UNIVERSITY OF SRI JAYEWARDENEPURA - FACULTY OF APPLIED SCIENCES

BSc Honors in in Polymer Products Manufacturing and Industrial Management

Aptitude Examination (Model paper) 2026/2027 Admission

DEPARTMENT OF POLYMER SCIENCE

Time: 80 min **No. of questions: 40** **No. of pages: 11** **Total marks: 80**

Answer all the questions. **Mark the correct answer**

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1. Which statement about polyethylene is not correct?
   A. It is an addition polymer
   B. It decolorizes bromine water
   C. It is non-biodegradable
   D. It has the empirical formula CH_2

2. Which molecule is polar?
   A. $CO_2(g)$ B. $BeCl_2(g)$ C. CCl_4 (g) D. $NH_3(g)$

3. The rate equation for a reaction is
   $Rate=k[A]^2[B]^0$
   The initial rate is 5.0×10^{-5} $moldm^{-3}s^{-1}$ when [A]=0.20 $moldm^{-3}$ and [B]= 0.30 $moldm^{-3}$. What is the value for the rate constant in $dm^3mol^{-1}s^{-1}$?
   A. 1.25×10^{-2} B. 1.25×10^{-3} C. 2.00×10^{-3} D. 5.00×10^{-5}

4. Which compound will have the highest boiling temperature?
   A. $CH_3CH_2CH_2CH_2CH_3$
   B. $CH_3CH_2CH_2CHO$
   C. $CH_3COCH_2CH_3$
   D. CH_3CH_2COOH

5. Which reagent(s) could be used to produce a chloroalkane from a tertiary alcohol?
   1. PCl_5
   2. Concentrated HCl
   3. Concentrated H_2SO_4 and KCl

   A. 1, 2, and 3
   B. 1 and 3 only
   C. 2 and 3 only
   D. 1 only

6. Which of the following is **not an effective method** for reducing environmental issues associated with the disposal of polymers?
   A. Producing polymers that can biodegrade
   B. Sending plastic waste to other countries
   C. Treating harmful gases released during polymer incineration
   D. Using polymer products again instead of discarding them

7. A metal block of mass 2 kg is heated, and its temperature increases by 5 °C. The specific heat capacity of the metal is 400 J kg^{-1} $°C^{-1}$.
   What is the amount of heat absorbed by the metal?
   A. 400 J C. 4000 J D. 8000
   B. 2000 J

8. Balance the following chemical equation:
   $C_2H_6+O_2\rightarrow CO_2+H_2O$
   Which of the following is the correctly balanced equation?

A. $C_2H_6+3O_2 \rightarrow 2CO_2+3H_2O$
B. $2C_2H_6+7O_2 \rightarrow 4CO_2+6H_2O$
C. $2C_2H_6+5O_2 \rightarrow 4CO_2+6H_2O$
D. $C_2H_6+2O_2 \rightarrow 2CO_2+3H_2O$

9. What is the correct IUPAC name of the following compound?
$CH_3-CH(CH_3)-CH_2-COOH$
A. Butanoic acid
B. 2-methylpropanoic acid
C. 3-methylbutanoic acid
D. Pentanoic acid

10. When ice melts into water at 0°C, what happens to the entropy of the system?
A. Entropy decreases
B. Entropy remains the same
C. Entropy increases
D. Entropy becomes zero

11. A car accelerates uniformly from rest to 20 m/s in 5 s. What is its acceleration?
A. 2 m/s² B. 4 m/s² C. 5 m/s² D. 10 m/s²

12. A particle moves with initial velocity 10 m/s and acceleration 2 m/s² for 4 s. Find the displacement.
A. 40 m B. 48 m C. 56 m D. 64 m

13. A force of 10 N acts on a 2 kg mass. What is the acceleration?
A. 2 m/s² B. 5 m/s² C. 10 m/s² D. 20 m/s²

14. Find the kinetic energy of a 2 kg object moving at 3 m/s:
A. 6 J B. 9 J C. 12 J D. 18 J

15. If the voltage is 12 V and the resistance is 4 Ω, find current:
A. 2 A B. 3 A C. 4 A D. 6 A

16. A 2 kg object moving at 5 m/s collides and comes to rest.
What is the change in momentum?
A. 0
B. 5 kg·m/s
C. 10 kg·m/s
D. −10 kg·m/s

17. Solve the system:
$2x + y = 7,\ x - y = 1$
A. x=2, y=3
B. x=3, y=1
C. x=8/3, y=5/3
D. x=4, y=−1

18. Solve for x
$$e^{2x} = 7$$
A. ln 7 B. ½ ln 7 C. 2 ln 7 D. ln 7/2

19. Find the mean of: 4, 8, 6, 2
A. 4 B. 5 C. 6 D. 7

20. The ratio of boys to girls in a class is 3:2. If there are 30 students, how many are girls?
A. 10 B. 12 C. 15 D. 18

21. Find the point of intersection: $y = 2x + 1$and $y = -x + 4$
A. (1, 3) B. (2, 5) C. (1, 2) D. (3, 1)

22. The graph of: $y = x^2 - 5x + 6$ intersects the x-axis at:
A. (2,0) and (3,0)
B. (1,0) and (6,0)

C. (−2,0) and (−3,0) D. (0,2) and (0,3)

23. Find the volume of a cylinder of radius 3 cm and height 5 cm:
A. 15π B. 30π C. 45π D. 60π

24. Solve for *x*: 2x + 5 = 17
A. 5 B. 6 C. 7 D. 8

25. Natural rubber is a major raw material in the polymer industry. Which product is most directly associated with natural rubber latex processing?
A. PET bottles
B. Latex gloves
C. PVC pipes
D. Nylon fibers

