

Reg. No. : .....

Name : .....

**Second Semester B.A./B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Language Course (Additional Language)- LATIN**

**LT 1211.1 : TRANSLATION AND COMMUNICATION IN LATIN**

**(2013 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**PART – A**

**Responde omnibus.**

**Delige verbum aptissimum.**

1. Apud Helvetios longe nobilissimus fuit et ditissimus (Marcus, Piso, Orgetorix. Messala).
2. Horum omnium fortissimi sunt (Aquitani, Belgae, Gauls, Marne)

**Indica verum (T) an falsum (F).**

3. 'Valentine' means healthy.
4. Gallia est omnis divisa in partes septem.

**Scribe quod non aptum**

5. Aurum, Argentum, beatum, caelum,
6. Duo, Dulcem, Tres, Quatuor

**Redde Latine:**

7. Work overcomes all things
8. A poet comes into the school.

**Redde Anglice:**

9. Laborare est orare.
10. Studio sapientia crescit.

PART – B

(10 × 1 = 10 Marks)

**Responde octo de datis.**

**Explica significationem in lingua Anglica:**

11. Nil homini certum est.
12. Donum dabo.

**Scribe diversitatem inter verba:**

13. 'Filius' et 'filia'
14. 'Legere' et 'Liberare'

15. **Adequa insequentia**

- |                               |   |                 |
|-------------------------------|---|-----------------|
| (a) Regina caeli              | — | Our daily bread |
| (b) Ducere                    | — | Of the Lord     |
| (c) Panem nostrum Quotidianum | — | Queen of heaven |
| (d) Dominic                   | — | To lead         |

**Construe sententiam utens verbo:**

16. Monstrare

17. Venire

**Redde Anglice:**

18. Vaccae in silvis sunt.

19. **Conjuga 'dare' in praesens.**

20. **Corrige sententiam:**

Caritas numquam excidere.

**Declina singulariter et pluraliter:**

21. Lux-cis

22. Praemium-i

**(8 × 2 = 16 Marks)**

## PART-C

**Responde sex de datis.**

**Explica sententias datas:**

23. Ea petivit, sed sine mora in aurum versa sunt. Aurum edere nolebat.
24. Et Si distribuero in cibos pauperum omnes facultates meas et Si tradidero corpus meum ut ardeam caritatem autem non habuero nihil mihi prodest.
25. Aurum potius quam sapientiam habere mavult.
26. Si linguis hominum loquar et angelorum caritatem autem non habeam factus sum velut aes sonans aut cymbalum tinniens.
27. Patris aeterni verbum care factum;

Venite adoremus Dominum.

**Redde in Latinani linguam.**

28. The angel of the lord comes into the temple. The girl sees a sign in the sky. Lord, give gold and silver to the friend. Students have not gold, but rewards. Wars frighten the daughters of the queen.
29. Oh Poet, you are showing the moon. Oh poet, you are praising the roses. Sailor, you love the water. Sailors, you are giving the latters.

**Redde in Anglicam linguam.**

30. Deus ei auxilium mox dedit. Corpus caputque 1 flumine ponere eum iussit. Midas magna cum diligentia id fecit. Mox liberatus est, sed flumini suum donum dederat. Post id tempus arenae fluminis erant aureae.

31. Adeste, fideles, laeti triumphantes,

Venite, venite in Bethlehem;

Natum videte regi angelorum

Venite adoremus Dominum.

(6 × 4 = 24 Marks)

**PART D**

**Responde duo de datis.**

32. "Hi omnes lingua, institutis, legibus inter se different". Explica significationem belli gallici a Julio Caesare.

33. "Caritas non est ambitiosa non quaerit quae sua sunt non irritatur non cogitat malum". Explica caritatem, virtutem omnium virtutum.

34. Lingua Latina est lingua inflectionalis. Explica declinationes et conjugationes in lingua Latina.

**Scribe fabulam verbis aptis:**

35. Stellae \_\_\_\_\_<sup>1</sup> (via, viis, viam) non \_\_\_\_\_<sup>2</sup> (monstrare, monstrant, monstratum) agricolis, sed nautis. Spinae rosarum agricolam \_\_\_\_\_<sup>3</sup> (vulnerant, vulnerare, vulneratum). Puellae agricolae \_\_\_\_\_<sup>4</sup> (stellis, stellarum, stellas) monstrant. Puellae \_\_\_\_\_<sup>5</sup> (portam, portarum, portis) scholae \_\_\_\_\_<sup>6</sup> (ornare, ornatum, ornant). Agricola \_\_\_\_\_<sup>7</sup> (silvam silvis silarum) reginae non vastant. Hasta vaccam agricolae \_\_\_\_\_<sup>8</sup> (vulnerare, vulnerat, vulneratum). Agricola ancillis vaccae herbam \_\_\_\_\_<sup>9</sup> (monstrat, monstrare, monstratum). Agricolarum puellae \_\_\_\_\_<sup>10</sup> (laborare, aboratum, laborant). Agricola reginae silvas non \_\_\_\_\_<sup>11</sup> (vastare, vastat, vastatum). Non rosae, sed rosarum spinae \_\_\_\_\_<sup>12</sup> (puellis, puellarum, puellam) vulnerant. Hastae et sagittae agricolam non \_\_\_\_\_<sup>13</sup> (delectare, delectatum, delectant). Reginae ancillis \_\_\_\_\_<sup>14</sup> (viam, viis, viarum) monstramus. Puellae, scholae \_\_\_\_\_<sup>15</sup> (portarum, portis, portam) monstrate.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Second Semester B.A./B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Malayalam Language**

**Language Course V – Additional Language**

**ML 1211.1 : ഗദ്യസാഹിത്യം**

**(2014-2017 Admission)**

**Max. Marks : 80**

**Time : 3 Hours**

I. ഒരു വാക്കിലോ രണ്ടു വാക്യത്തിലോ ഉത്തരമെഴുതുക.

1. 'മനുഷ്യപുത്രി' എന്ന കഥ എഴുതിയതാര്?

2. 'ദൈവത്തിന്റെ വികൃതികൾ' എന്ന കൃതി ഏത് സാഹിത്യവിഭാഗത്തിൽപ്പെടുന്നു?

3. "അനേകായിരം ജനം ഈ ലോകത്തിൽ കഴിഞ്ഞ് ഒടുവിലത്തെ രംഗം ഇപ്പോൾ നിങ്ങളുടെ ചരിത്രത്തിൽ കാണുന്ന മാസിഡോണിയ എന്ന സ്ഥലത്തായിരുന്നു." ഈ വാക്യം ഏത് കഥയിലേതാണ്?

4. ബാലചന്ദ്രൻ, റഹിമാൻ എന്നിവർ മുഖ്യകഥാപാത്രങ്ങളായി വരുന്ന കഥയേത്?

5. 'ഇതാ ഇവിടെ വരെ' എന്ന ചിത്രം സംവിധാനം ചെയ്തതാര്?

6. 'ലോകത്തിലെ ഏറ്റവും വലിയ നോവലിസ്റ്റ് മാർക്സെയിൻ ആണ് എന്നവൾ വിശ്വസിക്കുന്നു' - ആരാണ് അങ്ങനെ വിശ്വസിച്ചത്?
7. 'അച്ഛത്തമ്മാമ' എന്ന കഥ രചിച്ചതാര്?
8. "കവികൾ വാക്കുകൊണ്ടെഴുതുന്ന അനുഭൂതിക്ക് ഒരിക്കലും മറക്കരുതാത്ത ദാർഢ്യം കിട്ടുന്നത് അവയുടെ കലാത്മകതകൊണ്ടാണ്." - ഈ വാക്കുകൾ ആരുടേതാണ്?
9. "വാക്കുകൾ കൂട്ടിച്ചൊല്ലാൻ വയ്യാത്ത കിടാങ്ങളേ ദീർഘദർശനം ചെയ്യും ദൈവജ്ഞരല്ലോ നിങ്ങൾ" ഏതു കവിതയിലേതാണ് ഈ വരികൾ?
10. മക്കളെ പട്ടിണിക്കിട്ടു കൊല്ലുന്ന കേരളമാതാവിനെ വർണ്ണിക്കുന്ന വൈലോപ്പിള്ളി കവിത ഏത്?

(10 × 1 = 10 Marks)

- II. ഒരു ഖണ്ഡികയിൽ കവിയാതെ ഏതെങ്കിലും എട്ടു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.
11. മാമ്പഴത്തിലെ അമ്മ തെറ്റുകാരിയല്ല എന്ന നിരീക്ഷണത്തിന്റെ അടിസ്ഥാനമെന്ത്?
12. ആന്ദ്രേഴീദിന്റെ ദുർമാർഗി (The Immoralist) എന്ന നോവലിന്റെ പ്രമേയമെന്ത്?
13. 'ശബ്ദമാണ് കവിതയുടെ ഇന്ദ്രിയഗോചരമായ ബാഹ്യഘടകം' എന്നു പറയാൻ കാരണമെന്ത്?
14. ബാലചന്ദ്രൻ ചുള്ളിക്കാട് ശിവജി ഗണേശനെ ആദ്യമായിക്കണ്ട സന്ദർഭം ഏത്?
15. കാവ്യകലയോടുള്ള ബഹുമാനം ശിവജി ഗണേശൻ പ്രകടിപ്പിച്ചതെങ്ങനെ?
16. എം. മുകുന്ദന്റെ നോവലുകൾ ഏതൊക്കെയാണ്?
17. "ഈ സ്ത്രീകളെ ലജ്ജയില്ലാതെ തുറിച്ചുനോക്കി അവരെ കഷ്ടപ്പെടുത്തുന്നതു നല്ലതാണോ" ? - സന്ദർഭമേത്?

18. മനുഷ്യപുത്രി എന്ന കഥയിലെ കുഞ്ഞാത്തോലമ്മ എന്തിനാണ് മന്ത്രിയെ കാണാൻ എത്തിയത്?
19. കടയനല്ലൂരിലെ സ്ത്രീ എന്ന കഥയിലെ പ്രധാന കഥാപാത്രങ്ങളെ പരിചയപ്പെടുത്തുക.
20. 'ഇതാ ഇവിടെ വരെ' പരസ്യവണ്ടിയുടെ സവിശേഷതകൾ എന്തൊക്കെയാണ്?
21. ആറാംകാലം എന്ന കഥയുടെ പ്രമേയഭംഗി വ്യക്തമാക്കുക.
22. 'ഇതാ ഇവിടെവരെ' എന്ന ചിത്രത്തിന്റെ പ്രമേയഭംഗി വ്യക്തമാക്കുക.

(8 × 2 = 16 Marks)

III. ഓരോന്നിനും 120 വാക്കിൽ കവിതയെ ഏതെങ്കിലും ആറു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

23. കെ.പി. രാമനൂണിയുടെ സാഹിത്യസംഭാവനകൾ വിലയിരുത്തുക.
24. 'മനുഷ്യപുത്രി' എന്ന കഥയിൽ തെളിയുന്ന ജീവിതദർശനം എന്ത്?
25. 'എന്റെ ഗന്ധർവ്വസ്നേഹിതൻ' എന്ന കഥയ്ക്ക് ഒരു ആസ്വാദനം എഴുതുക.
26. 'മാമ്പഴം' എന്ന കവിതയെ ജനകീയമാക്കിയ ഘടകങ്ങൾ എന്തൊക്കെയാണ്?
27. കളിത്തൊഴി എന്ന നോവലിന്റെ സവിശേഷതകൾ എന്തൊക്കെയാണ്?
28. 'അർത്ഥം കവിതയുടെ പ്രാണനാണോ'? എന്നുകൊണ്ട്?
29. 'ഗുരുസ്മരണ' എന്ന ലേഖനത്തിൽ തെളിയുന്ന സാമൂഹികജീവിതത്തിന്റെ സവിശേഷതകൾ എന്തൊക്കെയാണ്?
30. ലോല എന്ന കഥാപാത്രത്തിന്റെ സവിശേഷതകൾ വിശദീകരിക്കുക.
31. മലയാളത്തിലെ ആദ്യകാലകഥകളെക്കുറിച്ച് ഒരു ലഘുവിവരണം എഴുതുക.

