POST GRADUATE COMMON ENTRANCE TEST-2017

DATE and TIME	COURSE	SUBJECT
01-07-2017 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
					A - 1	120033

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 2.25 p.m.**
4. The Serial Number of this question booklet should be entered and the respective circles should also be shaded completely 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 on the OMR answer sheet.
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 2.30 p.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.

CONFIDENTIAL

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 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.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

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 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. 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)

POLYMER SCIENCE AND TECHNOLOGY

PART – 1

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

1. Most important to separate a mixture of two volatile liquids by distillation is

   (A) Solubility

   (B) Relative volatility

   (C) Density difference

   (D) Selectivity

2. Alcohol is dehydrated using

   (A) Extractive distillation

   (B) Azeotropic distillation

   (C) Steam distillation

   (D) Molecular distillation

3. The ratio of flux to concentration gradient is called

   (A) Thermal diffusivity

   (B) Eddy diffusivity

   (C) Mass transfer coefficient

   (D) Volumetric diffusivity

4. Metals are good heat conductors, because

   (A) of free electron present

   (B) of their atoms are relatively far apart

   (C) of their atoms collide frequently

   (D) of presence of free ions

5. Heat transfer by radiation between two surfaces can be decreased by

   (A) Bringing the surfaces together

   (B) Polishing the surfaces

   (C) Providing a radiation shield between the surfaces

   (D) controlling humidity

Space For Rough Work

6. An exchanger in which hot and cold fluids flow over heat transfer alternatively is

(A) Direct contact exchanger

(B) Regenerator

(C) Parallel flow exchanger

(D) Free convection

7. An example of extensive property is

(A) Refractive index

(B) Viscosity

(C) Internal energy

(D) Surface tension

8. Thermodynamic property of a system is

(A) Entropy

(B) Density

(C) Viscosity

(D) Concentration

9. $C_P - C_V = R$ is valid for

(A) Real gas

(B) Ideal gas

(C) All gases

(D) Gases at very high pressure and low temperature

10. During isothermal expansion of an ideal gas, its

(A) Enthalpy reduces to zero

(B) Enthalpy decreases

(C) Internal energy increases

(D) Enthalpy remains unaffected

11. A system in which there may be exchange of energy but not mass is known as

(A) Classed system

(B) Isolated system

(C) Open system

(D) Insulated system

Space For Rough Work

12. All spontaneous process are

(A) Reversible adiabatic

(B) Reversible

(C) Adiabatic

(D) Irreversible

13. A fluid in which resistance to deformation is independent of the shear stress is called

(A) Bingham plastic fluid

(B) Pseudo plastic fluid

(C) Dilatant fluid

(D) Newtonian fluid

14. A large Raynold number is indication of

(A) Highly turbulent flow

(B) Steady flow

(C) Laminar flow

(D) Smooth and stream line flow

15. In laminar flow, maximum velocity at the centre of the pipe is how many times to the average velocity

(A) Zero

(B) Two

(C) Three

(D) Four

16. A flow in which each liquid particle has a definite path and their paths do not cross each other is called

(A) Steady flow

(B) Stream line flow

(C) Uniform flow

(D) Turbulent flow

17. Head loss in turbulent flow in a pipe

(A) varies directly as velocity

(B) varies inversely as square of velocity

(C) varies approximately as square of velocity

(D) varies inversely as velocity

Space For Rough Work

18. Two forces most important in laminar flow between closely parallel plates are

(A) Viscous and pressure

(B) Inertial and viscous

(C) Pressure and inertial

(D) Gravity and pressure

19. Converting 100 kg/h of water flow rate to litres/second gives a value of

(A) 0.028

(B) 0.238

(C) 10.03

(D) 2.834

20. If a solution contains 30 kg of sugar and 50 kg of water, mass fraction of sugar is

(A) 0.50

(B) 3.76

(C) 0.375

(D) 0.48

21. Equivalent weight of $Al_2(SO_4)_3$ is (if molecular weight is 342)

(A) 570

(B) 57

(C) 5.7

(D) 34.2

22. Moles of O_2 in 500 g is

(A) 5.0 g moles

(B) 50 g moles

(C) 15.62 g moles

(D) 1.56 g moles

23. The volume of chlorine gas at 230 °C and 150 atm using ideal gas law is

(Given R = 0.08205 l. atm/g mol. °k)

(A) 0.275 litres

(B) 2.86 litres

(C) 28.7 litres

(D) 287 litres

Space For Rough Work

24. The SI unit of mass flux is

(A) $kg/m^2.s$

(B) $l/m^2.h$

(C) $g/m^2.s$

(D) $lb/m.s$

25. _____ is added to reduce the Tg of a polymer.

