

POST GRADUATE COMMON ENTRANCE TEST-2019

DATE and TIME	COURSE	SUBJECT
20-07-2019 2.30 p.m. to 4.30 p.m.	ME/M.Tech/M.Arch/ courses offered by VTU/UVCE/UBDTCE	POLYMER SCIENCE & TECHNOLOGY
MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
100	150 Minutes	120 Minutes
MENTION YOUR PGCET NO.		QUESTION BOOKLET DETAILS
		VERSION CODE
		SERIAL NUMBER
		F
		151006

DOs :

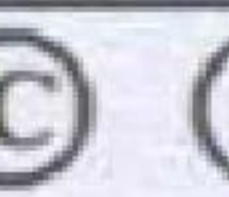
1. Candidate must verify that the PGCET number & Name printed on the OMR Answer Sheet is tallying with the PGCET number and Name printed on the Admission Ticket. Discrepancy if any, report to invigilator.
2. This question booklet is issued to you by the invigilator after the 2nd bell i.e., after 2.25 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.

ಸರಿಯಾದ ಕ್ರಮ CORRECT METHOD	ತಪ್ಪು ಕ್ರಮಗಳು WRONG METHODS
 (A)  (C)  (D)	 (B)  (C)  (D)  (A)  (B)  (C)  (D)  (A) (B) (C) (D)

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)

PO-F



SUBJECT		COURSE		SEMESTER	
POLYMER SCIENCE & TECHNOLOGY		B.TECH. POLYMER SCIENCE & TECHNOLOGY		SEMESTER I	
MAXIMUM MARKS		TOTAL DURATION		DATE	
100		3 HOURS			
INSTRUCTIONS		QUESTIONS		ANSWERS	
1. All questions are compulsory.		2. Answer any four questions.		3. Write the answers in the spaces provided.	
4. The duration of the examination is 3 hours.		5. The total marks are 100.		6. The questions are of 25 marks each.	
7. The questions are of 10 marks each.		8. The questions are of 5 marks each.		9. The questions are of 2 marks each.	
10. The questions are of 1 mark each.		11. The questions are of 0.5 marks each.		12. The questions are of 0.2 marks each.	

1. The polymer science and technology is a branch of science and technology that deals with the study of the properties and behavior of polymers. Polymers are long chains of repeating units called monomers. They are found in nature and are also synthesized in the laboratory. Polymers are used in a wide range of applications, from plastics to fibers to rubbers. The study of polymer science and technology is important for the development of new materials and products.

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QUESTIONS		ANSWERS	
1. Define polymer.		A polymer is a long chain of repeating units called monomers.	
2. What is the difference between a thermoplastic and a thermosetting plastic?		A thermoplastic plastic can be melted and reshaped, while a thermosetting plastic cannot.	
3. What is the difference between a natural polymer and a synthetic polymer?		A natural polymer is found in nature, while a synthetic polymer is synthesized in the laboratory.	
4. What is the difference between a linear polymer and a branched polymer?		A linear polymer has a straight chain of repeating units, while a branched polymer has a chain with side groups.	
5. What is the difference between a crystalline polymer and an amorphous polymer?		A crystalline polymer has a regular, repeating arrangement of repeating units, while an amorphous polymer has an irregular arrangement.	
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POLYMER SCIENCE AND TECHNOLOGY/ENGINEERING

PART – 1

Each question carries one mark.

(50 × 1 = 50)

1. The reverse process of fractional crystallization is called
(A) Stripping
(B) Leaching
(C) Differential distillation
(D) Absorption
2. Avogadro number is the number of molecules in one _____ of a gas.
(A) gram
(B) kilogram
(C) gram mole
(D) litre
3. Viscosity of 1 centipoise is equal to 1 centistoke in case of
(A) Water
(B) Mercury
(C) Carbon tetrachloride
(D) None of these
4. In an adiabatic process, the
(A) Heat transfer is zero.
(B) Temperature change is zero.
(C) Work done is a path function.
(D) Enthalpy remains constant.
5. For an isothermal reversible compression of an ideal gas
(A) only $\Delta E = 0$
(B) only $\Delta H = 0$
(C) $\Delta E = \Delta H = 0$
(D) $dQ = dE$
6. Degree of freedom at triple point will be
(A) 0
(B) 1
(C) 2
(D) 3
7. The absolute entropy for all crystalline substances at absolute zero temperature is
(A) zero
(B) negative
(C) more than Zero
(D) indeterminate

