

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE
First Semester B.Sc Degree Examination, November 2021
BCH1B01 – Theoretical & Inorganic Chemistry – I
(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

Section A (Short answers)**(Answer questions up to 20 marks. Each question carries 2 marks)**

1. Differentiate between *scientific theory* and *law*.
2. Any scientific hypothesis is falsifiable. What does this statement mean?
3. What is MSDS?
4. Compare Iodimetry and Iodometry.
5. What is a primary standard? What are the characteristics that a primary standard should possess?
6. Explain why the first ionization enthalpy of B is less than that of Be.
7. Write a note on *inert pair effect*.
8. What is polar covalent bond ? Give example
9. Mention the uses of boric acid.
10. What is Usanovich concept of acids and bases.
11. What is N/P ratio ? Give its significance.
12. What is Critical mass.

[Ceiling of marks: 20]**Section B (Paragraph)****(Answer questions up to 30 marks. Each question carries 5 marks)**

13. Explain C- 14 dating.
14. Discuss the Ostwald's theory of acid –base indicators.
15. Write note on complexometric titration.
16. Define Ionization enthalpy. Explain its variation along the period and down the group.
17. Describe the structure, properties and applications of diborane.
18. Write a brief note on Borazine.
19. State and explain HSAB principle.

[Ceiling of marks: 30]**Section C (Essay)****(Answer any one. Each question carries 10 marks)**

20. What are the general rules that must be followed with regard to the storage and handling of chemicals?
21. (i) Discuss the principle of Aston's spectrograph.
(ii) Give one method of separation of isotopes.

[1 x 10 = 10 Marks]

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2021

BMT1C01 – Mathematics – I

(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

Section A

All questions can be attended

Each question carries 2 marks

1. Find the slope of the tangent line to the graph of $f(x) = x^2 + 1$ at $x_0 = -1$.
2. Find $\lim_{x \rightarrow \infty} \frac{2x + 1}{3x + 1}$.
3. Find $\frac{d}{dx}(10x^3 - \frac{8}{x} + 5\sqrt{x})$.
4. Differentiate $g(x) = (9x^3 + 10)^{\frac{5}{3}}$.
5. Find the general antiderivative for the function $f(x) = x^4 + 6$.
6. Find $\int 4x^{\frac{3}{2}} dx$.
7. State whether the function $f(x) = x^4 + 3x^2 + 6$ is even, odd, or neither.
8. State Mean Value Theorem.
9. Evaluate $\lim_{x \rightarrow 0} \frac{\cos x - 1}{x^2}$.
10. Prove that $\sum_{j=3}^{102} (j - 2) = 5050$
11. Let $F(x) = \int_1^x \frac{1}{3 + s^2 + s^3} ds$. Find $F'(2)$.
12. Find the average value of $f(x) = x^2$ on $[0, 2]$.

(Ceiling: 20 Marks)

Section B

All questions can be attended
Each question carries 5 marks

13. Use linear approximation to calculate $\frac{1}{(1.99)^2 + (1.99)^4}$.
14. Find the equation of the line tangent to the parametric curve given by the equation $x = t^2, y = t^3$ at $t = 5$.
15. If $y = (x^2 + 1)^{27}(x^4 + 3x + 1)^8$, find the rate of change of y with respect to x .
16. Find the intervals on which $f(x) = x^3 - 2x + 6$ is increasing and decreasing.
17. Suppose that f is continuous on $[0, 3]$, that f has no roots on the interval, and that $f(0) = 1$. Prove that $f(x) > 0$ for all x in $[0, 3]$.
18. Find the area under the graph of $f(x) = 2x$ for $0 \leq x \leq 1$ using upper and lower sums.
19. Find the volume of the solid obtained by revolving the region under the graphs of $\sqrt{3 - x^2}$ and $5 + x$ on $[0, 1]$ about the x axis.

(Ceiling: 30 Marks)

Section C

Answer any one question
Question carries 10 marks

20. (a) Find the equation of the line tangent to the graph of the function $f(x) = \frac{(\sqrt{x} + 1)}{2(x + 1)}$ at $x = 1$.
- (b) Find $\int [\frac{2}{x^2} + 7x^2 - 3x + 2 - \frac{9}{\sqrt{x}}] dx$.
21. (a) Find the interval on which $f(x) = 3x^3 - 8x + 12$ is concave upward and downward. Also find local maxima, local minima and inflection points.
- (b) Find the area between the graphs of $y = x^3 + 1$ and $y = x^2 - 1$ between $x = -1$ and $x = 1$.

(1×10 = 10 Marks)

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Reg. No:.....

Name:

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester B.Sc Degree Examination, November 2020

BPH1C01 - Properties of Matter & Thermodynamics

(2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

The symbols used in this question paper have their usual meanings

Section A – Short Answer type

(Answer all questions in two or three sentences, each correct answer carries a maximum of 2 marks)

1. State Hooke's law.
2. Define three elastic moduli.
3. A wire having a length L requires a force F to stretch by l . If it is cut into two parts of each length $L/2$, what is the force required to stretch a piece by $2l$?
4. What are cohesive and adhesive forces? Give one example for each.
5. Define angle of contact?
6. State Stokes Law.
7. Distinguish between intensive and extensive coordinates.
8. What is internal energy? State and explain Zeroth law of thermodynamics?
9. State Kelvin-Planck and Clausius statement of Second law of thermodynamics?
10. What are Helmholtz and Gibbs function? Write down the formulae?
11. What is latent heat?
12. State First law of thermodynamics? Write the differential form of First law.

(Ceiling – 20)

Section B – Paragraph/Problem type

(Answer all questions in a paragraph of about half a page to one page, each correct answer carries a maximum of 5 marks)

13. A torsion pendulum is set up by suspending a disc of mass 1.2 kg and radius 0.1 m at the lower end of a wire of length 1m and radius 0.72 mm. the period of torsional oscillation is 2 sec. Calculate the rigidity modulus of the material of the wire.
14. A cantilever shows a depression of 1 cm at the loaded end, What is the depression at its midpoint?
15. Calculate the energy needed to break a liquid drop of radius 'R' and surface tension 'T' in to n equal small drops.
16. A Carnot's engine whose lower temperature heat (sink) is at 27°C has its efficiency 40%. What is the temperate of the heat source? By how much should the temperature of the source be raised if the efficiency if to be raised to 70 %?
17. Derive the equation for work done in an adiabatic process.
18. Show that $C_p - C_v = R$.
19. What is meant by phase transitions? Write and explain Clausius- Clayperon equation of phase transition?

(Ceiling – 30)

Section C- Essay type

(Answer any one question, each question carries 10 marks)

20. Describe the working of a Carnot's engine. Define efficiency of a heat engine. Derive an expression for efficiency of a Carnot engine.
21. Derive Poiseuille's equation for the rate of flow of a liquid through a capillary tube.

(1x 10 = 10 Marks)