carries one mark.) **(50 × 1 = 50)**

1. Distillation is a separating process based on _____ of liquid mixture.
   (A) Vaporizing
   (B) Condensation
   (C) Freezing
   (D) None of these

2. Unit of mass velocity :
   (A) kg/m.hr
   (B) $kg/m^2.hr$
   (C) kg/hr
   (D) kg/m^2

3. In a binary liquid system, the composition expressed as _____ is independent of the temperature & pressure.
   (A) kg of solute/kg of solvent
   (B) kg-mole of solute/kg-mole of solvent
   (C) kg-mole of solute/1000 kg of solvent
   (D) All (A), (B) & (C)

4. For an endothermic reaction, the minimum value of energy of activation will be (where, ΔH = enthalpy of the reaction)
   (A) ΔH
   (B) $> \Delta H$
   (C) $< \Delta H$
   (D) 0

5. The reverse process of fractional crystalisation is called
   (A) Stripping
   (B) Leaching
   (C) Differential distillation
   (D) Absorption

6. Which of the following factors does not contribute to the pressure drop in a pipeline ?
   (A) Velocity of fluid
   (B) Size of pipe
   (C) Length of pipe and number of bends
   (D) None of these

Space For Rough Work

7. Which of the following can be used to create a flow of gas, where no significant compression is required ?

(A) Reciprocating compressor

(B) Blower

(C) Axial flow compressor

(D) Centrifugal compressor

8. Gear pump

(A) is a positive displacement pump.

(B) is a centrifugal pump.

(C) is a non-positive displacement pump.

(D) can be started with delivery valve closed.

9. The speed of sound in an ideal gas varies as the

(A) Temperature

(B) Pressure

(C) None of these

(D) Density

10. The Navier-Stokes equation deals with the law of conservation of

(A) Mass

(B) Energy

(C) Both (A) & (B)

(D) Momentum

11. Cyclones are used primarily for separating

(A) Solids

(B) Solids from fluids

(C) Liquids

(D) Solids from solids

12. The main differentiation factor between tube mill and ball mill is the

(A) Length to diameter ratio

(B) Size of the grinding media

(C) Final product size

(D) Operating speed

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13. Fick's law relates to

(A) Energy consumption

(B) Final particle size

(C) Feed size

(D) None of these

14. Which is a secondary crusher for a hard and tough stone ?

(A) Jaw crusher

(B) Cone crusher

(C) Impact crusher

(D) Toothed roll crusher

15. Carbon black is pulverised in a

(A) Hammer crusher

(B) Ball mill

(C) Roll crusher

(D) Gyratory crusher

16. In a forward feed multiple effect evaporators, the pressure is

(A) Highest in last effect

(B) Lowest in last effect

(C) Same in all effects

(D) Dependent on the number of effects

17. For the same heat load and mass flow rate in the tube side of a shell and tube heat exchanger, one may use multipass on the tube side, because it

(A) Decreases the pressure drop

(B) Decreases the outlet temperature of cooling medium

(C) Increases the overall heat transfer co-efficient

(D) None of these

18. LMTD can't be used as such without a correction factor for the

(A) Multipass heat exchanger

(B) Baffled heat exchanger

(C) Condensation of mixed vapour in a condenser

(D) All (A), (B) and (C)

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19. Evaporator tubes are generally

(A) Horizontal

(B) Vertical

(C) Inclined

(D) Random

20. Circulation pump is located below the evaporator to

(A) Avoid cavitation

(B) Avoid frequent priming

(C) Create more suction head

(D) None of these

21. Entropy is a measure of the_____ of a system.

(A) Disorder

(B) Orderly behaviour

(C) Temperature changes only

(D) None of these

22. For spontaneous changes in an isolated system (S = entropy)

(A) $dS = 0$

(B) $dS < 0$

(C) $dS > 0$

(D) dS = Constant

23. For equilibrium process (i.e. reversible) in an isolated system

(A) $dS = 0$

(B) $dS < 0$

(C) $dS > 0$

(D) dS = Constant

24. The four properties of a system viz. P, V, T, S are related by _____ equation.

(A) Gibbs-Duhem

(B) Gibbs-Helmholtz

(C) Maxwell's

(D) None of these

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25. Any substance above its critical temperature exists as

(A) Saturated vapour

(B) Solid

(C) Gas

(D) Liquid

26. Molecular weight of polymers are in the range of

(A) 10 to 10^3

(B) 10^2 to 10^7

(C) 10^7 to 10^9

(D) 10^9 to 10^{11}

27. Thermoplastic materials

(A) do not soften on application of heat.

(B) are heavily branched molecules.

(C) are solvent insoluble.

(D) None of these

28. Vulcanisation of rubber

(A) decreases its tensile strength.