Space For Rough Work

8. Which of the following is not an intensive property ?
- (A) Volume
 - (B) Density
 - (C) Temperature
 - (D) Pressure
9. Which is an example for a closed system ?
- (A) Air compressor
 - (B) Liquid cooling system of an automobile
 - (C) Boiler
 - (D) None of these
10. When a gas in a vessel expands, its internal energy decreases. The process involved is
- (A) Reversible
 - (B) Irreversible
 - (C) Isothermal
 - (D) Adiabatic
11. Heat flux is the time rate of heat transfer per unit
- (A) length
 - (B) area
 - (C) volume
 - (D) None of these
12. Natural Convection is characterized by
- (A) Grashoff number
 - (B) Peclet number
 - (C) Reynolds number
 - (D) Prandtl number
13. For what value of Prandtl number, the Colburn analogy is valid ?
- (A) 0.06 to 120
 - (B) 0.6 to 120
 - (C) 1 to 103
 - (D) 1 to 50

Space For Rough Work

14. In a single effect evaporator, the economy is

- (A) 1
- (B) < 1
- (C) > 1
- (D) None of these

15. The absorptivity of a black body is

- (A) 1
- (B) 0
- (C) 0.78
- (D) 0.95

16. The unit of volumetric diffusivity is

- (A) cm^2/s
- (B) cm/s
- (C) cm^3/s
- (D) cm^2/s^2

17. Mass transfer coefficient (K) and diffusivity (D) are related according to film theory as

- (A) $K \propto D$
- (B) $K \propto \sqrt{D}$
- (C) $K \propto D^{1.5}$
- (D) $K \propto D^2$

18. H_2S present in naphtha reformed gas is removed by absorbing with

- (A) Ethanolamine
- (B) K_2CO_3
- (C) HCl
- (D) Vacuum gas oil

19. Flooding in a column results due to

- (A) Low pressure drop
- (B) High pressure drop
- (C) Low velocity of the liquid
- (D) High temperature

Space For Rough Work

20. In distillation, overhead product contains

- (A) Only one component
- (B) Two components
- (C) Any number of components
- (D) Only saturated liquid

21. Poly tetra fluoro ethylene is known as

- (A) Dacron
- (B) Teflon
- (C) Bakelite
- (D) Celluloid

22. Most commonly used rubber vulcanization agent is

- (A) Sulphur
- (B) Bromine
- (C) Platinum
- (D) Alumina

23. Thermoplastic materials

- (A) do not soften on heating.
- (B) are heavily branched molecules.
- (C) are solvent insoluble.
- (D) None of these

24. Low density polythene as compared to high density polythene is

- (A) Harder
- (B) Tougher
- (C) Chemically inert
- (D) More flexible

25. Bristles of tooth brushes are made of

- (A) Nylon-6
- (B) Nylon-66
- (C) Polystyrene
- (D) PVC

Space For Rough Work

26. The monomer that is not suitable for condensation polymerization is
- (A) Propanoic acid and Ethanol
 - (B) Butane-dioic acid and Glycol
 - (C) Diamines and Dicarboxylic acids
 - (D) Hydroxyl acids
27. The polymer that exhibits a lower value of molar cohesion
- (A) Wool
 - (B) Silk
 - (C) Vulcanized rubber
 - (D) Polystyrene
28. The byproduct molecule released during the formation of polyurea is
- (A) NH_3
 - (B) H_2O
 - (C) HCl
 - (D) No elimination
29. The order of a self-catalyzed polyesterification reaction is
- (A) 2
 - (B) 3
 - (C) 1
 - (D) 4
30. What is the maximum attainable degree of polymerization for 5% stoichiometric imbalance?
- (A) 52
 - (B) 41
 - (C) 63
 - (D) 56
31. The die used in injection molding is cooled by
- (A) Oil
 - (B) Air
 - (C) Water
 - (D) Contact with cold surface

