# POST GRADUATE COMMON ENTRANCE TEST - 2015

| DATE & TIME | COURSE | SUBJECT |
|---|---|---|
| 08-08-2015 10.30 AM TO 12.30 PM | 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 SERIAL NUMBER | 335009 |
|---|---|---|
|  | VERSION CODE | A – 1 |

**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 am.**
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 AM, TILL THEN;**
   - Do not remove the seal / staple 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 10.30 am, remove the seal / staple stapled 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 ballpoint 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 (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 - 75) | |

SEAL

1.  In a closed system, there is

    a.  No change of energy of the system

    b.  Exchange of energy with surroundings and not mass

    c.  Exchange of mass and energy with surroundings

    d.  Exchange of mass with surroundings

2.  A State function is

    a.  Internal energy

    b.  Free energy

    c.  Pressure

    d.  All of these

3.  During adiabatic expansion of gas

    a.  Pressure remains constant

    b.  Pressure is increased

    c.  Temperature is decreased

    d.  None of these

4.  Work of expansion is given by

    a.  $P\Delta V$          b.  $\Delta PV$

    c.  $V\Delta P$          d.  None of these

5.  In an isobaric process

    a.  dp = 0          b.  dq = 0

    c.  dv = 0          d.  dT = 0

6.  According to first law of thermodynamics, the total energy of an isolated system

    a.  Increases

    b.  Decreases

    c.  Remains constant

    d.  None of these

7.  $C_p - C_v = R$ is valid for

    a.  Ideal gases

    b.  Real gases

    c.  All gases

    d.  Nobel gases

8.  Solid and liquid phases of a substance are in equilibrium at

    a.  Melting point

    b.  Freezing point

    c.  Both (a) & (b)

    d.  None of these

9.  In the reaction, $N_2 + O_2 \rightleftharpoons 2NO$, Increasing pressure will result in

    a.  Shifting of equilibrium towards right

    b.  Shifting the equilibrium towards left

    c.  No change in equilibrium condition

    d.  None of these

**Space For Rough Work**

10. For an ideal gas, enthalpy with rise in pressure
    a. Increases
    b. Decreases
    c. Is independent
    d. None of these

11. The value of gas constant R is
    a. 1.987 cal/g mole $^0/C$
    b. 1.987 BTU/lb mole $^0R$
    c. Both (a) & (b)
    d. None of these

12. Free energy change of mixing two liquid substances is a function of
    a. Concentration of the constituents only
    b. Quantities of the constituents only
    c. Temperature only
    d. All of these

13. Transfer of heat by molecular collision is called
    a. Conduction
    b. Convection
    c. Radiation
    d. All of these

14. Heat is transferred by conduction, convection and radiation in
    a. Boiler furnaces
    b. Melting of ice
    c. Condensation of steam in condenser
    d. None of these

15. A mixture of acetone - chloroform can be separated by
    a. Steam distillation
    b. Azeotropic distillation
    c. Flash distillation
    d. None of these

16. Term used in diffusion theory is
    a. Velocity
    b. Transfer rate across a plane
    c. Flux & concentration
    d. All of these

17. Mass transfer is a result of
    a. Concentration difference
    b. Diffusion
    c. Both (a) & (b)
    d. None of these

18. In a distillation operation, the reflux ratio may vary between
    a. Zero & one
    b. Zero & infinity
    c. Minimum & infinity
    d. One & two

19. Polyethylene is a polymer obtained by the polymerization of
    a. Ethane          b. Ethylene
    c. Isoprene        d. Methylene

**Space For Rough Work**

20. LDPE is a
   a.    Linear          b.    Branched
   c.    Crosslinked     d.    Thermoset

21. The kinetics and degree of polymerization of polymer during emulsion polymerization depends upon
   a.    Temperature and time of process
   b.    Quantity of initiator
   c.    Intensity of agitator
   d.    All of these

22. Thermoset is
   a.    Phenol-formaldehyde resin
   b.    Epoxy
   c.    Melamine-formaldehyde resin
   d.    All of these

23. In extrusion blow molding, the barrel heaters is of the type of
   a.    Band heater
   b.    Cast heater
   c.    Either (a) or (b)
   d.    None of these

