

DAY and TIME					COURSE		SUBJECT	
DAY-1 10.30 am to 12.30 pm					ME/M.Tech/M.Arch courses offered by VTU/UVCE/UBDTCE		POLYMER SCIENCE	
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 - 1		170009	

DOs :

1. Check whether the PGCET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. Ensure whether the circles corresponding to course and the specific branch have been shaded on the OMR answer sheet.
3. This Question Booklet is issued to you by the invigilator after the 2nd Bell i.e., after 10.25 a.m.
4. The Serial Number of this question booklet should be entered on the OMR answer sheet.
5. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
6. 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 10.30 a.m., till then;
 - Do not remove the paper seal / polythene bag 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 10.30 a.m., remove the paper seal / polythene bag 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 12.30 pm, stop marking on the OMR answer sheet and affix your left hand thumb impression on the OMR answer sheet as per the instructions.
6. Hand over the OMR ANSWER SHEET to the room invigilator as it is.
7. After separating the top sheet, 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)



POLYMER SCIENCE AND TECHNOLOGY

PART – 1

Each question carries one mark.

50 × 1 = 50

1. An ideal fluid is defined as the fluid which
 - (A) is compressible
 - (B) is incompressible
 - (C) is incompressible and non viscous
 - (D) has negligible surface tension

2. 1 kgf is equal to
 - (A) 9.81 N
 - (B) 981 N
 - (C) 0.981 N
 - (D) 98.1 N

3. Newton's law of viscosity states that
 - (A) Shear stress is directly proportional to the velocity
 - (B) Shear stress is directly proportional to velocity gradient
 - (C) Shear stress is directly proportional to shear strain
 - (D) Shear stress is directly proportional to the viscosity

Space For Rough Work

4. Bernoulli's theorem deals with the law of conservation of
- (A) Mass
 - (B) Momentum
 - (C) Energy
 - (D) None of these
5. The boundary-layer takes place for
- (A) Ideal fluids
 - (B) Pipe-flow only
 - (C) Real fluids
 - (D) Flow over flat plate only
6. When the relationship between Reynolds number and friction factor is represented by a straight line, the flow is said to be
- (A) Turbulent
 - (B) Laminar
 - (C) Vertex
 - (D) None of these

Space For Rough Work

7. Mole fraction is related to

- (A) Ratio of moles of a particular substance to total number of a particular substance
- (B) Product of moles of a particular substance and total number of a particular substance
- (C) Ratio of total number of a particular substance to moles of a particular substance
- (D) None of these

8. Which of the following is unit less ?

- (A) Density
- (B) Volume
- (C) Specific gravity
- (D) Both (B) and (C)

9. Moles per unit volume can be expressed

- (A) g mol of solute / cm^3
- (B) g mol of solute / Lt
- (C) lb mol of solute / ft^3
- (D) All of the above

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10. The total pressure exerted by a gaseous mixture of A and B is equal to

- (A) $p_A \times p_B$
- (B) $p_A + p_B$
- (C) $p_A - p_B$
- (D) p_A / p_B

11. Which of the following is an intensive property ?

- (A) Pressure
- (B) Mass
- (C) Volume
- (D) None of these

12. The process in which the pressure of system remains constant :

- (A) Isothermal
- (B) Isochoric
- (C) Adiabatic
- (D) Isobaric

13. The SI unit of pressure is

- (A) Pascal
- (B) Newton
- (C) Joules
- (D) All the three

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14. Which of the following is path variable ?
- (A) Work
 - (B) Temperature
 - (C) Pressure
 - (D) Both (B) & (C)
15. No work is done by the system when the reaction occurs at constant
- (A) Volume
 - (B) Temperature
 - (C) Pressure
 - (D) None of these
16. An open system exchanges _____ with the surroundings.
- (A) Mass
 - (B) Energy
 - (C) Both (A) & (B)
 - (D) None of these
17. Overall heat transfer coefficient depends on
- (A) individual heat transfer
 - (B) wall thickness
 - (C) thermal conductivity
 - (D) All the three

Space For Rough Work

18. Nusselt's number is given by
- (A) $C_p \mu / k$
 - (B) $\rho D U / \mu$
 - (C) $h D / k$
 - (D) None of these
19. In forced convection, the heat transfer depends on
- (A) Re, Pr
 - (B) Re, Gr
 - (C) Mainly Gr
 - (D) Re only
20. Flow of heat associated with the movement of fluid is
- (A) Conduction
 - (B) Convection
 - (C) Radiation
 - (D) None of these
21. In a continuous fractionating column, the stripping section is located
- (A) Below the feed plate
 - (B) Above the feed plate
 - (C) Both (A) & (B)
 - (D) None of these