Space For Rough Work

32. The granular molding material gets loaded into
(A) Barrel
(B) Hopper
(C) Pellets
(D) Split
33. In blow molding, to inflate soft plastic, the medium used is
(A) Air
(B) Water
(C) Oil
(D) Alcohol
34. The material that is not used in extrusion is
(A) Wax
(B) Granules
(C) Powder
(D) Pellets
35. The material that cannot be used for making a core box is
(A) Aluminium
(B) Steel
(C) Zinc
(D) Cast iron
36. The disadvantage of bulk polymerization is
(A) High temperature
(B) Heat control
(C) Need catalyst
(D) All of these
37. The other name of pearl polymerization is
(A) Emulsion
(B) Heterogeneous
(C) Suspension
(D) Homogeneous
38. The degree of polymerization of polymer is obtained by
(A) Termination/Propagation
(B) Propagation/Termination
(C) Propagation * Termination
(D) None of these

Space For Rough Work

39. Mercury is generally used in manometer for measuring

- (A) Very low pressures only
- (B) Low pressures accurately
- (C) Large pressure only
- (D) All pressures except the small ones.

40. The specific weight of a substance has the unit

- (A) N/m^3
- (B) kg/m^3
- (C) N/m^2
- (D) kg/m^2

41. Potential flow is the flow of

- (A) Incompressible fluids with no shear
- (B) Incompressible fluids with shear
- (C) Newtonian fluids
- (D) Non-Newtonian fluids

42. For laminar flow of Newtonian fluid in a pipe of circular cross-section, the ratio of the maximum velocity to the average velocity is

- (A) 2
- (B) 0.8
- (C) 0.5
- (D) 1.2

43. The boundary layer exists in

- (A) Pipe flow only
- (B) Flow over flat surfaces only
- (C) Flow of ideal fluids
- (D) Flow of real fluids

44. An example of Bingham plastic is

- (A) Gas
- (B) Non-colloidal Solution
- (C) Sewage sludge
- (D) Rubber latex

Space For Rough Work

45. Power law behaviour is pseudoplastic for
- (A) $n = 1$
 - (B) $n < 1$
 - (C) $n > 1$
 - (D) $n = 0$
46. The law followed by an ideal solution is
- (A) Boyle's law
 - (B) Amagat's law
 - (C) Raoult's law
 - (D) Trouton's law
47. Volume percent for gases is equal to the
- (A) Weight percent
 - (B) Mole percent
 - (C) Weight percent only for ideal gases
 - (D) Mole percent only for ideal gases
48. The heat capacity of most substances is greater for
- (A) Solid state
 - (B) Liquid State
 - (C) Gaseous State
 - (D) Super critical State
49. Purge stream is useful to maintain low concentration of inerts. Which of the following holds good, if recycle rate equals bypass rate ?
- (A) Mixed feed rate = bypass rate
 - (B) Mixed feed rate = fresh feed rate
 - (C) Fresh feed rate = recycle rate
 - (D) None of these
50. A vapor whose partial pressure is less than its equilibrium vapor pressure called
- (A) Saturated vapor
 - (B) Superheated vapor
 - (C) Unsaturated vapor
 - (D) Dry gaseous vapor

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) None of these
52. 40 g each of the methane and oxygen are mixed in an empty container maintained at 40° C. The fraction of the total pressure exerted by oxygen is
- (A) $\frac{1}{2}$
(B) $\frac{1}{3}$
(C) $\frac{1}{4}$
(D) $\frac{2}{3}$
53. In a P-V diagram (for an ideal gas), an isothermal curve will coincide within adiabatic curve (through a point), when
- (A) $C_p < C_v$
(B) $C_p = C_v$
(C) $C_p > C_v$
(D) $C_p \geq C_v$
54. Internal energy of an element at 1 atm and 25 °C is _____ kcal/kg.mole.
- (A) 0
(B) 273
(C) 25
(D) None of these