26. Why are thermoplastics generally easier to recycle than thermosetting polymers?
A. They are stronger
B. They can be remelted and reshaped
C. They are biodegradable
D. They have higher density

27. Which polymer is most commonly used in plastic bags due to its flexibility and low cost?
A. PVC
B. PET
C. Polyethylene (PE)
D. Nylon 6

28. During the production of polyesters (e.g., PET), which functional groups react?
A. Alkene and alkane
B. Carboxylic acid and alcohol
C. Amine and alkene
D. Alcohol and alkane

29. Select the most appropriate word to complete the sentence:
"The report was _____ written, making it easy for readers to follow."
A. carelessly
B. coherently
C. vaguely
D. abruptly

30. Identify the sentence with correct grammar:
A. She don't like coffee.
B. She doesn't likes coffee.
C. She doesn't like coffee.
D. She not like coffee.

31. Choose the best summary of the sentence: "Due to heavy rainfall, the match was postponed."
A. The match continued in rain
B. The match was cancelled permanently
C. Rain caused the delay of the match

32. Choose the correctly punctuated sentence:
A. Its a beautiful day, isn't it?
B. It's a beautiful day isn't it?
C. It's a beautiful day, isn't it?
D. Its' a beautiful day, isn't it?

33. A boat travels **downstream** at 15 km/h and **upstream** at 9 km/h.
Find the speed of the boat in still water.
A. Boat = 12 km/h
B. Boat = 15 km/h
C. Boat = 9 km/h
D. Boat = 6 km/h

34. Which group of letters in the odd one out?
EDKJ NMTS IHON TSYX POVU
A. EDKJ
B. NMTS
C. TSYX
D. POVU

35. A B C D E F G H

What letter is two to the left of the letter that comes immediately to the right of the letter that comes four to the left of the letter that comes two to the right of the letter E?

A. B B. C C. D D. E

36. What comes next?

CANASTA
ACTRESS
SAUSAGE
ESCAPED

A. PAGODA
B. DEVELOP
C. DOUBLET
D. CABARET

Answer 37-40 based on the passage given below.

When metals are heated, they undergo thermal expansion due to an increase in the kinetic energy of their atoms. As temperature rises, atoms vibrate with greater amplitude about their equilibrium positions within the metallic lattice. This increased vibration effectively increases the average spacing between atoms, leading to a measurable increase in the material's dimensions. This behavior is quantitatively described by the Thermal Expansion principle, where the change in length is proportional to the original length, the temperature change, and the coefficient of linear expansion of the material. In engineering applications, thermal expansion must be carefully accounted for to avoid structural failure. For instance, railway tracks are constructed with small gaps between segments to accommodate expansion during temperature increases. Without these gaps, compressive stresses could build up, causing the tracks to buckle. Similarly, bridges incorporate expansion joints that allow controlled movement, preventing the accumulation of stress that could otherwise lead to cracking or deformation. Failure to consider thermal expansion can result in significant internal stresses within materials. These stresses arise because different parts of a structure may expand by different amounts or may be constrained from expanding freely.

37. Which factor is directly proportional to the increase in length of a metal according to thermal expansion?

A. Density of the material
B. Temperature change and original length
C. Electrical conductivity
D. Color of the metal

38. Why do railway tracks buckle in hot weather if gaps are not provided?

A. Metals lose mass when heated
B. Expansion creates compressive stress with no space to relieve it
C. The metal melts at high temperature
D. Air pressure increases between tracks

39. Two metal rods of equal length are heated equally, but one expands more than the other. What is the most likely reason?

A. They have different initial temperatures
B. They have different coefficients of thermal expansion
C. One rod is heavier
D. One rod is placed vertically

40. A metal rod is fixed tightly between two rigid walls and heated. What is the expected outcome?

A. The rod contracts
B. No change occurs
C. The rod develops internal compressive stress and may deform or crack
D. The rod melts immediately

Answer Key

1.	B		11.	B		21.	A		31.	C
2.	D		12.	C		22.	A		32.	C
3.	B		13.	B		23.	C		33.	A
4.	D		14.	B		24.	B		34.	C
5.	A		15.	B		25.	B		35.	A
6.	B		16.	D		26.	B		36.	B
7.	C		17.	C		27.	C		37.	B
8.	B		18.	B		28.	B		38.	B
9.	C		19.	B		29.	B		39.	B
10.	C		20.	B		30.	C		40.	C