(A) Plasticizer

(B) Sulphur

(C) Antioxidant

(D) Carbon black

26. Which of the following is thermoset resin

(A) Nylon 6

(B) Epoxy

(C) NBR

(D) PS

27. Polyurethane is the reaction product of

(A) Diacids + Diamines

(B) Diols + Diols

(C) Diacids + Diols

(D) Disocyanates + Polyols

28. By-products formed during poly condensation are removed to prevent reversible reaction by

(A) Sublimation

(B) Fractionation

(C) Crystallization

(D) Distillation

29. _____ additive is added during polymerization.

(A) Thermal stabilizer

(B) Chain transfer agents

(C) Plasticizer

(D) Antioxidants

Space For Rough Work

30. A physical mixture of matrix and filler is referred as

(A) Blends

(B) Alloys

(C) Composites

(D) Copolymer

31. _____ polymerization technique gives latex.

(A) Solution polymerization

(B) Emulsion polymerization

(C) Bulk polymerization

(D) Suspension polymerization

32. _____ polymerization mechanism is used to produce living polymers.

(A) Free radical polymerization

(B) Coordination polymerization

(C) Anionic polymerization

(D) Condensation polymerization

33. Which product is produced from rotational molding ?

(A) Disposable cups

(B) Table spoon

(C) Water tank

(D) Water bottle

34. LLDPE is produced from

(A) Low pressure process

(B) High pressure process

(C) Unipol process

(D) Plasma polymerization

35. _____ monomer is used for Nylon 6 production.

(A) E-caprolactum

(B) Adipic acid + Hexamethylene Tetramine

(C) TDI + Polyol

(D) Diol + Diacid

36. Glass transition temperature of polymer can be measured by

(A) DSC

(B) TGA

(C) Spectrophotometer

(D) GPC

37. Which of the following is copolymer ?

(A) ABS

(B) PP

(C) PVC

(D) PMMA

Space For Rough Work

38. Extrusion can be used to produce

(A) Disposable syringes

(B) Tumbler mat

(C) Pipes

(D) Compact disc

39. _____ is used as mold release agents.

(A) Silicone fluids

(B) Ethylene glycol

(C) Acetone

(D) Wax

40. Parison programming is related to

(A) Injection molding

(B) Blow molding

(C) Compression molding

(D) Rotational molding

41. For precition molded parts _____ technique is preferred.

(A) Transfer molding

(B) Compression molding

(C) Injection molding

(D) Calendering

42. The half-life period of a first order reaction and the rate constant are related as

(A) $t_{\left(\frac{1}{2}\right)} = 2.303/k$

(B) $t_{\left(\frac{1}{2}\right)} = k$

(C) $t_{\left(\frac{1}{2}\right)} = 0.693\ k$

(D) $t_{\left(\frac{1}{2}\right)} = 0.693/k$

43. In a reaction, the threshold energy is equal to

(A) Activation energy

(B) Activation energy + normal energy of reactants

(C) Normal energy of reactants

(D) Activation energy – normal energy of reactants

44. A catalyst is a substance which

(A) Changes the equilibrium constant of the reaction

(B) Supplies energy to the reaction

(C) Increases the equilibrium concentration of the product

(D) Shorten the time to reach equilibrium

Space For Rough Work

45. The molecularity of a reaction is always

(A) Whole number

(B) Fraction

(C) Negative value

(D) Zero

46. _____ polymer is used to make hot water bags.

(A) Poly styrene

(B) Poly methyl methacrylate

(C) Natural rubber

(D) Poly tetrafluoro ethylene

47. Poly dispersity index of polymer is the ratio of

(A) $\overline{M}_n / \overline{M}_w$

(B) $\overline{M}_w / \overline{M}_n$

(C) $\overline{M}_z / \overline{M}_n$

(D) $\overline{M}_v / \overline{M}_w$

48. Which of the following statement is not true with respect to Nylon 6,6 ?

(A) Obtained from condensation

(B) Sensitive to moisture

(C) Chemically inert and flame retardant

(D) Fiber forming polymer

49. Polymers below T_g behaves like

(A) Hard and tough

(B) Soft and flexible

(C) Hard and brittle

(D) Soft and tough

50. _____ are used to preserve monomers.