(6 × 4 = 24 Marks)

IV. മൂന്നു പുറത്തിൽ കവിയാതെ ഏതെങ്കിലും രണ്ടു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

32. ഒരു ദളിത് യുവതിയുടെ കദനകഥ എന്ന രചനയെ മുൻനിർത്തി എം. മുകുന്ദന്റെ ആഖ്യാനശൈലിയെ പരിചയപ്പെടുത്തുക.
33. മാമ്പഴം എന്ന ലേഖനത്തിൽ മനുശാസ്ത്രനിരൂപണത്തിന്റെ സവിശേഷതകൾ എത്രത്തോളം പ്രകടമാണ്? വിശകലനം ചെയ്യുക.
34. കവിതയുടെ മൂലഘടകങ്ങളെക്കുറിച്ച് സുകുമാർ അഴീക്കോടിന്റെ നിരീക്ഷണങ്ങൾ സംഗ്രഹിക്കുക.
35. കടയനല്ലൂരിലെ സ്ത്രീ എന്ന കഥയ്ക്ക് ഒരു ആസ്വാദനമെഴുതുക.

(2 × 15 = 30 Marks)

St. Xavier's College

(Pages : 3)

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Reg. No. : .....

Name : .....

**Second Semester B.A./B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Language Course – III**

**EN 1211.1 — ENVIRONMENTAL STUDIES**

**(2015-2018 Admission)**

Time : 3 Hours

Max. Marks : 80

I. Answer **all** questions, each in a word or sentence :

1. What is Sustainable development?
2. What is Hydrosphere?
3. What according to Wordsworth, is nature's holy plan?
4. Expand WCED.
5. Why is Britain reluctant to join the campaign to reduce emission?
6. What is Asbestos?
7. What is Biomedical waste?
8. What is ozone?
9. What is the quintessential Indian social unit?
10. Why does Assimov advocate the need to stop living by the code of the past?

**(10 × 1 = 10 Marks)**

P.T.O.

II. Answer **any eight** each in a **short paragraph** not exceeding **50** words.

11. The four dynamic constituents of environment.
12. Write a note on Plachimada issue.
13. Explain the theme of the poem 'Lines written in Early Spring'.
14. What is ex-situ conservation?
15. What is Ganga action plan?
16. What is Municipal Solid Waste (MSW)?
17. How is the poem 'The Poplar Field' related to ecology and aesthetics?
18. Dangers of radioactive waste.
19. Write a short note on Global Warming.
20. What does Chief Seattle say about rivers?
21. Chipko Andolan.
22. Women and child welfare.

(8 × 2 = 16 Marks)

III. Answer **any six**, each in a **paragraph** not exceeding **100** words.

23. Discuss the major environmental issues.
24. How are strategic minerals important to a nation's economy?
25. Explain the two major types of ecological succession.
26. What are the causes of water pollution?
27. Rain water harvesting.

28. Explain Pyrolysis and Gasification.
29. What are the family welfare programmes initiated by the Government of India?
30. Development and Environment.
31. India as a megadiversity nation.

**(6 × 4 = 24 Marks)**

IV. Answer **any two** in about **300 words**.

32. The role of youth in the conservation of nature.
33. Effective Solid waste management.
34. What are the issues related to environmental ethics and their solutions?
35. Environment and human health.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Second Semester B.A./B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Language Course (Additional Language II) – Hindi**

**HN 1211.1 FICTION, SHORT STORY AND NOVEL**

**(2017 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

PART – A

- I. एक या दो वाक्यों में उत्तर लिखिए।
1. प्रेमचन्द का जन्म कब हुआ?
2. 'परदा' कहानी का केंद्र पात्र कौन है?
3. अज्ञेय के नाटक का नाम लिखिए।
4. 'पीली छतरी वाली लड़की' का रचनाकार कौन है?
5. मृदुला गर्ग की कहानी का नाम लिखिए।
6. 'दूध का दाम' कहानी का केंद्र पात्र कौन है?
7. 'आना इस देश' किसका उपन्यास है?
8. अबीर की पत्नी कौन है?

9. कृष्णा अग्निहोत्री का जन्म कहाँ हुआ?

10. अबीर किस देश में रहता है?

(10 × 1 = 10 Marks)

PART – B

II. किन्हीं आठ प्रश्नों के उत्तर करीब 50 शब्दों में लिखिए।

11. 'दूध का दाम' का प्रतीकात्मक अर्थ क्या है?

12. 'परदा' कहानी का मुख्य उद्देश्य क्या है?

13. कैप्टन दयाल कौन है?

14. उपन्यासकार प्रेमचन्द का परिचय दीजिए।

15. हरी बिन्दी की नायिका क्या-क्या करती है?

16. 'नेलकटर' किसका प्रतीक है?

17. अज्ञेय की कहानियों का परिचय दीजिए।

18. "उसे मैं ने बहुत खोजा; बल्कि आज तक। कई वर्षों बाद भी। लेकिन वह कभी नहीं मिला। वह पता नहीं कहाँ खो गया था।" कथावाचक किसे खोजने की बात कहते हैं?

19. "लोग कहते हैं, दूध का दाम कोई नहीं चुका सकता और मुझे दूध का यह दाम मिल रहा है।" – सन्दर्भ व्यक्त कीजिए।

20. सुरैय्या कौन है?

21. सुरैय्या और अबीर के मिलन में डॉ. गीत की भूमिका क्या है?

22. 'आना इस देश' उपन्यास के शीर्षक की सार्थकता क्या है?

(8 × 2 = 16 Marks)

## PART – C

- III. किन्हीं छः प्रश्नों के उत्तर करीब 120 शब्दों में लिखिए।
23. मंगल का चरित्र-चित्रण कीजिए।
24. 'परदा' कहानी के शीर्षक की सार्थकता पर प्रकाश डालिए।
25. हीली बोन् अपने प्रिय बतखों की हत्या क्यों करती है?
26. 'नेलकटर' कहानी का उद्देश्य क्या है?
27. महिला-स्वतंत्रता का चित्रण 'हरि बिन्दी' में हुआ है। विचार कीजिए।
28. रचनाकार अज्ञेय और हिन्दी साहित्य।
29. 'आना इस देश' के भाषा और शिल्प पर विचार कीजिए।
30. अबीर का चरित्र-चित्रण कीजिए।
31. सुरैय्या के मानसिक एवं शारीरिक यातनाओं पर विचार कीजिए।

## PART – D

(6 × 4 = 24 Marks)

- IV. किन्हीं दो प्रश्नों के उत्तर करीब 250 शब्दों में लिखिए।
32. 'प्रेमचन्द आज भी प्रासंगिक एवं समकालीन है।' पठित कहानी के आधार पर इस कथन पर विचार कीजिए।
33. भारतीय जीवन के दोहरे चरित्र के सच को 'परदा' कहानी में उद्घाटित किया गया है। इस कथन का मूल्यांकन कीजिए।
34. 'आना इस देश' में चित्रित समस्याओं पर प्रकाश डालिए।
35. उपन्यास के तत्वों के आधार पर 'आना इस देश' के कथानक की समीक्षा कीजिए।

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

**Second Semester B.A./B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Malayalam Language**

**Language Course V – Additional Language**

**ML 1211.1 : ഗദ്യസാഹിത്യം**

**(2018 admission onwards)**

**Time : 3 Hours**

**Max. Marks : 80**

I. ഒരു വാക്കിലോ രണ്ടു വാക്യത്തിലോ ഉത്തരം എഴുതുക.

1. 'സുന്ദരികളും സുന്ദരന്മാരും' എന്ന നോവൽ എഴുതിയതാര്?
2. സി.വി. രാമൻ പിള്ള എഴുതിയ ഒരു ചരിത്ര നോവലിന്റെ പേരെഴുതുക.
3. 'അപ്ഫന്റെ മകൾ' എന്ന നോവലിന്റെ കർത്താവാര?
4. 'തിരസ്കാരം' എന്ന നിരൂപണ ഗ്രന്ഥം എഴുതിയതാര്?
5. എം.ടി. വാസുദേവൻ നായരുടെ രണ്ട് നോവലുകളുടെ പേര് എഴുതുക.
6. കുറ്റം ചെയ്ത പട്ടി വാലും മടക്കി നിൽക്കും പോലെ നിന്നതാര്?

7. കമല എന്ന പെൺകുട്ടിക്ക് അവളുടെ പതിനാലാം പിറന്നാളിന് അച്ഛൻ നൽകിയ സമ്മാനം എന്ത്?
8. “മരയ്ക്കാരെ നിങ്ങൾക്കു ഞാൻ പതിനഞ്ചു രൂപിക കടംവീട്ടാനുണ്ട് അല്ല, പതിനഞ്ച് രൂപികയും നാലണയും” - ആരുടെ വാക്കുകളാണിത്?
9. ‘ലന്തൻബത്തേരിയിലെ ലൂത്തിനിയകൾ’ എന്ന നോവൽ എഴുതിയതാര്?
10. ‘ഖസാക്കിന്റെ ഇതിഹാസം’ എഴുതിയതാര്?

(10 × 1 = 10 Marks)

- II. ഒരു ഖണ്ഡികയിൽ കവിയാതെ എട്ടു ചോദ്യത്തിന് ഉത്തരം എഴുതുക.
11. വീടാത്ത കടങ്ങൾ പടച്ചവന്റെ സൂക്ഷിപ്പുകളാണ്, അത് അങ്ങനെ തന്നെ ഇരിക്കട്ടെ. സന്ദർഭം എഴുതി ആശയം വ്യക്തമാക്കുക.
12. അപരിചിതന്റെ സംഭാഷണം ഒരു കൊലക്കയറിനെപ്പോലെ വെള്ളായിയപ്പന്റെ കഴുത്തിൽ ചൂറ്റി മുറുകി - എപ്പോൾ? വിശദമാക്കുക.
13. കാല്പനികത എന്നല്ല കാല്പനികതകൾ എന്നാണ് പറയേണ്ടത് എന്ന് ലവ്ജോ പറയുവാൻ കാരണമെന്ത്?
14. മലയാള ഗദ്യത്തിന്റെ വളർച്ചയിൽ ദിനപത്രത്തിന്റെ പങ്കിനെപ്പറ്റി ഇ.എം.എസിന്റെ അഭിപ്രായം എന്ത്?
15. “എന്റേതല്ലാത്ത മുതൽ റെയിൽ സ്റ്റേഷനിൽ നിന്നു എനിക്ക് കിട്ടിയാൽ ഞാൻ ആ മുതൽ ആരുടെ പക്കൽ ഏൽപ്പിക്കണം?” - സന്ദർഭം എഴുതി വിശദമാക്കുക.
16. ഉരുപ്പാനെ ഭ്രാന്തനെന്ന് വിളിക്കാൻ കാരണമെന്ത്?
17. ചെറിയച്ഛന്റെ മരണത്തെക്കാൾ വീട്ടിലുള്ളവർക്ക് സങ്കടം ഉളവാക്കിയ സംഭവമായിരുന്നു അത്. - ഏത്?

18. വാർത്താസ്പോടനങ്ങൾ ഇക്കാലത്ത് നടക്കുന്നതെങ്ങനെ ?
19. സാഹിത്യത്തെ സി.വി. സമ്പന്നമാക്കിയത് എങ്ങനെയെന്നാണ് കെ.പി. അപ്പൻ അഭിപ്രായപ്പെടുന്നത് ?
20. ആദ്യകാല കഥകളുടെ എല്ലാ പ്രത്യേകതകളും ഉൾക്കൊള്ളുന്ന കഥയാണ് ആരാന്റെ കൂട്ടി. വിശദമാക്കുക.
21. ഫുട്ബോളുമായുള്ള ഗീവർഗീസച്ചന്റെ ബന്ധം അപഗ്രഥിക്കുക.
22. ക്യാൻസറിനോട് പട പൊരുതി വിജയം നേടിയ നൗഷാദിനെപ്പറ്റി എഴുതുക.