Space For Rough Work

22. The unit of mass flux is

- (A) $\text{kg/m}^2\text{s}$
- (B) kg/m^2
- (C) kg/s
- (D) None of these

23. Minimum functionality of a monomer should be

- (A) 1
- (B) 4
- (C) 2
- (D) Zero

24. Which of the following is water sensitive polymer ?

- (A) Nylon 6
- (B) PU
- (C) PET
- (D) PTFE

Space For Rough Work

25. Nylon 6 is produced by
- (A) Addition polymerization
 - (B) Ring opening polymerization
 - (C) Condensation polymerization
 - (D) Melt condensation
26. Chain carrier in case of cationic polymerization is
- (A) Carbonium ion
 - (B) Carbanion
 - (C) Azoions
 - (D) Proton
27. Coordination polymerization is nothing but
- (A) Interfacial polymerization
 - (B) Insertion polymerization
 - (C) Vinyl polymerization
 - (D) Redox polymerization
28. The reaction between diol and diol yields
- (A) Polyester
 - (B) Polyanhydrides
 - (C) Polyether
 - (D) Polyethylene

Space For Rough Work

29. Which of the following is polar polymer ?
- (A) PTFE
 - (B) HDPE
 - (C) SBR
 - (D) PP
30. Which of the following is in crosslinked state ?
- (A) Ebonite
 - (B) EPDM
 - (C) NR
 - (D) SBR
31. Which of the following shows geometrical isomerism ?
- (A) NR
 - (B) PP
 - (C) PMMA
 - (D) EPDM
32. _____ polymer gives smoky flame while burning.
- (A) PP
 - (B) PVC
 - (C) Epoxy
 - (D) PS

Space For Rough Work

33. CMC is related to _____ technique.

- (A) Emulsion polymerization
- (B) Solution polymerization
- (C) Suspension polymerization
- (D) Bulk polymerization

34. _____ is an example for epoxy resin.

- (A) DGEBA
- (B) PF
- (C) MF
- (D) PVDF

35. High purity product obtained from _____ technique.

- (A) Emulsion polymerization
- (B) Solution polymerization
- (C) Suspension polymerization
- (D) Bulk polymerization

Space For Rough Work

36. Common name for acrylonitrile is
- (A) Vinyl chloride
 - (B) Styrene
 - (C) Vinylcyanide
 - (D) Vinylfluoride
37. Ion exchange resins are produced by _____ technique.
- (A) Emulsion polymerization
 - (B) Solution polymerization
 - (C) Suspension polymerization
 - (D) Bulk polymerization
38. Which of the following is used in the synthesis of Teflon ?
- (A) $\text{CF}_2 = \text{CF}_2$
 - (B) $\text{CHF} = \text{CHF}$
 - (C) $\text{CF}_2 = \text{CCl}_2$
 - (D) $\text{CF}_3 - \text{CF}_3$

Space For Rough Work

39. The minimum number of molecules taking part in one single elementary step of a reaction at a time is
- (A) Molecularity
 - (B) Order
 - (C) Rate
 - (D) None of these
40. $\text{N}_2\text{O}_4 \rightarrow 2\text{NO}_2$ is example for _____ reaction.
- (A) Unimolecular
 - (B) Bimolecular
 - (C) Termolecular
 - (D) None of these
41. Polyesterification reaction _____ polymerization.
- (A) Addition
 - (B) Condensation
 - (C) Poly addition
 - (D) Both (B) & (C)
42. The unit of rate of first order reaction is
- (A) moles/lit
 - (B) moles. lit. s
 - (C) moles/ lit. s
 - (D) None of these

Space For Rough Work

43. In free radical polymerization, the rate of polymer formation is proportional to
- (A) First power of monomer concentration
 - (B) Square root of initial concentration
 - (C) Both (A) & (B)
 - (D) Cannot be predicted
44. Which of the following requires pre-drying before injection molding ?
- (A) PE
 - (B) PP
 - (C) PC
 - (D) None of these
45. Warpage occurs in molded plastic parts due to
- (A) Non uniform wall thickness
 - (B) Less cooling time
 - (C) Both (A) & (B)
 - (D) None of these
46. A process in which a preform is heated and blown to final shape is known as
- (A) Extrusion blow molding
 - (B) Intermittent extrusion blow molding
 - (C) Injection blow molding
 - (D) None of these

Space For Rough Work

47. Crow's feet is related _____ process.
- (A) Injection molding
 - (B) Transfer molding
 - (C) Compression molding
 - (D) None of these
48. Which of the following is produced by extrusion process ?
- (A) Tumbler mats
 - (B) Insulated cables
 - (C) Floor mats
 - (D) None of these
49. _____ process generates greater amount of scrap.
- (A) Injection molding
 - (B) Blow molding
 - (C) Compression molding
 - (D) Thermoforming
50. In compression molding _____ type gives flash free products.
- (A) Positive
 - (B) Semi-positive
 - (C) Both (A) & (B)
 - (D) None of these

Space For Rough Work

PART - 2

Each question carries two marks.