(B) increases its ozone & oxygen reactivity.

(C) increases its oil & solvent resistance.

(D) converts its plasticity into elasticity.

29. Thermosetting materials

(A) are cross-linked molecules.

(B) soften on application of heat.

(C) are solvent soluble.

(D) None of these

30. Most commonly used rubber vulcanisation agent is

(A) Sulphur

(B) Bromine

(C) Platinum

(D) Alumina

Space For Rough Work

31. BET apparatus is used to determine the

(A) specific surface of a porous catalyst

(B) pore size distribution

(C) pore diameter

(D) porosity of the catalyst bed

32. The optimum performance for reactors operating in parallel is obtained when the feed stream is distributed in such a way, that the

(A) space time for each parallel line is same

(B) space time for parallel lines is different

(C) larger reactors have more space time compared to smaller ones

(D) None of these

33. Back mixing is most predominant in

(A) a well stirred batch reactor

(B) a plug-flow reactor

(C) a single CSTR

(D) CSTR's connected in series

34. The ratio of moles of a reactant converted into the desired product to that converted into unwanted product is called

(A) Operational yield

(B) Relative yield

(C) Selectivity

(D) None of these

35. The performance of a cascade of CSTR's can be improved by adding

(A) P.F. reactor in series

(B) P.F. reactor in parallel

(C) More CSTR's in series

(D) More CSTR's in parallel

36. Temperature rise in the bomb calorimeter is usually measured by a _____ thermometer.

(A) Beckman

(B) Bimetallic

(C) Platinum resistance

(D) Vapor pressure

Space For Rough Work

37. Humidity is most commonly measured by
(A) partial vapor pressure determination
(B) dry and wet bulb temperature measurement
(C) physical expansion
(D) evaporation

38. Working of a constant volume gas thermometer is based on the
(A) Archimedes principle
(B) Pascal's law
(C) Charle's law
(D) Boyle's law

39. Bolometer measures the
(A) Current
(B) Temperature
(C) Flow rate
(D) Millivolts

40. Choose the one whose resistance decreases with increase in temperature.
(A) Platinum
(B) Carbon
(C) Constantan
(D) Aluminum

41. Which one of the following is not an elastomer ?
(A) Polyisoprene
(B) Neoprene
(C) Nitrile-butadiene
(D) None of these

42. Styrene-butadiene-rubber (SBR) as compared to natural rubber has
(A) poorer tensile strength.
(B) poorer resistance to oxidation
(C) greater amount of heat build-up under heavy loading.
(D) All (A), (B) and (C)

43. Pick out the wrong statement.
(A) Cold rubber (SBR) is superior as compared to hot rubber (SBR).
(B) Polymerisation temperature can modify the properties of SBR.
(C) Production of cold SBR employs lower pressure as compared to that of hot SBR.
(D) None of these

44. The process involved in converting rubber into a thin sheet or coating it on fabric is called
(A) Extrusion
(B) Mastication
(C) Calendering
(D) Vulcanization

Space For Rough Work

45. Flexible foam for mattresses is usually made of

(A) PVC

(B) Silicone

(C) Polyurethanes

(D) Polyamides

46. Unit of molal diffusivity is

(A) cm^2/sec gm. mole

(B) gm moles/cm^2. sec

(C) gm moles/cm. sec

(D) gm moles/cm^2. sec^2

47. If R_m is the minimum reflex ratio, the optimum reflux ratio may be around _____ R_m

(A) 1.2 to 1.5

(B) 2.5 to 3

(C) 3 to 4

(D) 5

48. Separation of two or more components of a liquid solution cannot be achieved by

(A) Absorption

(B) Evaporation

(C) Liquid extraction

(D) Fractional crystallization

49. In batch distillation with constant reflux, overhead product composition _____ with time.

(A) increase

(B) decrease

(C) may increase or decrease, depend on the system

(D) does not vary

50. An azeotropic mixture is a _____ mixture.

(A) Binary

(B) Ternary

(C) Constant boiling point

(D) None of these

Space For Rough Work

PART – 2

(Each question carries two marks.) **(25 × 2 = 50)**

51. A solution is made by dissolving 1 kilo mole of solute in 2000 kg of solvent. The molality of the solution is

(A) 2

(B) 1

(C) 0.5

(D) 1.5

52. If 1.5 moles of oxygen combines with aluminium to form Al_2O_3, then the weight of aluminium (atomic weight = 27) used in this reaction is

(A) 27

(B) 54

(C) 5.4

(D) 2.7

53. A solution of specific gravity 1 consists of 35% A by weight and the remaining B. If the specific gravity of A is 0.7, the specific gravity of B is

(A) 1.25

(B) 1.3

(C) 1.35

(D) 1.2

54. If reciprocating pump having a mechanical efficiency of 80% delivers water at the rate of 80 kg/s with a head of 30 m, the brake power of the pump is _____ kW.