(8 × 2 = 16 Marks)

III. 120 വാക്കിൽ കവിയാതെ ആറു ചോദ്യത്തിന് ഉത്തരം എഴുതുക.

23. ഫലിതം കാഴ്ചപ്പാടിന്റെ മഹത്വത്തിൽ നിന്ന് ജനിക്കുന്ന ചിരിയല്ല എന്നു പറയാൻ കാരണം എന്ത്?
24. ഉമ്മാച്ചുവിലെ തറവാട് ഭാഗിക്കാൻ ഇടയായ സാഹചര്യം എഴുതുക.
25. ആദ്യകാല കഥകളുടെ വിഷയം സ്വഭാവം വിശകലനം ചെയ്യുക.
26. പെൺകുട്ടികളോടുള്ള സമൂഹത്തിന്റെ സമീപനം അനാവരണം ചെയ്യുന്ന കഥയാണ് കൃഷ്ണഗാഥ - വിശദീകരിക്കുക.
27. ഹിഗ്ഗിറ്റയിൽ അവതരിപ്പിക്കുന്ന സാമൂഹ്യ പ്രശ്നങ്ങൾ എന്തെല്ലാം?
28. സരസ്വതിയമ്മയുടെ ജീവിതവീക്ഷണം 'പെൺബുദ്ധി' എന്ന കഥയിൽ ആവിഷ്കൃതമാകുന്നത് എങ്ങനെ ?
29. മാധ്യമങ്ങൾ നമ്മുടെ മനസ്സിനെ എങ്ങനെയെല്ലാം സ്വാധീനിക്കുന്നു ? വിശദീകരിക്കുക.
30. മലയാളഭാഷ ഏതുവിധത്തിൽ നിലനിർത്തണമെന്നാണ് ഇ.എം.എസ്. അഭിപ്രായപ്പെടുന്നത് ?
31. 'തല്പം' എന്ന കഥയുടെ സമകാലപ്രസക്തി എന്ത് ?

(6 × 4 = 24 Marks)

IV. മൂന്നു പുറത്തിൽ കവിയാതെ രണ്ടു ചോദ്യത്തിന് ഉത്തരം എഴുതുക.

32. എം.ടി. കമകളുടെ പൊതുസ്വഭാവം പ്രകടിപ്പിക്കുന്ന ഒരു കഥയാണ് കർക്കിടകം. ചർച്ച ചെയ്യുക.
33. മലയാള നോവൽ സാഹിത്യത്തിലെ അതിശക്തമായ ഒരു സ്ത്രീ കഥാപാത്രമാണ് ഉമ്മാച്ചു - നിരൂപിക്കുക.
34. ഹിഗ്ഗിറ്റയിലെ ജീവിതദർശനം എന്ത്? ചർച്ച ചെയ്യുക.
35. മലയാള പ്രതിഭയുടെ മൗനം കെ.പി. അപ്പൻ അവതരിപ്പിച്ചിരിക്കുന്നത് എങ്ങനെയെന്ന് പരിശോധിക്കുക.

(2 × 15 = 30 Marks)

St. Xavier's College

Reg. No. : .....

Name : .....

**Second Semester B.A./B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Language Course — English**

**EN 1211.1 – ABILITY ENHANCEMENT COMPULSORY COURSE :  
ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

I. Answer **all** questions, each in a word or two.

1. Expand CPR.
2. Who is in-charge of a relief camp?
3. When did the Bhopal gas tragedy occur?
4. Which ministry is the nodal ministry for drought management in India?
5. Why does Saku write the essay?
6. What is deforestation?
7. What did the residents in the temple premises say about bats?
8. How were the children in Carson's 'Silent Spring' affected by the sickness?
9. Who culled the deer fawns?
10. Name the two eminent sages mentioned in our mythology.

**(10 × 1 = 10 Marks)**

II. Answer **any eight**, each in a paragraph not exceeding **50** words.

11. What are Resources?
12. The meaning of the word 'Sacchidananda'.
13. What happened to the birds in Carson's *The Silent Spring*?
14. How did the wife manage to get rat poison?
15. What is Resilience of an ecosystem?
16. How are governments acting to prevent plastic pollution?
17. How does the poet describe the arrival of death in Chernobyl?
18. Why is it important to dispose e-waste properly?
19. Who issues flood forecasts and how?
20. What was the reason for leakage in the Bhopal UCC plant?
21. What did Arif write down in his book?
22. What kinds of food items are required at a relief camp?

**(8 × 2 = 16 Marks)**

III. Answer **any six**, in a paragraph not exceeding **100** words.

23. What are procedures to be followed while closing a relief camp?
24. What are the likely ways a person behaves while experiencing personal disasters?
25. What are the procedures to be followed in the event of a bomb threat call?
26. What is the function of the District Level Disaster Management Committee?
27. What happened when Saku presented his essay before the class?

28. What are the dangers posed by plastic pollution?
29. What is Social-Ecological system?
30. Describe the vegetation in the land owned by the narrator in "The Inheritors of the Earth".
31. What is the prophecy that Carson makes at the end?

(6 × 4 = 24 Marks)

IV. Answer **any two** of the following in not less than **300** words.

32. Describe the functions and responsibilities of centre and state governments during a disaster.
33. Critically examine the various ecological concerns presented by Chief Seattle in his speech.
34. Write down the various aspects of conservation.
35. Narrate how as a student, you will prepare your community to face an emergency situation.

(2 × 15 = 30 Marks)

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Reg. No. : 190T1141025

Name : .....

**Second Semester B.A. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**History**

**Core Course II**

**HY 1241: CULTURAL FORMATION OF THE PRE-MODERN WORLD**

**(2014 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**PART – A**

Answer the question in **one or two** sentences each.

1. Cro-Magnons
2. *On the Origin Of Species*
3. Paleolithic Tools
4. Behistun Inscription
5. Nineveh
6. Aristotle
7. Children's Crusade
8. Oracle Bones

9. Mortimer Wheeler
10. Twelve Tables

(10 × 1 = 10 Marks)

PART – B

Answer any **eight** from the following not to exceed **one** Paragraph.

11. Catalhoyuk
12. Pax Romana
13. Code of Ur Nammu
14. Patricians and Plebians
15. Muziri's
16. Flinders Petrie
17. Council of Clermont
18. Lothal
19. God Particle Theory
20. Qin Shi Huang
21. City of Baghdad
22. *The History of Decline and Fall of Roman Empire*

(8 × 2 = 16 Marks)

## PART – C

Answer any **six** of the following not to exceed **120** words.

23. Analyse the features of Manorialism in Europe.
24. Explain the salient features of Hellenistic Philosophy.
25. Give an account of the trade relations of Sumerians.
26. Examine the contributions of Arab Science.
27. Describe about the slavery system of ancient Rome.
28. Critically analyse the rule of Harun - Al - Rashid.
29. Discuss the relation between Crusades and the revival of trade and exchange in Europe.
30. Bring out the significance of the ancient city of Ur.
31. Trace the peculiarities of ancient Chinese belief systems.

## PART – D

(6 × 4 = 24 Marks)

Long Essays. Answer any **Two** of the following

32. Examine the features of Indus Valley cities based on excavation reports.
33. 'Neolithic Revolution can be considered as the first revolution in the history of mankind'. Explain the statement on the basis of the life of man in Neolithic age.
34. Discuss the cultural development along Nile river valley during the Bronze Age.
35. Analyse the cultural contribution of Greece to European Civilization.

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : Nithya Jay .....

**Second Semester B.A. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Economics**

**Core Course II**

**EC 1241 – MICRO ECONOMICS I**

**(2015-18 Admissions)**

Time : 3 Hours

Max. Marks : 80

**SECTION – I**

Answer in one or two sentences. Attempt all questions.

1. Opportunity Cost
2. Income effect
3. Mixed Economy
4. Iso- cost line
5. PPC
6. Law of demand
7. MRS
8. Law of supply

9. Production function

10. Marginal Cost

(10 × 1 = 10 Marks)

### SECTION – II

Answer any **eight** questions not exceeding one paragraph. Each question carries **2** marks.

11. Distinguish between Micro Economics and Macro Economics.

12. Short run Average Cost Curves are U shaped. Why?

13. Explain income elasticity of demand.

14. What do you mean by demand forecasting?

15. Explain Consumer surplus

16. What are internal economies of scale?

17. Why demand curve slopes downward?

18. Explain Engel curve.

19. Distinguish between Returns to scale and returns to a factor.

20. Explain Cobb- Douglas Production function

21. Write a note on MRTS.

22. Explain cross elasticity of demand.

### SECTION – III

(8 × 2 = 16 Marks)

Answer any **six** Questions not exceeding **120** words. Each question carries **4** marks.

23. Explain the law of Returns to Scale? Give the causes of increasing returns to scale.

24. State and explain the law of Equi- marginal utility? How does it explain consumer equilibrium?

25. What are the properties of Indifference curve?
26. Exemplify the different methods of demand forecasting.
27. Discuss the Revealed Preference theory of consumer behaviour.
28. Explain Producers equilibrium by using Isoquant and Iso-cost line.
29. Elucidate the basic problems of an economic system.
30. Explain the relationship between Averaged Cost Curve and marginal Cost Curve.
31. Distinguish between cardinal and ordinal measurement of utility.

**(6 × 4 = 24 Marks)**

#### SECTION – IV

Answer any **two** Questions, not exceeding four pages. Each question carries **15** marks.

32. Show graphically the substitution effect and the real income effect by Slutsky.
33. Explain consumer equilibrium by using Indifference curve analysis
34. State and explain the Law of Diminishing Returns. Show graphically the stages of production in the short run.
35. Explain the traditional theory of cost.

**(2 × 15 = 30 Marks)**

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Reg. No. : .....

Name : .....

**Second Semester B.A. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Economics**

**Core Course – II**

**EC 1241 – INTERMEDIATE MICROECONOMICS**

**(2019 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. Each question carries **1** mark.

1. Derived demand
2. Exchange economy
3. Capital
4. Externality
5. Expected utility
6. Social dilemma
7. Co-operative game
8. Contract curve
9. Private good
10. Altruism

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer **any eight** questions not exceeding one paragraph. Each question carries **2** marks.

11. What is competitive factor market?
12. Define Internal rate of return.
13. Distinguish between risk lover and risk averter.
14. Define the term variability.
15. What is Nash equilibrium?
16. What is monopsony market?
17. Explain the methods through which economists have learned about people's preference.
18. What is an Edgeworth box?
19. Explain the concept marginal rate of transformation.
20. What is Zero- sum game?
21. Explain market demand curve.
22. Explain the term present disconnected value.

**(8 × 2 = 16 Marks)**

## SECTION – C

Answer **any six** questions not exceeding **120** words. Each question carries **4** marks.

23. Show that the supply of labour curve is backward bending.
24. Why is Behavioural Economics important? Explain.

25. What is an equity-efficiency trade off?
26. Distinguish between general equilibrium and partial equilibrium.
27. What is meant by game theory? Write down the assumptions of game theory.
28. What is the Pareto Criterion for optimum social welfare?
29. Distinguish between positive and negative externalities with an example.
30. Write down the concept ultimatum game.
31. Discuss the method of measuring economic inequality?

**(6 × 4 = 24 Marks)**

**SECTION – D**

Answer **any two** questions, not exceeding four pages. Each question carries **15 marks**.

32. Discuss how Net Present Value can be used as a criterion for capital investment decision.
33. Explain the standard methods used by investors for reducing the risk.
34. What do you mean by economic inequality? Discuss the use of Lorenz curve to measure economic inequality.
35. What are the properties of public goods? How to determine the optimal provision of public goods.

**(2 × 15 = 30 Marks)**

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Complementary Course for Mathematics**

**PY 1231.1 : HEAT AND THERMODYNAMICS**

**(2013 – 2017 Admission)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. Each question carries **1** mark.

1. State Wiedman – Franz law.
2. What is solar constant?
3. What is a heat engine'?
4. What is a perfect black body. Give one example.
5. State Stefan's law.
6. Give the Clasius statement of second law of thermodynamics.
7. What is an irreversible process? Give one example
8. State Planck's radiation formula.

9. What is conduction?
10. What is an isothermal process?

(10 × 1 = 10 Marks)

### SECTION – B

Answer any **eight** questions. Each question carries **2** marks.

11. What is a T-S diagram? Draw the T-S diagram or Carnot cycle.
12. Show that the entropy change of the universe is zero for a reversible process.
13. State Rayleigh- Jeans law. What are the failures?
14. Draw the indicator diagram for a diesel engine and name the different processes.
15. Show that the slope of adiabatic curve is steeper than isothermal curve.
16. Derive the expression for work done in an isothermal process.
17. State and explain the principle of increase of entropy.
18. State Kirchhoff's law. What are the applications?
19. Prove that for an isothermal process the isothermal elasticity is the pressure itself.
20. What is an indicator diagram. What is its significance?
21. What is an isentropic process? Show that adiabatic processes are isentropic.
22. Obtain the relation for coefficient of thermal conductivity? Find out its dimension.