(A) Initiator

(B) Chain transfer agents

(C) Inhibitors

(D) Short stops

Space For Rough Work

PART – 2

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

51. The pressure in meters of oil (specific gravity – 0.85) equivalent to 42.5 m of water is,

(A) 42.5 m

(B) 50 m

(C) 52.5 m

(D) 85 m

52. In case the velocity vector at different points along a stream line remains unchanged, then the flow is termed as;

(A) Stoke's flow

(B) Uniform flow

(C) Rotational flow

(D) Irrotational flow

53. The stress-strain relation of the Newtoneon fluid is,

(A) Linear

(B) Parabolic

(C) Hyperbolic

(D) Inverse type

54. Pressure in Pascals at a depth of 1m below the free surface of a body of water will be equal to,

(A) 1 Pa

(B) 98.1 Pa

(C) 981 Pa

(D) 9810 Pa

Space For Rough Work

55. In reversible isothermal expansion of an ideal gas

(A) $\Delta U = Q$

(B) $Q = W$

(C) $\Delta U = P\Delta V$

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

56. C_p is

(A) Always greater than C_v

(B) Equal to C_v

(C) Less than C_v

(D) Never be less than C_v

57. The temperature at which the Joule – Thomson coefficient changes sign is known as,

(A) Critical temperature

(B) Inversion temperature

(C) Condensation temperature

(D) Liquefaction temperature

58. Two modes of mass transfer in fluids are

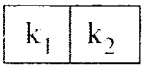
(A) Conduction and convection

(B) Diffusion and convection

(C) Convection and radiation

(D) Diffusion and radiation

59. The equivalent thermal conductivity of the wall as shown in the figure below is



$l_1 = l_2$

(A) $\frac{k_1 + k_2}{2}$

(B) $\frac{k_1 k_2}{k_1 + k_2}$

(C) $\frac{2k_1 k_2}{k_1 + k_2}$

(D) $\sqrt{k_1 k_2}$

Space For Rough Work

60. A flat plate has thickness 5 cm, thermal conductivity 1w/m°k, convective heat transfer coefficients on its two flat faces of 10 w/m^2k and 20 w/m^2 k. The overall heat transfer coefficient for such a flat plate is

(A) 5 w/m^2k

(B) 6.33 w/m^2 k

(C) 20 w/m^2k

(D) 9.26 w/m^2k

61. A solution contains 5 kg of water and 5 kg of HC*l*, what is the weight fraction of water

(A) 0.5

(B) 0.05

(C) 5

(D) 50

62. If a solution contains 50 kg of component 'A' and 100 kg of component 'B', what is the average molecular weight of solution. If molecular weight of A is 10 and that of B is 20 ?

(A) 15

(B) 150

(C) 100

(D) 200

63. Which of the following is an example for ring opening and condensation polymerization ?

(A) Nylon 6 and PE

(B) PET and PS

(C) Nylon 6,6 and PVC

(D) Nylon 6 and Nylon 6,6

Space For Rough Work

64. The group of polymers consisting of SBR, EPDM, SAN, ABS and NBR are best categorized as

(A) Thermoplastics

(B) Elastomers

(C) Copolymers

(D) Thermosets

65. Which of the following is amorphous and transparent engineering plastics ?

(A) PMMA

(B) PTFE

(C) Polycarbonate

(D) ABS

66. The group of polymers consisting of chitosan, sodium alginate, cellulose, gelatin and gangum are best categorized as

(A) Thermoplastics

(B) Monomers/oligomers

(C) Thermosets

(D) Natural polymers

67. Increase in the number of aromatic groups along the backbone of the polymer chains

(A) Increases the flexibility and T_m

(B) Increases the rigidity and T_m

(C) Increases the hardness and reduces the T_m

(D) Reduces the rigidity and increases the T_m

68. Mark-Houwink equation is related to

(A) Crystallinity

(B) Elasticity

(C) Viscosity

(D) Electrical property

69. Epoxy, group, co-prolactum and lactide are the examples for

(A) Condensation polymerization

(B) Addition polymerization

(C) Co-ordination polymerization

(D) Ring-opening polymerization

Space For Rough Work

70. In which of the following polymers hydrogen band present ?

(A) Cellulose and nylons

(B) Cellulose nitrate and chitosan

(C) Nylons and PTFE

(D) Cellulose and polyacrylics

71. If poly butadiene has degree of polymerization of 1000, what is its molecular weight ?

(A) 20,000

(B) 10,000

(C) 54,000

(D) 27,000

72. At any time when the chain polymerization progress, the reaction vessel contains

(A) Only monomers

(B) Monomer + Polymer + Oligomers

(C) Monomers + Solvents

(D) Only polymers

73. Which of the following are examples for inhibitors ?

(A) Hydroquinone & dinitrobenzene

(B) Hydroquinone & benzoyl peroxide

(C) Benzoyl peroxide & ammonium persulfate

(D) $AlCl_3$ & dinitrobenzene

74. DSC and DMA can be used to measure

(A) Thermal behaviours

(B) Tensile behaviours

(C) Morphological behaviours

(D) Structural behaviours

75. The odd polymer in the following combination, PP / PVC / PET / NR / Nylon 6 / PC / PMMA is,

(A) PP

(B) Nylon 6

(C) PMMA

(D) NR

Space For Rough Work

Space For Rough Work