24. Blow molding is a process to produce
   a.    Hollow articles
   b.    Bottles
   c.    Both (a) & (b)
   d.    None of these

25. Extrusion machine can be used for the making of
   a.    Thermoplastic      b.    Thermoset
   c.    Elastomers         d.    All of these

26. Rotational molding
   a.    Is also called roto molding
   b.    Is used to make plastic hollow articles
   c.    Has moulds usually made of aluminium
   d.    All of these

27. An extrusion machine cannot be used for the production of
   a.    Pipes          b.    Buckets
   c.    Filaments      d.    All of these

28. Purpose of preheating of sheet in thermoforming is to reduce the
   a.    Heating time
   b.    Forming time
   c.    Clamping time
   d.    All of these

29. Styrene can be polymerized by
   a.    Bulk polymerization
   b.    Solution polymerization
   c.    Suspension polymerization
   d.    All of these

**Space For Rough Work**

30. Terephthalic acid is a monomer for

    a.    Nylon        b.    Polyacetal

    c.    PET          d.    PC

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

    a.    LDPE        b.    HDPE

    c.    LLDPE     d.    XLPE

32. The polymer SBS represents

    a.    Block copolymer

    b.    Graft copolymer

    c.    Blend

    d.    Random copolymer

33. Living polymers can be produced by

    a.    Anionic polymerization

    b.    Cationic polymerization

    c.    Addition polymerization

    d.    Free radical polymerization

34. Which of the following are water resistive polymers?

    a.    PTFE        b.    HDPE

    c.    Iso PP      d.    All of these

35. Pearl or bead type polymerization is nothing but

    a.    Addition polymerization

    b.    Suspension polymerization

    c.    Solution polymerization

    d.    Condensation polymerization

36. Thermal decomposition of AIBN yields

    a.    CO          b.    $CO_2$

    c.    $N_2$         d.    NO

37. Example for free radical initiator

    a.    Benzoyl peroxide

    b.    NaOH

    c.    $TiCl_4$

    d.    Nitrobenzene

38. Chain carrier in cationic polymerization is

    a.    Carbonium ion

    b.    Carbanion

    c.    Hydroxyl group

    d.    None of these

39. EPDM is an example for

    a.    Blend

    b.    Alloy

    c.    Copolymer

    d.    None of these

40. Which of the following is an example for heteropolymer?

    a.    PVC        b.    PET

    c.    PMMA     d.    PP

**Space For Rough Work**

41. Polymer is nothing but

    a. Oligomer

    b. Macromolecule

    c. Subpolymer

    d. None of these

42. PP is an example for

    a. Tacticity

    b. Geometric isomerism

    c. Conformation

    d. All of these

43. Requirements for geometric isomerisms is

    a. Asymmetric carbon atom

    b. Symmetric carbon atom

    c. Carbon-carbon double bond

    d. Carbon-carbon single bond

44. Copolymer is a

    a. Physical mixture of polymers

    b. Chemical mixtures of polymers

    c. Both (a) & (b)

    d. None of these

45. Reaction between diol and diol yields

    a. Polyether    b. Polyester

    c. Polyol    d. None of these

46. Polyurethane can be produced by

    a. Ring opening polymerization

    b. Polyaddition polymerization

    c. Condensation polymerization

    d. Solution polymerization

47. Latex polymer product is obtained from

    a. Solution polymerization

    b. Bulk polymerization

    c. Emulsion polymerization

    d. Melt polymerization

48. Caprolactum is the monomer for

    a. PU

    b. Nylon 6

    c. PC

    d. Nylon 66

49. Stereoregular polymers are produced by

    a. Co-ordination polymerization

    b. Vinyl polymerization

    c. Condensation polymerization

    d. None of these

50. Kinematic similarity is obtained when there is equal

    a. Liquid motion

    b. Solid suspension

    c. Mass transfer

    d. Surface behaviour

**Space For Rough Work**

51. Advantages of emulsion polymerization is

    a. Control of temperature & viscosity

    b. High molecular weight obtained

    c. Homogeneity of the polymer

    d. All of these

52. Nylon is a

    a. Thermoplastic polymer

    b. Condensed polymer

    c. Polyamide

    d. All of these

53. Vulcanization of rubber is carried out to increase

    a. Strength

    b. Weight of polymer

    c. Oxidation resistance

    d. All of these

54. Which of the following statement is true with reference to thermoset?

    a. They cannot be remoldable/recyclable

    b. They do not possess $T_m$ and not soluble

    c. Both (a) & (b)

