GATE 2025 Chemical Engineering Question Paper

Time Allowed :3 hours	**Maximum Marks :**100	**Total questions :**65

General Instructions

Read the following instructions very carefully and strictly follow them:

This question paper is divided into three sections:

1. The total duration of the examination is 3 hours. The question paper contains three sections -

Section A: General Aptitude

Section B: Engineering Mathematics

Section C: Subject Based Questions

2. The total number of questions is **65**, carrying a maximum of **100 marks**.

3. The marking scheme is as follows:

(i) For 1-mark MCQs, $\frac{1}{3}$ mark will be deducted for every incorrect response.

(ii) For 2-mark MCQs, $\frac{2}{3}$ mark will be deducted for every incorrect response.

(iii) No negative marking for numerical answer type (NAT) questions.

4. No marks will be awarded for unanswered questions.

5. Follow the instructions provided during the exam for submitting your answers.

(1) Match the following processes to their corresponding descriptions: Sintering, Fouling , Positioning , Coking

(A) Sintering

(B) Fouling

(C) Positioning

(D) Coking

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(2) Mean Residence Time Calculation for a given system:

$$t_m = \int_0^\infty tE(t)\,dt$$

Where $E(t)$ is the distribution function.

For the given system, the distribution function is:

$$E(t) = 1 - 2t, \quad t \leq 0.5$$

$$E(t) = 0, \quad t > 0.5$$

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(3) Which of the following are characteristics of steady flow?

(A) Path

(B) Stream line

(C) Streak line

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(4) Classify the following diameters into the corresponding categories:

(A) Micropore

(B) Mesopore

(C) Macropore

(D) All of the above

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(5) What is the first stage of production of paper from wood?

(A) Removal of impurities

(B) Pulping

(C) Drying

(D) Pressing

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(6) Given the following parameters for a fluid flow, calculate the appropriate quantities:

$$V_0 = 1\,\text{m/s}, \quad P_r = 7.01, \quad \nu = 10^{-6}\,\text{m}^2/\text{s}$$
$$S_{hn} = \frac{4.91}{\sqrt{Re_x}}, \quad \Delta x = 0.01\,\text{m}$$

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(7) Sequence of Reactions of Ethylene and Chlorine to form PVC:

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(8) Find the sum of the series:

$$1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \cdots$$

(A) $e - 1$

(B) $e + 1$

(C) e

(D) π

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(9) Given the random variable X which takes the values 0, 1, 2, 7, 11, and 12 with the following probabilities:

$$P(X = 0) = 0.4, \quad P(X = 1) = 0.3, \quad P(X = 2) = 0.1, \quad P(X = 7) = 0.1, \quad P(X = 11) = ?$$

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(10) Given that λ is an eigenvalue of matrix A with the corresponding eigenvector x, and x is also an eigenvector of $B = A - 2I$, find the relationship between λ and the eigenvalue of B.

(A) $\lambda + 2$

(B) λ

(C) 2λ

(D) $\lambda - 2$

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(11) Find the maximum value of the function $f(x) = -x^3 + 2x^2$ in the interval $[-1, 1.5]$.