(8 × 2 = 16 Marks)

## SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. Calculate the change in entropy when 5kg of water at  $100^{\circ}\text{C}$  is converted into steam at the same temperature. Latent heat of steam is  $540\text{cal/gram}$ .  
( $1\text{cal/gm} = 4.2 \times 10^3 \text{J}$ )
24. A Carnot engine whose source temperature is at  $100^{\circ}\text{C}$  takes  $4200\text{J}$  of heat and gives out  $2800\text{J}$  to the sink. Find the temperature of the sink.
25. A quantity of air at  $30^{\circ}\text{C}$  and one atmospheric pressure is suddenly compressed to half of its original volume. Find the final pressure and temperature.  
 $\gamma = 1.4$  ( $1\text{atm} = 1.013 \times 10^5 \text{Pa}$ ).
26. The efficiency of a Carnot engine changes from  $1/6$  to  $1/3$  When the source temperature is raised by  $100\text{K}$ . Calculate the temperature of the sink.
27. A both at  $1500\text{K}$  emits maximum energy of wavelength  $1800\text{nm}$ . If the sun emits maximum energy of wavelength  $500\text{nm}$ , what would be the temperature of the sun?
28. Prove the  $PV^{\gamma} = a$  constant for an adiabatic process.
29. Calculate the black body temperature of the sun, given solar constant is  $2.3\text{cal/cm}^2/\text{minute}$ , radius of the sun is  $7 \times 10^5 \text{Km}$ , distance between earth and sun is  $1.5 \times 10^7 \text{Km}$  and Stefan's constant is  $5.672 \times 10^{-8} \text{SI Units}$ .
30. Deduce the temperature at which a black body losses thermal energy at the rate of  $1 \text{ watt/cm}^2$  ? Stephan's constant is  $5.672 \times 10^{-8} \text{SI Units}$ .
31. Calculate the workdone when 1 mole of a monoatomic gas at  $0^{\circ}\text{C}$  is compressed adiabatically half its volume. ( $R = 8.314 \text{J/mol.K}$ ,  $\gamma = 1.67$ ).

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. Each question carries **15** marks.

32. Derive an expression for workdone in isothermal and adiabatic process.
33. Explain with necessary diagram how the thermal conductivity of a poor conductor is determined by Lee's disc method.
34. With the help of indicator diagram explain the working of petrol engine. Calculate the efficiency of a petrol engine.
35. State Wien's displacement law. Explain the distribution of energy in black body spectrum. What are the results distribution curves.

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Chemistry**

**Complementary Course II for Physics / Geology**

**CH 1231.1/CH 1231.2 – PRINCIPLES OF CHEMISTRY II**

**(2013-2016 Admissions)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

**(Very Short Answer types questions)**

Answer **all**. Each questions carries **1** mark.

1. What are the different types of nuclear forces?
2. Write the nuclear equation for the emission of an alpha particle from  $\text{Th}^{232}$
3. Define roentgen.
4. Arrange UV, IR, MW, and Radio waves in the increasing order of wave number.
5. How is n/p ratio related to the stability of nucleus?
6. What is an adsorption indicator?
7. Explain the term precision with respect to analytical determination.

8. Sketch the conduct metric titration curve for acetic acid X sodium hydroxide.
9. What is meant by ionic mobility?
10. Discuss the meaning of most probable value related to an analytical result.

(10 × 1 = 10 Marks)

SECTION – B  
(Short Answer questions)

Answer **any eight** questions. Each carries **2** marks.

11. What is meant by permanganometry?
12. Name any two metal ion indicators.
13. Define Normality of an acid.
14. What is meant by ion conductance?
15. Give an explanation for the rusting of iron.
16. What is a concentration cell?
17. Define a normal mode of vibration.
18. Explain the rule of mutual exclusion.
19. Define chemical shift.
20. Explain spin- spin coupling.
21. Explain the term packing fraction
22. What is meant by artificial radioactivity?

(8 × 2 = 16 Marks)

SECTION – C  
(Short Essay question)

Answer any **six** questions. Each question carries **4** marks.

23. State and explain Geiger- Nuttal rule.
24. The activity  $C^{14}$  of a carbonaceous material found to be one fourth of a fresh sample. Calculate the age of the material if the half life period of  $C^{14}$  is 5730 years.
25. Describe the radio carbon dating technique.
26. calculate and compare the energies of two radiations, one with wavelength 600nm and other with wave length 900 nm.
27. The IR absorption peak of HBr is found to be 3770 nm. Calculate the force constant of the H Br bond.
28. What is Raman shift? Give the classical theory of Raman effect.
29. Write a note on conductometric titrations.
30. Calculate the EMF at 300K of the cell  $Zn(s)|Zn^{2+}(0.1M)||Cu^{2+}(0.1M)|Cu(s)$   
 $E^0 Zn/Zn^{2+}$  is  $-0.76V$  and  $E^0 Cu/Cu^{2+}$  is  $0.034V$ .
31. Distinguish between accuracy and precision in respect to analytical results.

(6 × 4 = 24 Marks)

SECTION – D  
(Long Essay Questions)

Answer any **two**. Each question carries **15** marks.

32. (a) Discuss the role and function of redox indicators in dichrometric titrations.
- (b) Discuss the quantum mechanical concept of Raman effect. Explain Stokes and antiStokes lines.

33. (a) Describe in detail how NMR spectroscopy can be used to distinguish benzene and phenol. (10)
- (b) Write a short note on radioactive series. (5)
34. (a) Explain the term ionic conductance. Discuss the Hittorf's method of determining transport numbers.
- (b) Write a note on neutron activation analysis.
35. (a) Discuss the biological effects of radiation giving emphasis to pathological and genetic damage.
- (b) Explain with an example each the role of stable isotope and radio isotopes as tracers.

(2 × 15 = 30 Marks)

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(Pages : 3)

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Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Chemistry**

**Foundation Course II**

**CH 1221 – METHODOLOGY AND PERSPECTIVES OF SCIENCES AND  
GENERAL INFORMATICS**

**(2013-2016 Admissions)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer in one sentences or two. Answer ALL questions.

1. What is a pi diagram?
2. What is the importance of models in science?
3. What is meant by Globalization in Science?
4. Define alchemy.
5. What are the two major contributions of Michel Faraday to science?
6. What is meant by plagiarism in science?
7. Explain MSDS.

P.T.O.

8. What is IPR in patents?
9. Explain SMILES of molecules.
10. Mention any two internet resources in chemistry.

(10 × 1 = 10 Marks)

### SECTION – B

Short answer

Answer **any eight** questions.

11. What is the difference between law and hypothesis?
12. What are the depositories of scientific information? Explain.
13. Differentiate between accuracy and precision.
14. What are the different branches of chemistry?
15. Explain the induction and deduction method in science.
16. What are the different communication networks used in education?
17. Mention the different file formats used in cheminformatics.
18. Explain the term copy right and patents.
19. Explain the necessity of units and dimensions in science.
20. What is INFLIBNET? What is it used for?
21. Mention any two structure drawing softwares in chemistry.
22. What is standard deviation?

(8 × 2 = 16 Marks)

## SECTION – C

### Short essay

Answer **any six** questions.

23. Explain the significance of simulations and virtual labs in science.
24. Discuss the different components of a chemistry project.
25. Explain QSAR.
26. Discuss the importance of Information technology in teaching and learning.
27. Explain any two statistical methods of data analysis.
28. Mention the different atom models and its draw backs.
29. Explain the Antony Lavoisier's contribution to modern chemistry.
30. Discuss the advantages of VIRTUAL LABS OF MHRD.
31. Explain the different choices of selection of instruments.

(6 × 4 = 24 Marks)

## SECTION – D

### Long essay.

Answer **any two** questions.

32. Explain the different steps involved in the design of science experiments.
33. Discuss the science strategies to meet the challenges in the twenty first century.
34. Explain the different stages of data handling in science.
35. Discuss the different stages of research in chemistry.

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, May 2020

First Degree Programme under CBCSS

Complementary Course for Chemistry/ Polymer Chemistry

MM 1231.2 : MATHEMATICS II- INTEGRATION, DIFFERENTIAL  
EQUATIONS AND ANALYTIC GEOMETRY

(2013 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – I

All the first ten questions are compulsory. They carry 1 mark each.

1. Integrate  $\cos 3x \sin x$ .
2. Solve  $y(1+x)dx + x(1+y)dy = 0$ .
3. Solve  $y'' + 5y' + 6y = 0$ .
4. Solve  $\frac{dy}{dx} + \frac{y}{x} = 0$ .
5. Find the particular integral of  $y'' + 4y' + 4y = e^{3x}$ .
6. Find the equation of the ellipse whose major axis is 6 and minor axis is 4.

7. Suppose that a particle moves on a coordinate line so that its velocity at time 't' is  $V(t) = t^2 - 2t$  m/s. Find the displacement of the particle during the interval  $[0,3]$ .
8. State the reflection property of ellipse.
9. What is the equation of an asymptote, to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ .
10. Find the average value of the function  $f(x) = \sqrt{x}$  over the interval  $[1,4]$ .

**(10 × 1 = 10 Marks)**

### SECTION – II

Answer **any eight** questions from among the question 11 to 22. These questions carry **2** marks each.

11. Find the new co-ordinates of the point (2,4) if the coordinate axes are rotated through an angle of  $\theta = 30^\circ$ .
12. Find the relation connecting rectangular and cylindrical co-ordinates.
13. Suppose that a point moves along some unknown curve  $y = f(x)$  in the  $xy$ - plane in such a way that at each point  $(x, y)$  on the curve, the tangent line has slope  $x^2$ . Find an equation for the curve given that it passes through the point (2,1).
14. Use the discriminant to identify the graph of  $8x^2 - 3xy + 5y^2 - 7x + 6 = 0$ .
15. State the focus-directrix property of conics.
16. Derive the equation of a rectangular hyperbola using the fact that its axes are in equal length and hence show that its asymptotes are at right angles.
17. What do you mean by an operator and operational methods?
18. What is the general form of second-order linear differential equation? When we say that it is homogeneous?
19. Find the point of intersection of the tangents at  $t_1$  and  $t_2$  the parabola  $y^2 = 4ax$ .

20. Find a polar equation in the form  $r \cos(\theta - \theta_0) = r_0$  for the line  $\sqrt{3}x - y = 1$ .
21. Prove that the tangents at the extremities of a diameter of the ellipse are parallel to the diameter conjugate to it.
22. Find the latus rectum of the hyperbola  $9x^2 - 16y^2 = 144$ .

(8 × 2 = 16 Marks)

### SECTION – III

Answer **any six** questions from among the question 23 to 31. These questions carry 4 marks each.

23. Find the arc length of the curve  $y = x^{\frac{3}{2}}$  from (1,1) to  $(2, 2\sqrt{2})$ .
24. Find the entire area of the cardioid  $r = 1 - \cos \theta$ .
25. Describe the graph of the equation  $y^2 - 8x - 6y - 23 = 0$ .
26. State the Kepler's law.
27. Find the equation of the hyperbola with vertices  $(0, \pm 8)$  and asymptotes  $y = \pm \frac{4}{3}x$ .
28. Evaluate  $\int_0^2 \int_0^3 xy(x-y)dy dx$ .
29. Find the equation of the hyperbola passing through the point (1,-1) and having the lines  $x + 2y + 3 = 0$  and  $3x + 4y + 5 = 0$  for asymptotes.
30. Find the area under the curve  $y = \log x$  between the x-axis and the ordinates at  $x = a$  and  $x = b$  given that  $1 < a < b$ .
31. Sketch the graph of  $r = \frac{2}{1 - \cos \theta}$  in polar co-ordinates.

(6 × 4 = 24 Marks)

## SECTION – IV

Answer **any two** questions from among the question 32 to 35. These questions carry **15** marks.

32. (a) Find the area of the region that is enclosed between the curves  $y = x^2$  and  $y = x + 6$ . Also sketch the region bounded by the area.
- (b) Find the area of the surface that is generated by revolving the portion of the curve  $y = x^3$  between  $x = 0$  and  $x = 1$  about the x-axis.
33. (a) Find the condition that the line  $y = mx + c$  touch the parabola  $y^2 = 4ax$ .
- (b) Find the locus of the point of intersection of perpendicular tangents to the parabola  $y^2 = 4ax$ .
34. (a) Evaluate the triple integral  $\iiint 12xy^2z^3 dV$  over the rectangular box defined by the inequalities  $-1 \leq x \leq 2$ ,  $0 \leq y \leq 3$ ,  $0 \leq z \leq 2$ .
- (b) Use a triple integral to find the volume of the solid within the cylinder  $x^2 + y^2 = 9$  and between the planes  $z = 1$  and  $x + z = 5$ .
35. (a) Find the orthogonal trajectories of the family of parabolas  $y^2 = 4a(x + a)$ , where  $a$  is the parameter. Prove that it is self-orthogonal?
- (b) Solve  $(D^2 + 9)y = \cos 4x$

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Physics**

**Complementary Course**

**PY 1231.2 – THERMAL PHYSICS**

**(For Chemistry and Polymer Chemistry)**

**(2013-2017 Admission)**

Time : 3 Hours

Max. Marks : 80

**PART – A**

Answer **all** the questions. Answer should not exceed two sentences. Each question carries **1** mark.

