POST GRADUATE COMMON ENTRANCE TEST-2016

DATE and TIME	COURSE	SUBJECT
03-07-2016 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	210006

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.

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 :

(A) ● (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 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)

PO-A1

POLYMER SCIENCE AND TECHNOLOGY

PART – 1

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

1. Which of the following is an intensive property ?

   (A) Pressure

   (B) Mass

   (C) Volume

   (D) None of these

2. The process in which the pressure of system remains constant

   (A) Isothermal

   (B) Isochoric

   (C) Adiabatic

   (D) Isobaric

3. The SI unit of pressure is

   (A) Pascal

   (B) Newton

   (C) Joule

   (D) All the three

4. Which of the following is path variable ?

   (A) Work

   (B) Temperature

   (C) Pressure

   (D) Both (B) & (C)

5. No work is done by the system when the reaction occurs at constant _____.

   (A) Volume

   (B) Temperature

   (C) Pressure

   (D) None of these

6. An open system exchanges _____ with the surroundings.

   (A) Mass

   (B) Energy

   (C) Both (A) & (B)

   (D) None of these

Space For Rough Work

7. XLPE is the trade name of Individual heat transfer

   (A) Low density polyethylene

   (B) High density polyethylene

   (C) Linear low density polyethylene

   (D) Crosslinked polyethylene

8. $CH_3 CH = CH_2$

   (A) Isomer

   (B) Oligomer

   (C) Monomer

   (D) Dimer

9. In forced convection, the heat transfer depends on

   (A) Re, Pr

   (B) Re, Gr

   (C) Mainly Gr

   (D) Re only

10. Flow of heat associated with the movement of fluid is _____.

    (A) Conduction

    (B) Convection

    (C) Radiation

    (D) None of these

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

    (A) Open system

    (B) Closed system

    (C) Isolated system

    (D) Insulated system

12. Internal energy of a system depends upon

    (A) Quantity of substance

    (B) Its chemical nature

    (C) Temperature, pressure and volume

    (D) All of these

Space For Rough Work

13. A state function is

(A) Internal energy

(B) Free energy

(C) Pressure

(D) All of these

14. Thermodynamics can be used

(A) To predict the feasibility of a particular process

(B) To provide the information regarding the time taken to reach equilibrium

(C) To study the rate at which a given process may proceed

(D) All of these

15. Study of fluid motion with the forces causing the flow is known as

(A) Kinematics of fluid flow

(B) Dynamics of fluid flow

(C) Statics of fluid flow

(D) None of these

16. A flow is said to be laminar when

(A) The fluid particles moves in a zig-zag way

(B) The Reynolds number is high

(C) The fluid particles moves in layers parallel to the boundary

(D) None of these

17. Fluid statics deals with

(A) Viscous and pressure forces

(B) Viscous and gravity forces

(C) Gravity and pressure forces

(D) Surface tension and gravity forces

18. 1 bar is equal to _____.

(A) 10^5 N/m^2

(B) 1000 N/m^2

(C) 100 Pascal

(D) 10^3 Pascal

Space For Rough Work

19. Pascal's law states that pressure at a point is equal in all directions

  (A) In a liquid at rest

  (B) In a fluid at rest

  (C) In a laminar flow

  (D) In a turbulent flow

20. Kinematic viscosity is equal to

  (A) Dynamic viscosity × density

  (B) Dynamic viscosity / density

  (C) Dynamic viscosity / pressure

  (D) Pressure × density

21. Geometric isomerism is obtained in polymers is due to the presence of

  (A) C = C in polymer backbone

  (B) Hetero atom in polymer backbone

  (C) Asymmetric carbon atom

  (D) Symmetric carbon atom

22. Copolymer is nothing but

  (A) Physical mixture of two monomers

  (B) Chemical mixture of two monomers

  (C) Physical mixture of monomer and initiator

  (D) None of these

23. Example for hetero polymers

  (A) PC

  (B) PPS

  (C) PEEK

  (D) All the three

24. On addition of solute in the solvent, the _____ of the solution decreases.

  (A) Boiling point

  (B) Freezing point

  (C) Vapour pressure

  (D) Both (B) and (C)

Space For Rough Work

25. The amount of steam required per unit quantity of distillate in case of steam distillation will be reduced by

(A) Raising the temperature

(B) Lowering the total pressure

(C) Both (A) and (B)

(D) Neither (A) nor (B)

26. Total reflux in a distillation column requires minimum

(A) Reboiler load

(B) Number of plates

(C) Condenser load

(D) None of these

27. Fenske's equation determines the

(A) Maximum number of ideal plates

(B) Height of the distillation column

(C) Minimum number of theoretical plates

(D) Optimum reflux ratio

28. High pressure process uses oxygen as catalyst in the manufacture of

(A) LDPE

(B) HDPE

(C) LLDPE

(D) Both (A) & (B)

29. Vinyl chloride monomer content in PVC is a measure of

(A) Molecular weight

(B) Toxicity

(C) Morphology

(D) Heat stability

30. Functionality of styrene is

(A) 3

(B) 1

(C) 2

(D) 4

Space For Rough Work

31. For a spontaneous process, free energy

(A) Is zero

(B) Increases

(C) Decreases whereas entropy increases

(D) None of these

32. Entropy is a measure of the _____ of a system.

(A) Disorder

(B) Orderly behaviour

(C) Temperature change only

(D) None of these

33. $N_2O_4 \longrightarrow 2NO_2$ is example for _____ reaction.

