

Question Booklet Series: **A**

Question Booklet Serial No. **110041**

CET (PG) – 2017

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

Roll No.

In Figure

In Words

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O.M.R. Answer Sheet Serial No.

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Signature of Candidate: _____

Signature of Invigilator: _____

Subject: M. Tech. (Polymer)

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 Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. 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. Please check that this Question Booklet contains 75 Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen**. **There shall be negative marking for wrong answer, $\frac{1}{4}$ of the marks of the question will be deducted for every wrong answer.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The University will provide Logarithmic table. Borrowing of log table or other material is not allowed.
11. 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.**
12. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
13. 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.
14. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant 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.
15. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
16. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1. For an ideal gas, the internal energy depends upon its ____ only

A) Molecular size	C) Pressure
B) Temperature	D) Volume

2. _____ moulding is used for shaping of thermosetting plastics exclusively.

A) Compression	C) Transfer
B) Injection	D) Extrusion

3. In pipe flow, heat is transferred from hot wall to the liquid by

A) Conduction only	C) Forced convection and conduction
B) Forced convection only	D) Free and forced convection

4. The ratio of average fluid velocity to the maximum velocity in case of laminar flow of Newtonian fluid in a circular pipe is

A) 0.5	C) 2
B) 1	D) 0.66

5. Liquefied Petroleum Gas is mainly a mixture of

A) Propane and butane	C) Methane and ethane
B) Butane and ethane	D) Methane and propane

6. Which of the following is not correct?

A) Dislocations are thermodynamically unstable defects.	C) Screw dislocations can change the slip plane without climb
B) Dislocations can move inside a crystal under the action of an applied stress.	D) Burger's vector of an edge dislocation is parallel to the dislocation line

7. Which of the following nitrogenous fertilizers has the highest percentage of nitrogen?

A) Calcium nitrate	C) Urea
B) Calcium ammonium nitrate	D) Ammonium sulfate

8. At a constant atmospheric pressure, the number of phases, P which coexist in a chosen system at equilibrium, is related to the number of components, C in the system and the degree of freedom, F by

A) $P+F=C-2$	C) $P+F=C+1$
B) $P+F=C+2$	D) $P+F=C-1$

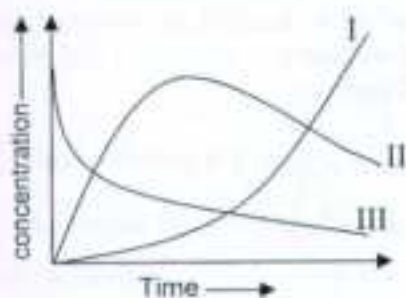
9. Air is to be heated by condensing steam. Two heat exchangers are available (i) a shell and tube heat exchanger and (ii) a finned tube heat exchanger. Tube side heat transfer area are equal in both the cases. The recommended arrangement is
- A) Finned tube heat exchanger with air inside tubes and steam outside
 B) Finned tube heat exchanger with air outside and steam inside tubes
 C) Shell and tube heat exchanger with air inside tubes and steam outside
 D) Shell and tube heat exchanger with air outside and steam inside tubes
10. Match the microscopes listed in **Column I** with their principle of operation listed in **Column II**

Column I	Column II
P Scanning Electron Microscope (SEM)	1 Van der Waals forces between atoms
Q Transmission Electron Microscope (TEM)	2 Electrons to jump across a potential barrier
R Scanning Tunneling Microscope (STM)	3 Diffraction of electrons
S Atomic Force Microscope (AFM)	4 Detection of secondary electrons
	5 Photo emission of electrons
A) P-2, Q-5, R-3, S-1	C) P-4, Q-3, R-2, S-1
B) P-3, Q-4, R-5, S-2	D) P-4, Q-3, R-5, S-2

11. Existence of boundary layer in fluid flow is because of the
- A) Surface tension
 B) Fluid density
 C) Fluid viscosity
 D) Gravity forces
12. Raw materials for nitric acid manufacture are
- A) Hydrogen peroxide, air and water
 B) Anhydrous ammonia and air
 C) Anhydrous ammonia, air and water
 D) Wet ammonia, air and water
13. Match the process in **Column I** with product in **Column II**

