

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE  
Fourth Semester B.Sc Degree Examination, March/April 2021

**BCH4B04 – Organic 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. Chloroacetic acid is stronger than acetic acid. Why?
2. What is electrometric effect?
3. Distinguish between singlet carbene and triplet carbene.
4. Draw the Newman projections of the two extreme conformations of butane.
5. What is meant by asymmetric synthesis?
6. Explain diastereoisomerism with suitable example.
7. Give the major product of dehydrohalogenation of 2-bromobutane. Justify your answer?
8. Acetylene is acidic. Why?
9. The ozonolysis of an alkene gives acetone and acetaldehyde as the products. Write the structure and IUPAC name of the alkene?
10. What is antiaromatic compounds? Give example.
11. What is Clemmensen reduction?
12. Alkyl halide is more reactive than vinyl chloride. Why?

**[Ceiling of marks: 20]**

**Section B (Paragraph)**

**(Answer questions up to 30 marks. Each question carries 5 marks)**

13. Write a note on mesomeric effect.
14. Arrange toluene, ethyl benzene and t-butylbenzene in the increasing order of their reactivity towards electrophilic substitution. Justify your answer.
15. Draw the chair and boat conformations of cyclohexane. Which is more stable? Why?
16. Discuss the mechanism of Markownikov addition in alkene.
17. Explain the mechanism of bromination and nitration of benzene.
18. Write a note on hydroboration oxidation and oxymercuration reduction?

**[Ceiling of marks: 30]**

**Section C (Essay)**

**(Answer any one. Each question carries 10 marks)**

19. Discuss the aspects regarding the mechanism and stereochemistry of SN1 and SN2 reactions of alkyl halide?
20. Discuss the structure, stability and reactions of carbonium ion and carbanion.

**[1x10=10 Mar**



FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE  
**Fourth Semester B.Sc Degree Examination, March/April 2021**  
**BMT4C04 – Mathematics – 4**  
 (2019 Admission onwards)

Time: 2 hours

Max. Marks : 60

**PART A**

**Answer all questions. Each question carries 2 marks.**  
**Maximum mark from this section is 20.**

1. Find the order and degree of the differential equation  $\frac{d^3y}{dx^3} = \left(1 + \left(\frac{dy}{dx}\right)^2\right)^{3/2}$ .
2. Give an example for a linear and a non-linear differential equation.
3. Define an autonomous differential equation and give an example.
4. Find a solution to the differential equation  $x \frac{dy}{dx} = 4y$ .
5. Find the integrating factor in simplified form for the differential equation
6.  $\frac{dy}{dx} + y \tan x = \sin 2x$
7. Write the general form of Bernoulli's differential equation and explain how it can be solved
8. Define the Dirac Delta function and WRITE its Laplace transformation.
9. Find the inverse Laplace transformation of  $F(s) = \frac{s+1}{s^2+1}$ .
10. State the superposition principle for homogenous differential equations.
11. Verify whether the functions  $f_1(x) = 5$ ,  $f_2(x) = \cos^2 x$  and  $f_3(x) = \sin^2 x$  are linearly dependent or independent in the interval  $(-\infty, \infty)$
12. Find the wroskian of the two functions  $f_1(x) = e^x$ ,  $f_2(x) = e^{-x}$

**PART B**

**Answer all questions. Each question carries 5 marks.**  
**Maximum mark from this section is 30.**

13. Derive the formula for the Laplace transformation of  $f'''(t)$ , where  $L(f(t)) = F(s)$  is given.
14. Find the Fourier cosine series of the function  $f(x) = x$ .
15. Using the method of separation of variables, solve the partial differential equation  

$$\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$$
16. Solve the differential equation  $x^2 y'' + xy' - y = 0$
17. Show that the differential equation  $(e^{2y} - y \cos(xy))dx + (2xe^{2y} - x \cos(xy) + 2y)dy = 0$  is exact and hence solve the same.
18. Solve the initial value problem  $\cos x (e^{2y} - y) \frac{dy}{dx} = e^y \sin(2x)$ ,  $y(0) = 0$
19. Using the method of undetermined coefficients, solve  $y'' + 4y = 8x^2$ .

**PART C**

**Answer any ONE question. One question carries 10 marks.**

20. Using the Laplace transformation, solve the initial value problem  
 $y'' - y = t$ ,  $y(0) = 1$ ,  $y'(0) = -1$
21. Find the Fourier Series of the function  $f(x) = x$ ,  $-\pi < x < \pi$

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Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester B.Sc Degree Examination, March/April 2021

BPH4C04 - Electricity, Magnetism and Nuclear Physics

(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. What is electrostatic shielding?
2. Distinguish between primary and secondary cosmic rays.
3. Define Nuclear Magnetic Resonance.
4. Derive the relation between permeability and susceptibility.
5. Define temperature coefficient of resistance.
6. Electron cannot be accelerated using cyclotron. Why?
7. Explain the terms retentivity and coercivity.
8. What is Meissner effect?
9. What is Higg's Boson?
10. Show that the introduction of a dielectric slab into the capacitor can increase the capacitance.
11. Define reduction factor of TG.
12. What is drift velocity? Write down its expression. **(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. The binding energy of  ${}_{12}^{24}\text{Mg}$  is 198.25 MeV. Find its atomic mass?  
(Mass of hydrogen atom = 1.00783u , mass of neutron = 1.0865u)
14. The activity of a radioactive sample is decreased to 75% of the initial value after 30 days. Calculate the half life of sample.
15. Describe the classification of elementary particle
16. With the help of neat diagram explain the working of linear accelerator
17. What capacitance is required to store an energy of 100 KWh at a potential difference of  $10^4$  V?
18. Explain cosmic ray shower
19. The force between two electrons when placed in air equal to 0.5 times weight of an electron. Find the distance between two electrons  
(Given mass of electron =  $9.1 \times 10^{-31}$  Kg). **(Ceiling – 30)**

**SECTION C – Essay type**

**(Essays - Answer in about two pages, any one question.**

**Answer carries 10 marks)**

20. Explain the principle of potentiometer. How can we determine the resistance using potentiometer?
21. Explain the theory of vibration magnetometer. With the help of Searle's Vibration magnetometer how can we find the moment of magnet?

**(1 x 10 = 10 marks)**