(A) Unimolecular

(B) Bimolecular

(C) Termolecular

(D) None of these

34. Polyesterification reaction _____ polymerization.

(A) Addition

(B) Condensation

(C) Poly addition

(D) Both (B) & (C)

35. The unit of rate of first order reaction is _____.

(A) moles/lt

(B) moles. lt. s

(C) moles/lt. s

(D) None of these

36. 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

Space For Rough Work

37. Which of the following requires pre-drying before injection molding ?

   (A) PE

   (B) PP

   (C) PC

   (D) None of these

38. 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

39. 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

40. Crow's feet is related _____ process.

   (A) Injection molding

   (B) Transfer molding

   (C) Compression molding

   (D) None of these

41. Which of the following is produced by extrusion process ?

   (A) Tumbler mats

   (B) Insulated cables

   (C) Floor mats

   (D) None of these

42. _____ process generates greater amount of scrap.

   (A) Injection molding

   (B) Blow molding

   (C) Compression molding

   (D) Thermoforming

Space For Rough Work

43. In compression molding _____ type gives flash free products.

(A) Positive

(B) Semi-positive

(C) Both (A) & (B)

(D) None of these

44. Polyethylene terephthalate is

(A) Terelyne

(B) Decron

(C) Both (A) & (B)

(D) None of these

45. An addition polymer is

(A) Polypropylene

(B) Polyvinyl chloride

(C) Polystyrene

(D) All of these

46. Metals are good conductors of heat, because

(A) Of free electrons present

(B) Their atoms are relatively far apart

(C) Their atoms collide frequently

(D) All of these

47. With increase in temperature, thermal conductivity of solid metals

(A) Increases

(B) Decreases

(C) Their atoms collide frequently

(D) Depend on other factors

48. Mass transfer operations are used for

(A) Separation of products from its by-products

(B) Purification of raw materials

(C) Both (A) and (B)

(D) None of these

49. The unit of diffusion coefficient is

(A) m^2/s

(B) m/s

(C) $mole/m^2s$

(D) None of these

50. Blow molding is a process to produce

(A) Hollow articles

(B) Bottles

(C) Both (A) & (B)

(D) None of these

Space For Rough Work

PART – 2

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

51. The group of polymers consisting of PC, PEO, PPO, PPS and Nylons are best categorized as

(A) Engineering polymers

(B) Natural polymers

(C) Biodegradable polymers

(D) Commodity polymers

52. Examples for ring opening polymerization

(A) Epoxy group

(B) Caprolactum

(C) Lactide

(D) All of these

53. A gas at 0 °C is cooled at constant pressure until its volume becomes half the original volume. The temperature of the gas at this state will be

(A) −136.5 °C

(B) −136.5 K

(C) −273 °C

(D) 0 °C

54. Which of the following polymer produced by condensation polymerization ?

(A) PU

(B) Polycarbonate

(C) EVA

(D) PMMA

55. What is the degree of freedom for a system comprising of liquid water equilibrium with its vapour ?

(A) Zero

(B) One

(C) Two

(D) Three

56. The repeat unit in polyurethane is

(A) $-NH - CO - NH(CH_2)_5 -$

(B) $- CO - (CH_2)_5 - NH -$

(C) $- CO - (CH_2)_5 - NH_2 -$

(D) $- COO - (CH_2)_5 - NH -$

Space For Rough Work

57. N_2 content in urea sample is 42%. What is the urea content of the sample (MW of urea is 60)?

(A) 80%

(B) 90%

(C) 95%

(D) 98%

58. One Newton equals to _____ dynes.

(A) 10^2

(B) 10^3

(C) 10^4

(D) 10^5

59. $CaCO_3$ contains _____ percentage of Ca by weight.

(A) 40

(B) 48

(C) 96

(D) 12

60. In a solution containing 0.3 k mole of solute and 600 kg of solvent, the molality

(A) 0.5

(B) 0.6

(C) 2

(D) 1

61. The weight average degree of polymerization for an equimolar mixture of a diacid and glycol at an extent of reaction 0.99 is _____.

(A) 100

(B) 199

(C) 19.9

(D) 10

62. 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

63. 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

64. 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

65. 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.

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

(A) Obtained from condensation polymerization

(B) Fiber forming polymer

(C) Sensitive to moisture

(D) Chemically inert & flame retardant

Space For Rough Work

67. Chain polymerization is also known as

(A) Vinyl polymerization

(B) Poly addition polymerization

(C) Condensation polymerization

(D) Insertion polymerization

68. Functionality of acetylene and butadiene is

(A) 4 & 4

(B) 2 & 2

(C) 2 & 4

(D) 4 & 2

69. 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

70. _____ is example for natural polymer.

(A) Chitosan

(B) Starch

(C) Cellulose

(D) All the three

71. 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

Space For Rough Work

72. 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

73. Rotomolding process is used to make _____ hollow articles.

   (A) Very large

   (B) Seamless

   (C) Both (A) & (B)

   (D) None of these

74. 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) $R_p + R_t$

75. The rate constant of a first order reaction is 3.5×10^{-2} min^{-1}. The half life of the reaction is _____.

   (A) 19.8 sec

   (B) 19.8 min

   (C) 198 min

   (D) 1980 min

Space For Rough Work

Space For Rough Work