Column I	Column II
P DCDA process	1 Sodium hydroxide
Q Mercury cell	2 Sulfuric acid
	3 Sodium carbonate
	4 Nitric acid
A) P-1, Q-4	C) P-2, Q-3
B) P-1, Q-3	D) P-2, Q-1

14. In carbon fiber reinforced resin composites, for a given fiber volume content, Young's modulus depends on the orientation of the fiber with respect to the applied load. Which orientation of the fibers will give the maximum value of Young's modulus?
- A) Transverse
B) Longitudinal
C) Random
D) Both transverse and longitudinal
15. The heat transfer coefficient in film type condensation is _____ that for dropwise condensation.
- A) Greater than
B) Lower than
C) Is same as
D) Half
16. For a given ambient air temperature with increase in the thickness of insulation of hot cylindrical pipe, the rate of heat loss from the surface would
- A) Decrease
B) Increase
C) First decrease and then increase
D) First increase and then decrease
17. The relative volatility of a binary mixture at the azeotropic composition is
- A) 1
B) >1
C) 0
D) ∞
18. A first order homogeneous reaction of the type $X \rightarrow Y \rightarrow Z$ is carried out in a CSTR. Which of the following curves respectively show the variation of the concentration X , Y and Z with time?



- A) I, II, III
B) III, II, I
C) III, I, II
D) II, I, III
19. Kg of liquid evaporated per hour in an evaporator is defined as
- A) Steam capacity
B) Steam economy
C) Steam load
D) Steam efficiency
20. If the time required to complete a definite fraction of reaction varies inversely as the concentration of the reactants, then the order of reaction is
- A) 0
B) 1
C) 2
D) 3

21. Mixer used for rubber compounding is

- A) Mixer-extruder
B) Banbury internal mixer
C) Muller mixer
D) Pug mill

22. Match the byproducts/co-products mentioned in Column I to one of the main products mentioned in Column II.

Column I		Column II
P Glycerine	1	Rocket propellant
Q Ammonium chloride	2	Soda ash
	3	Battery grade MnO_2
	4	Antibiotics
	5	Soap
	6	Sugar

- A) P-5, Q-2
B) P-3, Q-4
C) P-1, Q-6
D) P-2, Q-5

23. What are all the values for k such that $\int_{-2}^k x^k dx = 0$?

- A) 0
B) -2 and 2
C) -2, 0 and 2
D) 0 and 2

24. In case of _____ distillation, a solvent is added to alter the relative volatility of the mixture to be separated.

- A) Molecular
B) Azeotropic
C) Extractive
D) Flash

25. If the rate of change of y is directly proportional to y , then it's possible that

- A) $y = 3e^{3t}$
B) $y = 5e^{1.5t}$
C) $y = \ln\left(\frac{3}{2}t\right)$
D) $y = \frac{3}{2}t^2$

26. Coal is finely pulverized to 200 mesh size for burning in boilers by a

- A) Hammer crusher
B) Ball mill
C) Roll crusher
D) Gyratory crusher

27. The most widely used coagulant for removing suspended impurities from water is

- A) Bleaching powder
B) Chlorine
C) Calcium sulfate
D) Alum

28. In the decomposition of PCl_5 represented by $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$, decrease in the pressure of the system will _____ the degree of dissociation of PCl_5
- A) Increase
B) Decrease
C) Not alter
D) None of these
29. A space velocity of 5 hr^{-1} means that
- A) Five reactor volumes of feed (at specified conditions) are being fed into the reactor per hour
B) After every 5 hr, reactor is being filled with feed
C) Cent per cent conversion can be achieved in at least 5 hr
D) A fixed conversion of a given batch of feed takes 5 hr
30. For a zero order reaction, the concentration of product increases with
- A) Increase of reaction time
B) Increase in initial concentration
C) Total pressure
D) Decrease in total pressure
31. Which of the following fine dust removal equipments is the most efficient?
- A) Bag filter
B) Scrubber
C) Electrostatic precipitator
D) Cyclone separator
32. Corrosion resistance of steel is increased by the addition of
- A) Phosphorous and tungsten
B) Nickel and chromium
C) Lead and vanadium
D) Molybdenum and tungsten
33. One ton of refrigeration is defined as the heat rate corresponding to melting of one ton of ice in one
- A) Hour
B) Day
C) Minute
D) Second
34. _____ is the major constituent of Portland cement.
- A) Calcium carbonate
B) Calcium oxide
C) Tricalcium silicate
D) Calcium sulfate
35. Match the process in **Column I** with catalysts in **Column II**
- | | | | |
|---|---------------------------------|-----|-------------------------|
| P | Fischer-Tropsch synthesis | I | Nickel |
| Q | Formaldehyde from methanol | II | Fe_2O_3 |
| R | Hydrogenation of vegetable oils | III | Silver |
| S | Dehydrogenation of ethylbenzene | IV | Cobalt |
- A) P-III, Q-IV, R-I, S-II
B) P-IV, Q-II, R-I, S-II
C) P-IV, Q-III, R-I, S-II
D) P-III, Q-IV, R-II, S-I