(A) 29.4

(B) 20.8

(C) 15.4

(D) 10.8

Space For Rough Work

55. For a maximum transmission of power through a pipeline with total head 'H', the head loss due to friction h_f, is given by

(A) 0.1H

(B) H/3

(C) H/2

(D) 2H/3

56. To produce talcum powder, use

(A) Ball mill

(B) Hammer mill

(C) Jet mill

(D) Pin mil

57. The terminal settling velocity of a 6 mm diameter glass sphere (density : 2500 kg/m^3) in a viscous Newtonian liquid (density : 1500 kg/m^3) is 100 μm/s. If the particle Reynolds number is small and the value of acceleration due to gravity is 9.81 m/s^2, then the viscosity of the liquid (in Pa.s) is

(A) 100

(B) 196.2

(C) 245.3

(D) 490.5

58. For a particle settling in water at its terminal settling velocity, which of the following is true ?

(A) Buoyancy = weight + drag

(B) Weight = buoyancy + drag

(C) Drag = buoyancy + drag

(D) Drag = weight

59. Thermal radiative flux from a surface of emissivity 0.4 is 22.68 kW/m^2. The approximate surface temperature (K) is (Stefan-Boltzman constant = 5.67×10^{-8} W/m^2.K^4)

(A) 1000

(B) 727

(C) 800

(D) 1200

60. A multiple effect evaporator has a capacity to process 4000 kg of solid caustic soda per day, when it is concentrating from 10% to 25 % solids. The water evaporated in kg per day is

(A) 6000

(B) 24000

(C) 60000

(D) 48000

Space For Rough Work

61. A 2 ton air-conditioner installed in a room and working continuously for 2 hours will remove heat of _____ kcal.

(A) 12096

(B) 6084

(C) 3024

(D) 1296

62. If 30,000 kcal/hr of heat is removed from a room, then the refrigeration tonnage will be nearly equal to _____ tons of refrigeration.

(A) 5

(B) 10

(C) 20

(D) 30

63. $C_p - C_v = R$ is valid for _____ gases.

(A) Ideal

(B) All

(C) Very high pressure

(D) Very low pressure

64. Rate constant for a first order reaction does not depend upon reaction time, extent of reaction and the initial concentration of reactants; but it is a function of reaction temperature. In a chemical reaction, the time required to reduce the concentration of reactant from 100 gm moles/litre to 50 gm moles/litre is same as that required to reduce it from 2 gm moles/litre to 1 gm mole/litre in the same volume. Then the order of this reaction is

(A) 0

(B) 1

(C) 2

(D) 3

65. The conversion for a first order liquid phase reaction. $A \rightarrow B$ in a CSTR is 50%. If another CSTR of the same volume is connected in series, then the conversion % at the exit of the second reactor will be

(A) 60

(B) 75

(C) 90

(D) 100

Space For Rough Work

66. Which of the following will give maximum gas conversion ?

(A) Fixed bed reactor

(B) Fluidised bed reactor

(C) Semi-Fluidised bed reactor

(D) Plug-flow catalytic reactor

67. The time constant of a first order process with resistance R and capacitance C is

(A) R + C

(B) R – C

(C) RC

(D) 1/RC

68. Identify an unbounded input from inputs whose transfer functions are given below.

(A) 1

(B) 1/S

(C) $1/S^2$

(D) $1/(S^2+1)$

69. In a feed-back control system G and H denote open loop and close loop transfer functions respectively. The output-input relationship is

(A) G/1+H

(B) H/1+G

(C) G/H

(D) H/G

Space For Rough Work

70. BOD of raw municipal sewage may be in the range of about _____ mg/litre.

(A) 1-2

(B) 5-10

(C) 150-300

(D) 2000-3000

71. COD of raw municipal sewage may be in the range of about _____ mg/litre.

(A) 1-2

(B) 5-10

(C) 90-120

(D) 1500-2500

72. Molecular diffusivity of a liquid

(A) increases with temperature.

(B) decreases with temperature.

(C) may increase or decrease with temperature.

(D) is independent of temperature.

73. For turbulent mass transfer in pipes, the Sherwood number depends on the Reynolds number as

(A) $Re^{0.33}$

(B) $Re^{0.83}$

(C) $Re^{0.53}$

(D) Re

74. Solvay process is used for the manufacture of

(A) Caustic soda

(B) Soda ash

(C) Caustic potash

(D) Soda lime

75. Styrene is produced from ethyl benzene by the process of

(A) Dehydrogenation

(B) Oxidation

(C) Alkylation

(D) Dehydration

Space For Rough Work

Space For Rough Work