1. State Fick's law.
2. Define coefficient of diffusivity.
3. State Wien's displacement law.
4. Name the three types of propagation of heat.
5. What is a blackbody?
6. State Planck's law of radiation.

7. Define isothermal process.
8. What do you mean by phase transition?
9. How entropy is related to the disorder of a system?
10. Write the equation for efficiency of a Carnot's engine.

(10 × 1 = 10 Marks)

### PART – B

Answer **any eight** questions. Answer should not exceed one small paragraph. Each question carries **2** marks.

11. Differentiate between thermal conductivity and thermal diffusivity.
12. Define the terms temperature gradient of a material. Write its expression.
13. State Wiedemann-Franz law.
14. State and explain Kirchhoff's law of radiation.
15. Define solar constant.
16. State the first law of thermodynamics. State the significance and limitations of first law of thermodynamics.
17. What is heat engine? Write the expression for its efficiency.
18. Distinguish between first order and second order phase transitions.
19. Write a note on super fluidity of liquid helium.
20. Draw the IS diagram for a Carnot's engine.
21. State the second law of thermodynamics in terms of entropy.
22. Define an adiabatic process. How much is the change in entropy in an adiabatic process?

(8 × 2 = 16 Marks)

## PART – C

Answer **any six** questions. Each question carries **4** marks.

23. Discuss the transport of mass in a gas system by self-diffusion phenomena and derive the equation for the coefficient of diffusion.
24. Discuss the Lee's disc method for determination of thermal conductivity of bad conductors.
25. Two thin concentric spherical shells of radii 5 cm and 10 cm respectively have their annular cavity filled with charcoal powder. When heat energy is supplied at the rate of 10.5 Watt to a heater at the centre, a temperature difference of  $60^{\circ}\text{C}$  is setup between the shells. Find the thermal conductivity of Charcoal.  $1\text{ cal} = 4.2\text{ joule}$ .
26. Calculate the temperature at the surface of sun from the following data.  
Stefans constant =  $1.37 \times 10^{-12}\text{ cal/cm}^2/\text{s}$ , solar constant =  $2.3\text{ cal/cm}^2/\text{min}$ ,  
Radius of the sun =  $7 \times 10^{10}\text{ cm}$ , distance from sun to earth =  $1.5 \times 10^{13}\text{ cm}$
27. Compare the radiant emittance of a blackbody at 200K and 2000K. Given that the  $\sigma = 5.672 \times 10^{-8}\text{ SI units}$ .
28. Find the efficiency of a Carnot's engine working between ice point and steam point.
29. Derive the relation between isothermal and adiabatic elasticity.
30. Calculate the change in entropy when 10 g of water at  $60^{\circ}\text{C}$  is mixed with 30 g of water at  $20^{\circ}\text{C}$ .
31. Calculate the change in entropy when 10 grams of ice at  $0^{\circ}\text{C}$  is converted into water at the same temperature. Given that the latent heat of ice is  $80\text{ cal/g}$ .  $1\text{ cal} = 4.2\text{ joule}$ .

(6 × 4 = 24 Marks)

## PART – D

Answer **any two** questions. Each question carries **15** marks.

32. Derive an expression for the heat conduction through a cylindrical shell.
33. Derive the expression for the Rayleigh-Jeans formula of Blackbody radiation and explain its limitations. Derive the Planck's formula for Blackbody Radiation.
34. Explain the principle of working of a Diesel engine. Derive the expression for its efficiency. Comment on the efficiency of a diesel engine.
35. Derive the expression for change in entropy in a reversible process. Compare the change in entropy of reversible and irreversible processes.

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020****First Degree Programme Under CBCSS****Complementary Course for Mathematics****ST 1231.1-RANDOM VARIABLES AND ANALYSIS OF BIVARIATE DATA****(2014-17 Admissions)**

Time 3 Hours

Max. Marks : 80

**SECTION – A**Answer **all** questions each carry 1 mark

1. State the conditions for a function  $f(x)$ ,  $x \in R$ , a continuous random variable, to be a probability function.
2. How you find the distribution function of a discrete random variable with probability mass function  $f(x)$ ,  $x \in X$ .
3. If  $f(x) = e^{-x}$ ,  $x \geq 0$ , Find the pdf of  $Y = -3x + 7$ .
4. Define expectation of a discrete random variable.
5. Define characteristic function of a random variable.
6. Give the expression for Karl Pearson coefficient of correlation.
7. Define mgf of a random variable.

8. An unbiased coin is tossed 4 times in succession. If  $X$  denote the number of heads turns up, find  $E(X)$ .
9. Define Rank correlation.
10. Write the normal equations for fitting a straight line  $Y = aX + b$  based on 10 observations.

(10 × 1 = 10 Marks)

### SECTION – B

Answer any **eight** questions each carry 2 marks.

11. Differentiate discrete and continuous random variables

12. If the distribution function of a random variable is  $F(x) = \begin{cases} 0 & \text{if } x < 0 \\ x & \text{if } 0 \leq x \leq 1 \\ 1 & \text{if } x > 1 \end{cases}$ . Find

$$P(2x + 3 \leq 3.6).$$

13. Check whether  $f(x) = \begin{cases} \frac{1}{2} & \text{if } x = 1 \\ \frac{2}{3} & \text{if } x = 0 \\ \frac{1}{4} & \text{if } x = 2 \end{cases}$  is a probability function.

14. Draw the graph of the distribution function of a continuous random variable  $X$  with probability function  $f(x) = x/2$ ,  $0 \leq x \leq 2$ .

15. If  $X$  and  $Y$  are 2 random variables and  $a$  and  $b$  constants Find  $E(aX + bY)$ .

16. Define characteristic function of a random variable.

17. Define raw moments and central moments of a random variable.

18. Give the expression for variance and covariance in terms of expectation.
19. What is the principle of least squares?
20. Establish the relation between regression coefficient and correlation.
21. The regression lines of  $Y$  on  $X$  and  $X$  on  $Y$  are  $Y = aX + b$  and  $X = cY + d$ . Find means of  $X$  and  $Y$ .
22. What is the relation between the sign of regression coefficient and correlation coefficient?

**(8 × 2 = 16 Marks)**

### SECTION – C

Answer any six questions. each carry 4 marks.

23. A discrete random variable has the following probability function.

|        |     |      |      |      |      |       |       |       |       |
|--------|-----|------|------|------|------|-------|-------|-------|-------|
| $X$    | 0   | 1    | 2    | 3    | 4    | 5     | 6     | 7     | 8     |
| $P(X)$ | $a$ | $3a$ | $5a$ | $7a$ | $9a$ | $11a$ | $13a$ | $15a$ | $17a$ |

Find (1) Value of  $a$  (2)  $P(X < 3)$ .

24. Define (1) joint probability density function (2) joint density mass function (3) conditional probability density function (4) marginal probability mass function.
25. State and prove multiplication theorem of expectation.
26. Three coins are tossed let  $X$  denote the number of heads on the first 2 coins,  $Y$  denote the number of tails on the last 2 coins. Find joint distribution of  $X$  and  $Y$ .
27. State and prove Cauchy- Schwartz inequality.
28. Explain the fitting of a straight line  $Y = aX + b$  using a bivariate data set.
29. Show that the moment generating function of the sum of a number of independent random variables is equal to the product of their respective moment generating functions.

30.  $P(X = x) = 1/2^x, x = 1, 2, 3, \dots$  Find its moment generating function.
31. Comment on the statement  $8x - 10y + 66 = 0$  is the regression equation of  $X$  on  $Y$  and  $40X - 18y = 214$  is the regression equation of  $Y$  on  $X$ .

**(6 × 4 = 24 Marks)**

### SECTION – D

Answer any **two** questions. each carry **15** marks.

32. If  $f(x, y) = (2x + 3y)/72, x = 0, 1, 2, y = 1, 2, 3$  is the joint pdf find (1) Distribution of  $X + Y$  (2) Conditional distribution of  $X$  given  $X + Y = 3$  (3) Examine whether  $X$  and  $Y$  are independent.
33. The joint density function of two random variables  $X$  and  $Y$  is  $f(x, y) = x + y, 0 < x < 1, 0 < y < 1$  Find (1) The correlation between  $X$  and  $Y$  (2) Obtain the conditional mean and conditional variance of  $X$  given  $Y = y$ .
34. (1) What is meant by curve fitting (2) Derive formulae for Spearman's rank correlation coefficient. (3) The ranks of 16 students in two subjects are given in order  
 $(1, 1), (2, 10), (3, 3), (4, 4), (5, 5), (6, 7), (7, 2), (8, 6), (9, 8), (10, 11), (11, 15), (12, 9), (13, 14), (14, 12), (15, 16), (16, 13)$  Calculate rank correlation coefficient.
35. For 10 observations on price ( $X$ ) and supply ( $Y$ ) following data were obtained  
 $\sum X = 130, \sum Y = 220, \sum X^2 = 2288, \sum Y^2 = 5506$  and  $\sum XY = 3467$ . Obtain (1) The line of regression of  $Y$  on  $X$  (2) The line of Regression of  $X$  on  $Y$  (3) Estimate the supply when the price is 16 units.

**(2 × 15 = 30 Marks)**

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, May 2020

First Degree Programme under CBCSS

Complementary Course for Physics

MM 1231.1 — MATHEMATICS II – INTEGRATION AND VECTORS

(2014-2017 Admissions)

Time : 3 Hours

Max. Marks : 80

## SECTION – I

**All** the first **ten** questions are compulsory. They Carry **1** mark each.

1. Evaluate  $\int \frac{\cos x}{\sin^2 x} dx$ .
2. Suppose that a particle moves on a coordinate line so that its velocity at time  $t$  is  $v(t) = \sin t$  m/s. Find the distance traveled by the particle during the time interval  $0 \leq t \leq \frac{\pi}{2}$ .
3. Define average value of a function.
4. Find the area under the curve  $y = \frac{1}{(3x + 1)^2}$  over the interval  $[0, 1]$ .

5. Write the formula for finding the arc length of the smooth curve  $y = f(x)$  over  $[a, b]$ .
6. Find the domain of the vector valued function  $\vec{r}(t) = \cos \pi t \hat{i} - \ln t \hat{j} + \sqrt{t-2} \hat{k}$ .
7. Find the unit tangent vector to the graph of  $\vec{r}(t) = t^2 \hat{i} + t^3 \hat{j}$  at the point where  $t = 2$ .
8. Define the curl of the vector field.
9. Sketch the vector field  $\vec{F}(x, y) = \frac{x\hat{i} + y\hat{j}}{\sqrt{x^2 + y^2}}$  by drawing some representative of non-intersecting vectors.
10. State the Fundamental Theorem of Work Integrals.

## SECTION – II

Answer any **eight** questions from among the questions 11 to 22. These questions carry **2** marks each.

11. Suppose that a point moves along a curve  $y = f(x)$  in the  $xy$  – plane in such a way that at each point  $(x, y)$  on the curve the tangent line has slope  $-\sin x$ . Find an equation for the curve, given that it passes through the point  $(0, 2)$ .
12. A ball is hit directly upward with an initial velocity of 49 m/s and is struck at a point that is 1 m above the ground. Assuming that the free-fall model applies, how high will the ball travel?