36. Pirani gauge is used for the measurement of
- | | |
|-----------------------|---|
| A) Very high pressure | C) Liquid level under pressure |
| B) High vacuum | D) Liquid level at atmospheric pressure |
37. The net positive suction head (NPSH) of a centrifugal pump is defined as the sum of velocity head and pressure head at the
- | | |
|--------------|--|
| A) Discharge | C) Suction minus vapor pressure of liquid at suction temperature |
| B) Suction | D) Discharge minus vapor pressure of liquid at discharge temperature |
38. The pipe wall thickness is minimum for a pipe of given nominal size having schedule number
- | | |
|--------|-------|
| A) 160 | C) 80 |
| B) 120 | D) 40 |
39. Property of a material due to which recovery after unloading is complete and instantaneous is called
- | | |
|---------------|--------------------|
| A) Elasticity | C) Anelasticity |
| B) Plasticity | D) Viscoelasticity |
40. For a given fluid flow rate, which of the following incurs maximum head loss?
- | | |
|------------------|---|
| A) Orifice meter | C) Flow nozzle |
| B) Venturimeter | D) All of them incur the same head loss |
41. Optical activity of a solution can be determined using a
- | | |
|----------------|------------------|
| A) Dilatometer | C) Polarimeter |
| B) Polarograph | D) Refractometer |
42. A barometer measures the _____ pressure
- | | |
|-------------|------------------------------|
| A) Absolute | C) Absolute as well as gauge |
| B) Gauge | D) Dynamic |
43. A change in state involving a decrease in entropy can be spontaneous, only if
- | | |
|----------------------|--------------------------------------|
| A) It is exothermic | C) It takes place isothermally |
| B) It is isenthalpic | D) It takes place at constant volume |
44. A pipe of ID 4 m is bifurcated into two pipes of ID 2 m each. If the average velocity of water flowing through the main pipe is 5 m/s, the average velocity (m/s) through the bifurcated pipes is
- | | |
|-------|--------|
| A) 20 | C) 2.5 |
| B) 10 | D) 5 |

45. Which of the following controller has the highest maximum deviation?
- A) P controller
B) PI controller
C) PD controller
D) PID controller
46. Ethylene is commercially produced from naphtha by
- A) Catalytic cracking
B) Catalytic dehydrogenation
C) Pyrolysis
D) Hydrocracking
47. The continuity equation for one dimensional, unsteady state flow of an incompressible fluid is
- A) $\frac{\partial u}{\partial x} = 0$
B) $\frac{\partial(\rho u)}{\partial x} = 0$
C) $\frac{\partial u}{\partial x} = -\frac{\partial \rho}{\partial t}$
D) $\frac{\partial \rho}{\partial t} = 0$
48. The function $f(x) = 3x(x - 2)$ has a
- A) Minimum at $x = 1$
B) Maximum at $x = 1$
C) Maximum at $x = 1$
D) Maximum at $x = 2$
49. Use of raschig rings in place of crushed stones as packing in packed beds (other things being same)
- A) Increases pressure drop, increases surface area
B) Increases pressure drop, decreases surface area
C) Decreases pressure drop, increases surface area
D) Decreases pressure drop, decreases surface area
50. The overall heat transfer coefficient for a shell and tube heat exchanger for clean surface is $U_o = 400 \text{ W/m}^2\text{K}$. The fouling factor after one year of operation is found to be $h_{df} = 2000 \text{ W/m}^2\text{K}$. The overall heat transfer coefficient at this time is
- A) 1200
B) 894
C) 333
D) 287
51. The weight fraction of methanol in an aqueous solution is 0.64. The mole fraction of methanol will be
- A) 0.75
B) 0.5
C) 0.4
D) 0.2
52. In the sulphite process for paper manufacture, the cooking liquor is
- A) Magnesium bisulfite and sulphur dioxide in acid medium
B) Magnesium sulfite and magnesium bicarbonate
C) Sodium sulfite and magnesium sulfite
D) Sodium sulphite, Sodium bisulfite and sulphur dioxide