Space For Rough Work

55. 4 kg moles of an ideal gas expands in vacuum spontaneously. The work done is
- (A) 4 J
(B) ∞
(C) 0
(D) 8 J
56. kg of liquid evaporated per hour in an evaporator is defines as its
- (A) Capacity
(B) Economy
(C) Steam load
(D) None of these
57. The geometric mean of two heat transfer areas A_1 and A_2 is
- (A) $\sqrt{A_1 \cdot A_2}$
(B) $\sqrt{A_1 + A_2}$
(C) $\frac{1}{2} \sqrt{A_1 \cdot A_2}$
(D) $2 \sqrt{A_1 \cdot A_2}$
58. For heat flow through very thick walled cylinder, mean radius used is
- (A) Arithmetic
(B) Logarithmic
(C) Geometric
(D) Arithmetic or Geometric
59. On addition of solute in the solvent, the _____ of the solution decreases.
- (A) Boiling point
(B) Freezing point
(C) Vapor pressure
(D) Both freezing point and vapor pressure
60. Design calculation for multiple component distillation is done by
- (A) Ponchon-Savarit method
(B) McCabe-Thiele method
(C) Enthalpy concentration method
(D) Tray to Tray calculations

Space For Rough Work

61. The product of absorption and stripping factor is

- (A) 1
- (B) 0
- (C) 0.5
- (D) ∞

62. Polycondensation reaction of polymerization

- (A) does not produce linear polymers
- (B) produces only thermoplastic material
- (C) produces epoxy polymers
- (D) does not need any catalyst

63. The rubber that has the widest service temperature range (-75 to 275°C)

- (A) Butyl rubber
- (B) Silicon rubber
- (C) Nitrile rubber
- (D) Silicone rubber

64. The polythene that is most prone to stress cracking has

- (A) high density
- (B) low density
- (C) cross linked
- (D) linear low density

65. The scrap that can be recycled and reutilized is

- (A) Bakelite
- (B) Epoxy resin
- (C) Polythene
- (D) None of these

66. Plastic articles are normally produced by

- (A) Green sand moulding
- (B) Injection moulding
- (C) Shell moulding
- (D) Dry sand moulding

Space For Rough Work

67. Softening point of high density polythene is about
- (A) 85 °C
 - (B) 135 °C
 - (C) 165 °C
 - (D) 205 °C
68. The polymers that are known for their high crystallinity are
- (A) Isotactic
 - (B) Syndiotactic
 - (C) Atactic
 - (D) None of these
69. What is the average degree of polymerization for a complete polycondensation reaction in a bifunctional system?
- (A) ∞
 - (B) 0
 - (C) 1
 - (D) 2
70. Number of initiator fragments present in the dead polymer formed by combination mode of chain termination is
- (A) 2
 - (B) 1
 - (C) 3
 - (D) 0
71. The expression for rate of termination reaction of free radical polymerization is
- (A) $k_t[M']^2$
 - (B) $2k_t[M']^2$
 - (C) $2fk_t[M']$
 - (D) $fk_t[M']$

Space For Rough Work

72. Discharge from a 24 inch pipe of water at 10 ft/s will be _____ ft³/s.

- (A) 7.65
- (B) 32.36
- (C) 48.22
- (D) 125.6

73. The maximum discharge through a circular channel takes place, when the depth of the fluid flow is _____ times the pipe diameter.

- (A) 0.25
- (B) 0.5
- (C) 0.66
- (D) 0.95

74. For an ideal fluid flow, Reynolds number is

- (A) 2100
- (B) 100
- (C) 0
- (D) ∞

75. 18 kg of salt (NaCl) is added to 100 kg of water to make a liquid of density 1200 kg/m³. The concentration of salt in this solution as a weight fraction is

- (A) 0.1566
- (B) 0.1525
- (C) 0.1850
- (D) 0.2535

Space For Rough Work

Space For Rough Work



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