13. Suppose that a particle moves with acceleration  $a(t) = \frac{1}{\sqrt{5t+1}} \text{ m/s}^2$  along  $x$ -axis and has velocity  $v_0 = 2 \text{ m/s}$  at time  $t = 0$ . Find the displacement and the distance traveled by the particle during the time interval  $0 \leq t \leq 3$ .
14. Find the average value of the function  $f(x) = \frac{\cos(\pi/x)}{x^2}$  over the Interval  $[1, 3]$ .
15. A particle moves through 3-space in such a way that its velocity is  $\mathbf{v}(\bar{t}) = \hat{i} + t\hat{j} + t^2\hat{k}$ . Find the coordinates of the particle at time  $t = 1$  given that the particle at the point  $(-1, 2, 4)$  at time  $t = 0$ .
16. Find the volume of the solid generated when the region enclosed by  $y = \sqrt{x}, y = 2$  and  $x = 0$  is revolved about the  $y$ -axis.
17. Use polar coordinates to evaluate  $\iint_R e^{-(x^2+y^2)} dA$ , where  $R$  is the region enclosed by the circle  $x^2 + y^2 = 1$ .
18. Find the arc length parametrization of the circular helix  $\bar{r} = \cos t\hat{i} + \sin t\hat{j} + t\hat{k}$  that has reference point  $\bar{r}(\bar{0}) = (1, 0, 0)$  and the same orientation as the given helix.
19. Using vector equation of the ellipse  $\frac{x^2}{4} + \frac{y^2}{9} = 1$ , find the curvature of the ellipse at the end points of the major and minor axes. Deduce the curvature of the circle.
20. Suppose that the speed of a particle at time  $t$  be  $\|\mathbf{v}(\bar{t})\| = \sqrt{3t^2 + 4}$ . Find the scalar tangential component of acceleration at time  $t = 2$ .

21. Find the directional derivative of  $f(x, y) = e^{xy}$  at  $(-2, 0)$  in the direction of the unit vector that makes an angle of  $\frac{\pi}{3}$  with the positive  $x$ -axis.
22. Find the work done by the force field  $\vec{F}(x, y) = xy\hat{i} + x^2\hat{j}$  on a particle that moves along the curve  $x = y^2$  from  $(0, 0)$  to  $(1, 1)$ .

### SECTION – III

Answer **any six** questions from among the questions 23 to 31. These questions carry **4 marks each**.

23. A car that has stopped at a toll booth leaves the booth with a constant acceleration of  $2 \text{ ft/s}^2$ . At the time the car leaves the booth it is 5000 ft behind a truck traveling with a constant velocity of 50 ft/s. How long will it take for the car to catch the truck and how far will the car be from the toll booth at that time.
24. Sketch the region enclosed by the curves  $x^2 = y$ ,  $x = y - 2$  and find its area.
25. Prove that (i)  $\nabla \|\vec{r}\| = \frac{\vec{r}}{\|\vec{r}\|}$  and (ii)  $\nabla \frac{1}{\|\vec{r}\|} = -\frac{\vec{r}}{\|\vec{r}\|^3}$ .
26. Use double integral to find the volume of the solid that is bounded above by the plane  $z = 4 - x - y$  and below by the rectangle  $R = [0, 1] \times [0, 2]$ .
27. Evaluate  $\int_0^2 \int_{y/2}^1 \cos(x^2) dx dy$  by changing the order of integration.
28. Use cylindrical coordinates to find the volume of the solid enclosed by the paraboloid  $z = x^2 + y^2$  and the plane  $z = 9$ .

29. A shell is to be fired from ground level at an elevation angle of  $30^\circ$ . What should be the muzzle speed be in order for the maximum height of the shell to be 2500 ft.

30. Show that the divergence of the inverse square field

$$\vec{F}(x, y, z) = \frac{c}{(x^2 + y^2 + z^2)^{3/2}} (x\hat{i} + y\hat{j} + z\hat{k}) \text{ is zero.}$$

31. Evaluate the line integral  $\int_C (xy + z^3) ds$  from  $(1, 0, 0)$  to  $(-1, 0, \pi)$  along the helix  $C$  that is represented by the parametric equation  $x = \cos t$ ,  $y = \sin t$ ,  $z = t$  ( $0 \leq t \leq \pi$ ).

#### SECTION – IV

Answer **any two** questions from among the questions 32 to 35. These questions carry **15 marks each**.

32. (a) Find the area of the region enclosed by the curves  $y = 2 + |x - 1|$  and  $y = -\frac{1}{5}x + 7$ . (7)

(b) Find the area of the surface that is generated by revolving the portion of the curve  $y = x^3$  between  $x = 0$  and  $x = 1$  about the  $x$ -axis. (8)

33. (a) Evaluate  $\iiint_G y dV$  where  $G$  is the solid enclosed by the plane  $z = y$ , the  $xy$ -plane and the parabolic cylinder  $y = 1 - x^2$ . (8)

(b) Find the total arc length of the cardioid  $r = 1 + \cos \theta$ . (7)

34. (a) Show that the force field  $\vec{F}(x, y) = 2xy^3\hat{i} + 3x^2y^2\hat{j}$  is conservative in any open connected region containing the points  $P(-3, 0)$  and  $Q(4, 1)$  and then find the work done by the force field on a particle moving along any smooth curve in the region from  $P$  to  $Q$ . (8)

(b) Evaluate the surface integral  $\iint_G \sigma xz dS$  where  $\sigma$  is the part of the plane  $x + y + z = 1$  that lies in the first octant (7)

35. Use the Divergence theorem to find the outward flux of the vector field  $\vec{F}(x, y, z) = x^3\hat{i} + y\hat{j} + z^3\hat{k}$  across the surface of the region that is enclosed by the hemisphere  $z = \sqrt{a^2 - x^2 - y^2}$  and the plane  $z = 0$ .

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, May 2020

First Degree Programme under CBCSS

Complementary Course for Chemistry / Polymer Chemistry

MM 1231.2 : MATHEMATICS – II – INTEGRATION, DIFFERENTIAL  
EQUATIONS AND ANALYTIC GEOMETRY

(2014 – 2017 Admissions)

Time : 3 Hours

Max. Marks : 80

## SECTION – I

All the first ten questions are compulsory. They carry 1 mark each.

1. Evaluate  $\int x^3 \sqrt{x} dx$ .
2. Suppose that the position function of a particle moving along a coordinate line is  $s(t) = \frac{3}{4}t^4 + 2t$ . Find the average velocity of the particle over the time interval  $1 \leq t \leq 4$ .
3. A particle moves with acceleration  $a(t) = -3t \text{ m/s}^2$  and has velocity  $v_0 = 0 \text{ m/s}$  at time  $t = 0$ . Find the speed of the particle at time  $t = 1$ .
4. Solve  $xy' + y = 0$ .
5. Find an integrating factor for the differential equation  $xdy - ydx = 0$ , so that it becomes exact.
6. Find a general solution of  $2y'' - 9y' = 0$ .

7. Define conic section.
8. Identify the curve  $x^2 + 4x + 4y + 16 = 0$ .
9. What is the eccentricity of the ellipse  $2x^2 + 3y^2 = 6$ ?
10. State the reflection property of a hyperbola.

## SECTION – II

Answer **any eight** questions from among the questions 11 to 22. These questions carry **2** marks each.

11. A projectile is fired vertically upwards with an initial velocity of 49 m/s from a tower of 150 m high. How long will it take the projectile to reach its maximum height? What is the maximum height?
12. Find the area of the region enclosed by the curves  $y = x^2$  and  $y = 4x$ .
13. Derive the formula for the volume of a sphere of radius  $r$ .
14. Find the arc length of the curve  $y = x^2$  from  $x = 0$  to  $x = 2$ .
15. Solve  $e^x dx - y dy = 0$ ,  $y(0) = 1$ .
16. Solve  $xy' = y + x$ .
17. Find a general solution of  $y'' - 3y' + 4y = 0$ .
18. Obtain the particular integral of the equation  $y'' = 9x^2 + 2x - 1$ .
19. Find the equation of the ellipse whose foci are  $(\pm 2, 0)$  and eccentricity  $= \frac{1}{2}$ .
20. A hyperbola has for its asymptotes the straight lines  $2x - y - 3 = 0$  and  $3x + y - 7 = 0$  and passes through the point  $(1, 1)$ . Find the equation of the conjugate hyperbola.

21. Find the equations to the directrices of the ellipse  $5x^2 + 9y^2 = 45$ .
22. Find the condition that the line  $y = mx + c$  to be a tangent to the parabola  $y^2 = 4ax$ .

### SECTION – III

Answer **any six** questions from among the questions **23 to 31**. These questions carry **4** marks each.

23. Evaluate the iterated integral  $\int_0^2 \int_0^{\sqrt{2x-x^2}} \sqrt{(x^2 - y^2)} dy dx$  by converting to polar coordinates.
24. Obtain the area of the surface generated by revolving the semicircle  $x = \cos t$ ,  $y = \sin t$ ,  $0 \leq t \leq \pi$ , about the  $x$ -axis.
25. Evaluate the triple integral  $\iiint_G e^{2x+y-z} dV$  where  $G$  is the set of points satisfying  $0 \leq x \leq 1$ ,  $0 \leq y \leq \ln 3$ ,  $0 \leq z \leq \ln 2$ .
26. Solve  $(x + 2y - 3)dx - (2x - y + 1)dy = 0$ .
27. Obtain the general solution of  $y' + y \tan x = y^3 \sec x$ .
28. Solve  $y'' + 4y' + 8y = \sin x$ ,  $y(0) = 1$ ,  $y'(0) = 0$ .
29. Find the coordinates of the centre, foci and the equations to the directrices of the ellipse  $9x^2 + 25y^2 - 18x - 100y - 116 = 0$ .
30. Describe the graph of the equation  $x^2 - y^2 - 4x + 8y - 21 = 0$ .
31. Prove that three normals can be drawn to a parabola from any point in its plane.

## SECTION – IV

Answer **any two** questions from among the questions **32 to 35**. These questions carry **15 marks** each.

32. (a) Use double integral in polar coordinates to find the area of the region enclosed by the Cardioid  $r = 1 - \cos\theta$ .
- (b) Use spherical coordinates to find the volume of the solid enclosed by the sphere  $x^2 + y^2 + z^2 = 4$  and the planes  $z = 0$  and  $z = 1$ .
33. (a) Obtain the orthogonal trajectory of coaxial circles  $x^2 + y^2 + 2gx + C = 0$  where  $g$  is the parameter.
- (b) Solve  $\frac{d^3y}{dx^3} - \frac{d^2y}{dx^2} - 6\frac{dy}{dx} = x^2 + a^2 \sin x$ .
34. (a) Find the equation of the hyperbola whose vertices are  $(2,4)$ ,  $(10,4)$  and foci are 10 units apart.
- (b) Obtain a condition for the line  $y = mx + c$  is a normal to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .
35. (a) A planet has eccentricity  $e = 0.249$  and semi major axis  $a = 39.5$  AU.
- (i) Find equation of its orbit in polar coordinate system
- (ii) Find the period  $T$  in years
- (iii) Find the perihelion and aphelion distances.
- (b) Find the eccentricity and distance from the pole to the directrix and sketch the graph of  $r = \frac{6}{2 + \cos\theta}$ .

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Chemistry**

**Foundation Course II**

**CH 1221 – METHODOLOGY AND PERSPECTIVES OF SCIENCES AND  
GENERAL INFORMATICS**

**(2017 Admission onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions. Answer in one word/sentence. Each question carries **1** mark.

1. What is co-precipitation?
2. What are carcinogenic substances?
3. What do you meant by cyber crime?
4. Mention about precision of data.
5. What do you meant by virtual testing in chemistry?
6. What is the early form of chemistry?
7. What do you meant by knowledge management?

8. Name any two educational softwares.
9. Write the name of two toxic chemicals used in chemistry laboratory.
10. What are variables?

(10 × 1 = 10 Marks)

### SECTION – B

(Short answer type)

Answer **any eight** questions from the following. Each question carries **2** marks.

11. What are adsorption indicators?
12. Discuss about the toxicity of inorganic reactants.
13. What are molecular visualization tools?
14. Define the terms correlation and causality.
15. Briefly discuss about the importance of models in chemistry.
16. What is the Contribution of Antoine Lavoisier in the revolution in chemistry?
17. What is the scope of chemical science?
18. What do you meant by Plagiarism?
19. Briefly discuss about the precipitation of IV group cations.
20. What is common ion effect?
21. What is post-precipitation?
22. Write a note on a chemical which is skin irritant.

(8 × 2 = 16 Marks)

## SECTION – C

(Short essay type)

Answer **any six** questions from the following. Each question carries **4** marks.

23. What do you mean by solubility product?
24. Discuss about the theory of complexometric titration.
25. Discuss about internet as a knowledge repository.
26. How will you prepare projects using computers?
27. Write a note on revision of scientific theories and laws.
28. What is the background and thought of John Dalton on atom?
29. Write short notes on units and dimensions.
30. What are the features of modern personal computer?
31. What is the use of IT in teaching learning process?