53. Match the polymerization mechanisms in **column I** with corresponding polymers in **column II**.

Column I		Column II	
P	Chain growth/addition polymerisation	I	Polyethylene
Q	Step growth/condensation polymerisation	II	Polyvinyl chloride
		III	Polyethylene terephthalate
A)	P-III; Q-I, II	C)	P-II; III, Q-I
B)	P-I, II; Q-III	D)	P-I; Q-II, III

54. Match the item in **column I** with appropriate item in **column II**.

Column I		Column II	
P	Nusselt number	1.	Convective resistance/fluid conduction resistance
Q	Biot number	2.	Fluid conduction resistance/Convective resistance
		3.	Solid conduction resistance/Convective resistance
		4.	Convective resistance/solid conduction resistance
A)	P-1, Q-2	C)	P-3, Q-4
B)	P-1, Q-4	D)	P-2, Q-4

55. A pressure head of 320 m of water in m of CCl_4 (sp. gr. = 1.6) will be

A)	100	C)	320
B)	200	D)	160

56. Which of the following liquid vapor contacting devices provides maximum contact surface area for a particular duty?

A)	Sieve plate column	C)	Randomly packed column
B)	Bubble cap column	D)	Wetted wall column

57. Aniline point test of an oil qualitatively indicates the _____ content of an oil.

A)	Aromatic	C)	Paraffin
B)	Olefin	D)	Naphthene

58. A gas performs maximum work, when it expands

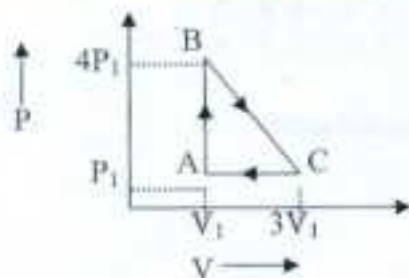
A)	Non-uniformly	C)	Isobarically
B)	Adiabatically	D)	Isothermally

59. Glycol is added to aviation gasoline as it

A)	Reduces consumption of petrol	C)	Prevents freezing of petrol
B)	Increases efficiency of petrol	D)	Reduces evaporation of petrol

60. Dimension of mass diffusivity is same as that of
- | | |
|------------------------|--------------------|
| A) Dynamic viscosity | C) Pressure |
| B) Kinematic viscosity | D) Surface tension |

61. An ideal gas is taken around the cycle ABCA as shown in PV diagram:



The work done by the gas during the cycle is equal to

- | | |
|-----------------|----------------|
| A) $12 P_1 V_1$ | C) $3 P_1 V_1$ |
| B) $6 P_1 V_1$ | D) $P_1 V_1$ |
62. The normal boiling points of benzene and water are 80.1°C and 100°C respectively. At a pressure of 1 atm, the boiling point of a mixture of benzene and water is
- | | |
|-----------------------------------|--|
| A) 80.1°C | C) 100°C |
| B) Less than 80.1°C | D) Greater than 80.1°C but less than 100°C |
63. An aqueous solution of 2.45% by weight H_2SO_4 has a specific gravity of 1.011. The composition expressed in normality is
- | | |
|-----------|-----------|
| A) 0.2500 | C) 0.5000 |
| B) 0.2528 | D) 0.5055 |
64. The ratio of inertial forces to elastic forces is called
- | | |
|--------------------|-----------------|
| A) Reynolds number | C) Euler number |
| B) Mach number | D) Weber number |
65. The value of 'n' for a chemical reaction $A \rightarrow B$ whose reaction rate is kC_A^n will be _____, if the rate of reaction increases by a factor of 8, when the concentration of A is doubled.
- | | |
|------|------|
| A) 0 | C) 2 |
| B) 1 | D) 3 |
66. Where does the maximum stress occur in case of laminar flow of incompressible fluid in a closed conduit of diameter 'd'?
- | | |
|---------------------------|---------------------------|
| A) At the centre | C) At the wall |
| B) At $d/4$ from the wall | D) At $d/8$ from the wall |