25 × 2 = 50

51. The kinematic viscosity of a given fluid is _____, whose dynamic viscosity is 100 Ns/m^2 and density is 1900 kg/m^3 .
- (A) $10 \text{ m}^2/\text{s}$
 - (B) $0.052 \text{ m}^2/\text{s}$
 - (C) $0.56 \text{ m}^2/\text{s}$
 - (D) $0.8 \text{ m}^2/\text{s}$
52. The flow in pipe is laminar if Reynolds number is
- (A) 2500
 - (B) 4000
 - (C) > 2500
 - (D) None of these
53. Monometers are used to measure
- (A) Flow rate
 - (B) Temperature
 - (C) Viscosity
 - (D) Pressure drop

Space For Rough Work

54. When fluid is at rest, the shear stress is
- (A) Maximum
 - (B) Zero
 - (C) Unpredictable
 - (D) None of these
55. If a mixture contain 5 kg of water and 5 kg of NaOH, the weight fraction of water is
- (A) 5
 - (B) 10
 - (C) 0.5
 - (D) 1
56. At standard condition the value of universal gas constant is _____
- $(\text{cm}^3)(\text{atm})(\text{K})^{-1} (\text{g mol})^{-1}$
- (A) 82.06
 - (B) 8206
 - (C) 8.206
 - (D) None of these
57. A man circling the earth in a spaceship weighed 300N at a location where the local gravitational acceleration was 4.5 m/s^2 . The mass of the man is
- (A) 6667 kg
 - (B) 66.67 kg
 - (C) 300 kg
 - (D) 100 kg

Space For Rough Work

58. Gibb's free energy is defined as
- (A) $G = H / TS$
 - (B) $G = H - TS$
 - (C) $G = H + TS$
 - (D) $G = TS / H$
59. The extensive properties depends on the matter specified in the system
- (A) Mass
 - (B) Volume
 - (C) Both (A) & (B)
 - (D) None of these
60. Unit of thermal conductivity is
- (A) $W/m\ K$
 - (B) W/m
 - (C) $W\ m\ K$
 - (D) None of these
61. Molecular diffusion induced by external field is known as
- (A) Thermal diffusion
 - (B) Eddy diffusion
 - (C) Forced diffusion
 - (D) None of these

Space For Rough Work

62. The rate constant of a first order reaction is $3.5 \times 10^{-2} \text{ min}^{-1}$. The half life of the reaction is
- (A) 19.8 sec
 - (B) 19.8 min
 - (C) 198 min
 - (D) 1980 min
63. The steady state assumption in free radical polymerization is
- (A) $R_i - R_t$
 - (B) $R_i + R_t$
 - (C) $R_p = R_t$
 - (D) $R_p + R_t$
64. Rotomolding process is used to make _____ hollow articles.
- (A) Very large
 - (B) Seam less
 - (C) Both (A) & (B)
 - (D) None of these
65. In plug-assist forming process, the plug is used to
- (A) Eject the part
 - (B) Force the material into the mold cavity
 - (C) Heat the material
 - (D) None of these

Space For Rough Work

66. In an extruder, the compression zone can be identified by
- (A) Gradual increase in root dia and decrease in flight depth of screw
 - (B) Gradual decrease in root dia and increase in flight depth of screw
 - (C) Gradual decrease in root dia and decrease in flight depth of screw
 - (D) Gradual increase in root dia and increase in flight depth of screw
67. _____ is example for natural polymer.
- (A) Chitosan
 - (B) Starch
 - (C) Cellulose
 - (D) All the three
68. If the degree of polymerization of PP is 500, the molecular weight of PP is
- (A) 21,000
 - (B) 23,000
 - (C) 42,000
 - (D) 22,000
69. Functionality of acetylene and butadiene is
- (A) 4 & 4
 - (B) 2 & 2
 - (C) 2 & 4
 - (D) 4 & 2

Space For Rough Work

70. Chain polymerization is also known as
- (A) Vinyl polymerization
 - (B) Poly addition polymerization
 - (C) Condensation polymerization
 - (D) Insertion polymerization
71. Which of the following statement is not true with respect to Nylon 66 ?
- (A) Obtained from condensation polymerization
 - (B) Fiber forming polymer
 - (C) Sensitive to moisture
 - (D) Chemically inert & flame retardant
72. Which of the following statement is not true for addition polymerization ?
- (A) Elemental composition of reactant and product are same.
 - (B) Polymerization occurs without byproducts.
 - (C) New functional group forms after polymerization.
 - (D) Is a single step polymerization.

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73. 1 g mol of methane contains
- (A) 6.02×10^{23} atoms of hydrogen
 - (B) 4 g mol of hydrogen
 - (C) 3.01×10^{23} molecules of methane
 - (D) 3 g of Carbon
74. Which of the following group belongs to polyester, polyamide and polyether family respectively ?
- (A) PET, Nylon & PEO
 - (B) PET, Kevlar & DGEBA
 - (C) PET, Nylon & PF
 - (D) PET, PU & PEG
75. Which of the following is an example for crystalline and amorphous polymer respectively ?
- (A) Isotactic PP & HDPE
 - (B) Isotactic PP & PS
 - (C) PS and HDPE
 - (D) PS & PF

Space For Rough Work

A-1