(6 × 4 = 24 Marks)

## SECTION – D

(Essay type)

Answer **any two** questions from the following. Each question carries **15** marks.

32. (a) What do you mean by chromatography? What are the types of partition chromatography?  
(b) Discuss about the theory of redox and metallochromic indicators.
33. (a) What are the steps involved in gravimetric analysis?  
(b) What are the basic concepts of IPR, copy right and patents?

34. (a) How will you analyze experimental data by statistical methods?
- (b) What are the major contributions of Friedrich Wohler and Mendeleev on atom models?
35. (a) What are the basis for scientific laws and factual truths?
- (b) Explain about the lab safety- regulatory requirements.

(2 × 15 = 30 Marks)

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St. Xavier's College

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Chemistry**

**Complementary Course**

**CH 1231.1/CH 1231.2 – Physical Chemistry – I**

**(Common for Physics and Geology)**

**(2017 admn onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

(Answer **all** questions. Each question carries **1** mark)

1. What is an *Arrhenius* acid?
2. What is meant by Gibb's free energy?
3. Define entropy.
4. What is common ion effect?
5. What is standard enthalpy of combustion?
6. State Le Chatlier principle.
7. Write the relationship between  $\Delta G^\circ$  and  $K_p$ .

8. Define bond energy.
9. What is standard enthalpy of neutralisation?
10. What is enthalpy of a system?

(10 × 1 = 10 Marks)

### SECTION – B

(Answer **any eight** questions Each question carries **2** marks)

11. Define the term equilibrium constant.
12. What is meant by leveling effect?
13. Why  $\text{HNO}_3$  behaves as weak acid in acetic acid?
14. Calculate the  $\text{pH}$  of  $0.0001\text{M}$   $\text{HNO}_3$  solution.
15. Define  $C_p$  and  $C_v$ .
16. Calculate the change in entropy when 10 moles of an ideal gas expands reversibly from a volume of  $10\text{dm}^3$  to  $100\text{dm}^3$  at  $27^\circ\text{C}$ .
17. State second law of thermodynamics.
18. Equilibrium constant for a reaction is 3.0 at  $400^\circ\text{C}$  and 4.0 at  $500^\circ\text{C}$ . Calculate  $\Delta H^\circ$  for the reaction. ( $K = 1.987\text{ cal deg}^{-1}\text{ mol}^{-1}$ )
19. What is the effect of change of pressure on the reaction involving combination of nitrogen and hydrogen to form ammonia?
20. Calculate the enthalpy change for the transition of graphite to diamond. (Standard enthalpies of combustion for graphite and diamond are  $-393.5\text{ kJ mol}^{-1}$  and  $-395.4\text{ kJ mol}^{-1}$  respectively)
21. What are conjugate acids? Give an example.
22. Explain the term salt hydrolysis with a suitable example.

(8 × 2 = 16 Marks)

## SECTION – C

Answer **any six** questions. Each question carries **4** marks)

23. Calculate the hydrolytic constant and degree of hydrolysis of  $\text{CH}_3\text{COONH}_4$  in a 0.1M solution at 298K.

$$(K_b \text{ for } \text{NH}_4\text{OH} = 1.81 \times 10^{-5}; K_a \text{ for } \text{CH}_3\text{COOH} = 1.75 \times 10^{-5} \text{ } K_w = 1 \times 10^{-14}).$$

24. Explain the solvent effect on the strength of an acid with suitable examples.
25. Derive Gibb's Helmholtz equation. Explain its significances.
26. One mole of an ideal gas expands against a constant pressure of 1 atm from a volume of  $10 \text{ dm}^3$  to a volume of  $30 \text{ dm}^3$  and absorbs 1.5 kJ of thermal energy from its surroundings.

Calculate  $\Delta U$  for the process in joules.

27. Two moles of  $\text{PCl}_5$  were introduced in 2L flask and heated to  $250^\circ\text{C}$  to establish equilibrium when 60% of  $\text{PCl}_5$  was dissociated into  $\text{PCl}_3$  and  $\text{Cl}_2$ . Calculate the equilibrium constant.
28. Discuss the limitations of 1<sup>st</sup> law of thermodynamics.
29. State and explain the law of mass action.
30. State and explain Kirchoff's equation.
31. Establish the relationship between  $q_p$  and  $q_v$  for the formation of ammonia through Haber process, assuming ideal nature for the gaseous reactants and products.

(6 × 4 = 24 Marks)

## SECTION – D

(Answer **any two** questions. Each question carries **15** marks)

32. (a) Derive van't Hoff's equation.
- (b) Derive the relationship between  $K_p$  and  $K_c$ .
- (c) The equilibrium constant of a reaction doubles on rising the temperature from  $30^\circ\text{C}$  to  $40^\circ\text{C}$ . Calculate  $\Delta H^\circ$  for this reaction.
33. (a) Derive the relationship between the molar heat capacity of a gas at constant volume and constant pressure.
- (b) Define
- (i) Intrinsic energy
  - (ii) Gibb's free energy
  - (iii) Available work
34. (a) Write a brief note on buffer solutions
- (b) Derive Henderson's equation for the pH of an acidic buffer
- (c) What are the applications of Henderson's equation.
35. Discuss about Hess's law and its applications.

(2 × 15 = 30 Marks)

Reg. No. : .....

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**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Mathematics**

**Foundation Course – II**

**MM 1221 : FOUNDATIONS OF MATHEMATICS**

**(2018 Admission onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – I**

All the **first ten** questions are compulsory. They carry **1** mark each.

1. Define conjunction.
2. What is a biconditional statement?
3. Define contradiction.
4. Give an example of a tautology.
5. Prove that empty set is a subset of any set  $A$ .
6. Find the curve represented by the parametric equation  $x = t^2, y = t^3$ .
7. Write the arc length formula for parametric curves.
8. Define a parabola.
9. Find the distance  $d$  between the points  $(2, 3, -1)$  and  $(4, -1, 3)$ .
10. Define orthogonal projection of  $v$  on  $e$ .

## SECTION – II

Answer **any eight** questions from among the questions 11 to 22. These questions carry **2** marks each.

11. Find the antecedent and consequent in the following statement. "You can work here only if you have a college degree."
12. Determine the truth value of the statement  $\forall x \exists y \ni x + y = 3$ . Justify.
13. Prove that  $|x| \geq 0, \forall x$ .
14. Prove that  $A \cup (U \setminus A) = U$ .
15. Define injective and surjective function. Give example for each.
16. If  $f(x) = \sin x$  is a function defined on  $\mathbf{R}$ . Find  $f([0, \pi])$  and  $f([0, 8\pi])$ .
17. Sketch the curve whose parametric equation is  $x = \cos t, y = \sin t$ .
18. Find parametric equations for a circle of radius 2, centered at (3, 5).
19. Find the rectangular coordinates of the point  $P$  whose polar coordinates are  $(r, \theta) = (6, 2\pi/3)$ .
20. Find the unit vector that has the same direction as  $v = 2i + 2j - k$ .
21. Find the angle between the vector  $u = i - 2j + 2k$  and  $v = -3i + 6j + 2k$ .
22. Let  $u = \langle 1, 2, -2 \rangle$  and  $v = \langle 3, 0, 1 \rangle$ . Find
  - (a)  $u \times v$
  - (b)  $v \times u$ .

### SECTION – III

Answer **any six** questions from among the questions 23 to 31. These questions carry **4 marks each**.

23. Prove that "If  $7m$  is an odd number then  $m$  is an odd number".
24. Which of the following statements are true? Justify
  - (a) If  $m^2 > 0$  then  $m > 0$
  - (b) If  $m > 0$  then  $m^2 > 0$ .
25. Prove that  $[(p \wedge \sim q) \Rightarrow c] \Leftrightarrow (p \Rightarrow q)$  is a tautology.
26. Find polar coordinates of the point  $P$  whose rectangular coordinates are  $(-2, -2\sqrt{3})$ .
27. Sketch the graph of  $r = \theta (\theta \geq 0)$  in polar coordinates by plotting points.
28. State symmetry test.
29. State any four rules of vector arithmetic.
30. Find the direction cosines of the vector  $v = 2i - 4j + 4k$ , and approximate the direction angles to the nearest degree.
31. Find the angle between a diagonal of a cube and one of its edges.

### SECTION – IV

Answer **any two** questions from among the questions 32 to 35. These questions carry **15 marks each**.

32. Explain in detail any five proof techniques.
33.
  - (a) Prove that the subset of a countable set is countable.
  - (b) Prove that the set of all real numbers is uncountable.

34. In a disastrous first flight, an experimental paper airplane follows the trajectory of the particle having parametric equation  $x = t - 3 \sin t$ ,  $y = 4 - 3 \cos t$  ( $t \geq 0$ ); but crashes into a wall at time  $t = 10$ .
- (a) At what times was the airplane flying horizontally?
- (b) At what times was it flying vertically?
35. (a) Find the distance  $D$  between the point  $(1, -4, -3)$  and the plane  $2x - 3y + 6z = -1$ .
- (b) Describe the surface  $4x^2 + 4y^2 + z^2 + 8y - 4z = -4$ .
- (c) Find equations of the paraboloid  $z = x^2 + y^2$  in cylindrical and spherical coordinates.
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Reg. No. : .....

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**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Complementary Course for Mathematics**

**ST 1231.1 — PROBABILITY AND RANDOM VARIABLES**

**(2018 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

Instructions : Scientific Calculators and Mathematical/Statistical tables are permitted to use.

**SECTION – A**

Answer **all** questions. **Each** question carries **1** mark.

1. Define the sample space of a random experiment and give an example.
2. In a population of  $N$  balls, there are  $M$  white balls and remaining are black balls. What is the probability that the group so selected will contain exactly  $m$  white balls, if  $n$  balls are selected from the population?
3. Let  $A$  and  $B$  be any two events defined on a sample space then prove that  $P(A \cap B^c) = P(A) - P(A \cap B)$  where  $A^c$  is the complement of  $A$ .
4. If five cards are selected from a pack of 52 cards, find the probability of getting at least three spade cards.

5. If the probability mass function of a discrete random variable is given by  $f(x) = \frac{1}{2^x}$  where  $x = 1, 2, 3, \dots$  find moment generating function of  $X$ .
6. Let  $X$  be a random variable with distribution function  $F(x) = 1 - e^{-\theta x}$ ; where  $x \geq 0$ ;  $\theta \geq 0$  find probability density function of  $X$ .
7. If  $x$  is a random variable with following probability mass function
- |         |     |     |     |     |
|---------|-----|-----|-----|-----|
| $x:$    | -1  | 0   | 1   | 2   |
| $p(x):$ | 3/8 | 1/8 | 1/8 | 3/8 |
- Find  $E(X^2)$ .
8. If  $X$  is a random variable then what is the value of  $E[X(X-1)] - E(X)E(X-1)$  where  $E(X)$  is the expectation of  $X$ .
9. If  $M_X(t) = \frac{2}{2 - e^t}$  is the moment generating function of  $X$ , find the moment generating function of  $2X + 1$ .
10. Define conditional expectation of a random variable  $X$  given  $Y$ .

(10 × 1 = 10 Marks)

### SECTION – B

Answer any **eight** questions. **Each** question carries **2** marks.

11. Explain concept Statistical regularity.
12. Three unbiased coins are tossed together find the probability distribution of number of heads and sketch the graph of the function.
13. State and prove addition theorem on probability.

14. Let  $P(A) = 0.4$  and  $P(A \cup B) = 0.6$  for what values of  $P(B)$  are  $A$  and  $B$  independent events?
15. If  $A$  and  $B$  are any two independent events verify the independence of  $A^c$  and  $B^c$ .
16. A random variable  $X$  has the probability density function  $f(x) = \begin{cases} 1/4 & -2 < x < 2 \\ 0 & \text{otherwise} \end{cases}$ . Find (i) distribution function of  $X$  (ii)  $P(|x| > 1)$ .
17. For a random variable  $X$ , probability mass function is given by  $f(x) = \begin{cases} \frac{x}{k}, & x = 1, 2, 3, 4, 5 \\ 0, & \text{otherwise} \end{cases}$ . Find  $K$  and hence obtain  $P(X \geq 2)$ . What is the distribution of  $Y = (X - 3)^2$ .
18. A random variable  $X$  has the following probability density function  $f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2 - x, & 1 \leq x \leq 2 \end{cases}$ . Find the probability distribution function of  $X$ .
19. If  $M_x(t) = \left(\frac{2}{3} + \frac{1}{3} e^t\right)^4$  is the moment generating function of  $X$ , what is  $E(X)$ ?
20. If  $\Phi_x(t)$  is the characteristic function of  $X$  derive the characteristic function of  $Y = aX + b$  where  $a$  and  $b$  are constants.
21. Let  $X$  be a non negative continuous random variable with probability density function  $f(x)$  then obtain the probability density function of  $Y = X^2$
22. If  $f(x, y) = K(x + 2y)$ ,  $x = 0, 1, 2$ ;  $y = 1, 2, 3$  is the joint probability function of  $X$  and  $Y$  then obtain the value of  $K$ . Also find  $E(XY)$ .