    d. None of these

55. Which of the following statements is true for addition polymerization?

    a. Elemental composition of reactant and product are same

    b. Is a single step polymerization

    c. Polymerization occurs without by products

    d. All of these

56. Which of the following belongs to thermoplastic, thermoset and elastomer family?

    a. PP, epoxy and PF

    b. PMMA, PP and NR

    c. PP, epoxy and NR

    d. PP, NR and epoxy

57. Which of the following contain nitrogen element?

    a. Nylon          b. PAN

    c. NBR            d. All of these

58. Example for ring opening polymerization

    I. Epoxy          II. Caprolactum

    III. Vinyl chloride    IV. Styrene

    a. Both (I) & (II)

    b. Both (I) & (III)

    c. Both (I) & (IV)

    d. Both (II) & (III)

**Space For Rough Work**

59. Example for symmetrical polymer pair

   a. PS & HDPE

   b. HDPE & PTFE

   c. PP & PTFE

   d. None of these


60. Barometers are used to measure

   a. Flow rate

   b. Temperature

   c. Viscosity

   d. Pressure


61. Functionality of ethylene glycol and acetylene is

   a. 2 & 4      b. 4 & 4

   c. 2 & 2      d. 4 & 2


62. A screw is used in extrusion blow molding process to

   a. Get minimum difference in melt temperature

   b. Permit materials and colors to be blended

   c. Deliver a more uniform melt to the mold

   d. All of these


63. Advantage of blow molding as compared to injection molding is

   a. Possibility of re-entrant curves (irregular)

   b. Low stresses and favourable cost factor

   c. Possibility of variable wall thickness

   d. All of these


64. In an injection molded article, the shrinkage cannot be minimized by

   a. Decreasing temperature

   b. Increasing pressure

   c. A longer cycle

   d. Keeping the mold cool


65. HDPE water storage tank is an example of

   a. Extrusion process

   b. Injection molding

   c. Rotational molding

   d. Thermoforming


66. The unit of diffusion coefficient is

   a. $m^2/s$      b. $m/s$

   c. $mole/(m^2.s)$    d. None of these


67. 1 g mol of ammonia contains

   a. $6.02 \times 10^{23}$ atoms of hydrogen

   b. 3 g mol of hydrogen

   c. $2 \times 10^{23}$ molecules of ammonia

   d. None of these

**Space For Rough Work**

68. For an ideal gas the relation between the enthalpy change $(\Delta H)$ and internal energy $(\Delta E)$ at constant temperature is given by

   a. $\Delta H = \Delta E + PV$

   b. $\Delta H = \Delta E + \Delta n, RT$

   c. $\Delta G = \Delta H + T\Delta S$

   d. $\Delta H = \Delta E + P\Delta T$

   where P,V,T & S are pressure, volume, temperature and entropy respectively and n is the number of moles.

69. In Vander Wall's equation $P = \dfrac{RT}{v-b} - \dfrac{a}{v^2}$ the constants a and b are zero for

   a. Ideal gases
   b. Real gases
   c. Liquid
   d. None of these

70. In p - v diagram of isotherms as given by equation of state, for the isotherm $T > T_c$, with increasing v, pressure decreases

   a. Rapidly        b. Monotonically
   c. Slowly         d. None of these

71. Intensive properties are the properties whose magnitude

   a. Depends on the quantity of material involved
   b. Does not depend on the quantity of material involved
   c. Depends on the path followed
   d. None of these

72. If the degree of polymerization of polybutadiene is 1000, the molecular weight of polybutadiene is

   a. 5400        b. 54000
   c. 10800       d. 42000

73. A high Reynolds number

   a. Power number tends to be independent of impeller Reynolds number
   b. Power number is dependent on the geometry of the impeller
   c. Both (a) & (b)
   d. All of these

74. Laminar flow region exists during agitation, when Reynold's number is

   a. Less than 10
   b. More than 50
   c. More than 1000
   d. More than 2500

75. 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**

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