(8 × 2 = 16 Marks)

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

23. If  $P(A) = 0.5$ ,  $P(B) = 0.4$  and  $P(A \cap B) = 0.3$  then find the following probabilities  
(i) at least one of the two events (ii) exactly one of the two events (iii) none of the events occur (iv)  $P(A/B^c)$ .
24. Prove that  $P(A \cup B/C) = P(A/C) + P(B/C) - P(A \cap B/C)$ .
25. State and prove Bayes' theorem.
26. Prove that  $E(aX + bY) = aE(X) + bE(Y)$  where  $a$  and  $b$  are constants.
27. Let  $X$  has the moment generating function  $M_X(t) = (1-t)^{-2}$  for  $|t| < 1$  then what is the mean and variance of  $x$ ?
28. Show that  $(E(XY))^2 \leq E(X^2)E(Y^2)$ .
29. Two random variables have joint probability mass function  $P(X=0, Y=0) = 2/9$ ,  $P(X=0, Y=1) = 1/9$ ,  $P(X=1, Y=0) = 1/9$ , and  $P(X=1, Y=1) = 5/9$ . Find the value of  $E(X+Y)$ . Also examine independence of random variables  $X$  and  $Y$ .
30. The joint probability mass function of  $(X, Y)$  is given by  $f(x, y) = \frac{1}{16}$  for  $(x, y) = (-3, -5), (-1, -1), (1, 1)$  and  $(3, 5)$ . Find the covariance between  $X$  and  $Y$ .
31. If  $V(X)$  is the variance of a random variable then show that it can be represented as  $V(X) = E(V(X/Y)) + V(E(X/Y))$  where  $E(X/Y)$  and  $V(X/Y)$  are conditional mean and conditional variance of  $X$  given  $Y$ .

**(6 × 4 = 24 Marks)**

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. (i) Explain the concept of pair wise independence and mutual independence between  $n$  events. Give examples.
- (ii) In a factory total items are produced by 4 machines in the proportion 4:7:8:6 and of their output, respectively 8%, 3%, 4% and 5% are defective items. An item is selected at random then find the chance that
- (a) it is a non defective
- (b) It is produced by the third machine if the selected was a defective.
33. (i) A box contains  $2^n$  tickets of which  $\binom{n}{i}$  tickets bear the number  $i = 0, 1, 2, \dots, n$ . A group of  $m$  tickets are drawn, what is the expectation of the sum of their numbers.
- (ii) If  $X$  is a random variable with probability mass function  $f(x) = \frac{1}{n}$ ,  $x = 1, 2, \dots, n$  then find mean, variance and moment generating function of  $X$ .
34. (i) A random variable  $X$  has the cumulative distribution
- $$F(x) = \begin{cases} 0 & \text{if } x \leq 0 \\ \frac{1}{2}x & \text{if } 0 < x < 1 \\ x - 1/2 & \text{if } 1 \leq x < 3/2 \\ 1 & \text{if } x \geq 3/2 \end{cases}$$
- Find probability density function of  $X$ .
- Also obtain  $P(X > 1/2)$ ,  $P(X \leq 5/4)$  and  $P(X = 5/4)$ . Sketch the graph of both distribution and density function of  $x$ .
- (ii) Let  $X$  and  $Y$  are jointly distributed with probability density function  $f(x, y) = \begin{cases} e^{-(x+y)} & \text{if } 0 < x < \infty, 0 < y < \infty \\ 0 & \text{otherwise} \end{cases}$ . Show that  $X$  and  $Y$  are independent random variables.

35. (i) Let  $X$  and  $Y$  are two random variables having joint probability mass function  
$$f(x, y) = \frac{1}{72}(2x + 3y), \quad x = 0, 1, 2; \quad y = 1, 2, 3$$

Find (a) marginal probability mass functions of  $X$  and  $Y$

(b) conditional distribution of  $X$  given  $Y = 1$ ,

(c) conditional mean of  $X$  given  $Y = 1$ .

- (ii) Let  $X$  and  $Y$  have the joint probability density function  
 $f(x, y) = k, \quad x, y, 0 < x < y < 1$ , find  $k$  and marginal probability density functions of  $X$  and  $Y$ .

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Complementary course for Mathematics**

**PY 1231.1 : THERMAL PHYSICS AND STATISTICAL MECHANICS**

**(2018 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Very short answer type questions. (One word to Maximum 2 sentences). Answer **all**. Each carries one 1 mark.

1. State Weidmann Franz law.
2. In a toss of 4 coins a macro state with 2 Heads has \_\_\_\_\_ number of microstates.
3. There are three furnaces, Furnace A with blue flame, Furnace B with yellow flame and Furnace C with red flame which has the highest temperature \_\_\_\_\_
4. State postulate of 'equal a priori probabilities'.
5. The efficiency of Carnot engine working between steam point and ice point is \_\_\_\_\_
6. The expression for work done in isothermal process is \_\_\_\_\_

7. Which states of matter (solid, liquid or gas) has the highest entropy
8. State Wien's displacement law?
9. Why it is cooler at the top of the mountain than at the sea level.
10. If  $dU = -dW$  in a thermodynamic process, then process is:

**(10 × 1 = 10 Marks)**

### SECTION – B

Short answer type question. Answer any **eight** questions. Each carry **2** marks. (Not to exceed one paragraph).

11. Explain Plank's radiation law
12. Differentiate between thermal conductivity and thermometric conductivity.
13. Distinguish between isothermal and adiabatic process.
14. When a tyre bursts, the air coming out is cooler Than the surrounding air. Why
15. State Kelvin and Clausius statement of second Jaw of thermodynamics.
16. Discuss the relation between entropy and disorder.
17. What do you mean by "ultra violet catastrophe"
18. Rate of formation of ice in lakes decreases with increase in the thickness of ice layer. Why?
19. Explain phase-space and ensemble.
20. Explain the concept of macro states and micro state.
21. Briefly explain Maxwell Boltzmann distribution.
22. Nine particles have speeds of 5.00, 8.00, 12.0, 12.0, 12.0, 14.0, 14.0, 17.0, and 20.0 m/s.
  - (a) Find the particles average speed
  - (b) r.m.s. speed.

**(8 × 2 = 16 Marks)**

## SECTION – C

Short essay questions. (not to exceed **120** words). Answer any **six**. Each carries **4** marks.

23. Explain how the temperature of sun can be measured by knowing solar constant.
24. State and explain the principle of increase of entropy.
25. (a) Find the populations of the first and second excited states *relative* to the ground state for atomic hydrogen at room temperature, assuming that hydrogen obeys Maxwell—Boltzmann statistics.  
(b) Find the populations of the first and second excited states relative to the ground state for hydrogen heated to 20,000 K in a star. Given that Energy  $n$ th level  $E_n = 13.6/n^2$  eV and the degeneracy  $g_n = 2n^2$ .
26. Calculate rms speed, most probable speed and average speed of oxygen molecule at 27 °C. Molar mass of oxygen is 32  $u$ .
27. Calculate the increase in entropy of 1 kg of ice when it is converted into steam. Given that specific heat of water is 1 kcal /kg°C, latent heat of ice is 80 kcal /Kg and latent heat of steam is 540 kcal/kg.
28. A petrol engine using ideal air as working substance has its compression ratio raised from 5 to 6. Find the % increase in efficiency.
29. Two identical samples of monatomic gases are allowed to expand to twice their initial volume. One sample expands isothermally, while the other sample expands adiabatically. In which sample is the pressure higher? Explain.
30. A Carnot engine has an efficiency of 0.4 when its cold reservoir is at 300K. Find the change in its hot reservoir temperature so that efficiency becomes 0.65.
31. A house has wooden siding 1.0cm thick, with total surface area of 275 m<sup>2</sup>. Suppose it is 19 °C inside and 1 °C outside.
  - (a) What is the rate of energy loss through the walls?
  - (b) What is the daily heating cost with energy at \$ 0.10 per kWh? Thermal conductivity for wood 0.12 W/°C.m<sup>2</sup>

(6 × 4 = 24 Marks)

## SECTION D

Long essay questions. Answer any **two**. Each carries **15** marks.

32. Obtain the relation connecting pressure and volume in an adiabatic process. Derive an expression for work done in adiabatic process?
33. Define entropy? What is its physical meaning? Explain T-S diagram? Find an expression for efficiency of reversible Carnot engine with help of T-S diagram?
34. What is perfect black body? Draw curves for the distribution of energy in the spectrum of a black body for three different temperatures, Explain important results obtained from these curves?
35. Describe an experiment with necessary theory to determine the thermal conductivity of a poor conductor by Lee's disc method.

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Physics**

**Core Course**

**PY 1241 : HEAT AND THERMODYNAMICS**

**(2018 Admission Onwards)**

Time : 3 Hours

Max. Marks : 80

**SECTION – A**

Answer **all** questions; each carries **1** mark.

1. Give the differential form of first law of thermodynamics.
2. Give one example each for isothermal and adiabatic process.
3. What is a quasistatic process?
4. State Clausius statement of second law of thermodynamics.
5. Write Clausius - Clapeyron equation and explain the symbols.
6. State Stefan's law.
7. Represent Carnot cycle on a TS diagram.
8. What is meant by Clausius theorem?
9. How is entropy related to available energy?
10. Give two examples for a second order phase – transition.

**(10 × 1 = 10 Marks)**

P.T.O.

## SECTION – B

Answer any **eight; each** carries **2** marks.

11. Obtain the relation for the work done in an adiabatic process.
12. What is a reversible process? What are the conditions to be satisfied for a process to be reversible?
13. State and explain Carnot's theorem.
14. Draw labelled diagram for the Diesel cycle.
15. Explain the third law of thermodynamics.
16. Give two applications of heat conduction in daily life.
17. Derive Mayer's relation from first law of thermodynamics.
18. Show that entropy remains constant in a reversible process.
19. Define thermal conductivity. Obtain its unit.
20. Explain the effect of pressure on the boiling point of a liquid.
21. What are the conditions for a system to be in thermodynamic equilibrium?
22. What are the advantages of a diesel engine?

## SECTION – C

(8 × 2 = 16 Marks)

Answer any **six; each** carries **4** marks.

23. A Carnot engine working between two temperatures has efficiency 0.2. When the temperature of the source is increased by 25°C, the efficiency increases to 0.25. Find the temperature of the source and sink.
24. A motor tyre has a pressure of 2 atmospheres at the room temperature of 27°C. If the tyre suddenly bursts, find the resulting temperature. ( $\gamma = 1.4$ )
25. Calculate the amount of work done in adiabatically compressing one mole of a perfect gas at normal pressure to  $1/3$  of its volume. The molecular specific heat of the gas at constant volume is  $3/2 R$ .

26. 2 mole of a gas at  $27^{\circ}\text{C}$  expands isothermally until its volume is doubled. Calculate the work done.
27. 1 Kg of water at  $0^{\circ}\text{C}$  is heated to  $100^{\circ}\text{C}$ . Compute the change in entropy (Specific heat capacity of water =  $4200 \text{ J Kg}^{-1} \text{ K}^{-1}$ )
28. Calculate the change in entropy when 5 Kg of water at  $100^{\circ}\text{C}$  is converted to steam at the same temperature.  $L = 2.268 \times 10^6 \text{ J Kg}^{-1}$ .
29. Calculate the depression in the melting point of ice produced by 1 atmosphere increase of pressure. Given latent heat of ice  $3.36 \times 10^5 \text{ J Kg}^{-1}$  and specific volume of 1 gm of ice and water at  $0^{\circ}\text{C}$  are  $1.091 \text{ cm}^3$  and  $1 \text{ cm}^3$  respectively.
30. The temperature of a perfect black body is 700 K and area of its radiating surface is  $2 \times 10^3 \text{ m}^2$ . Find the energy radiated in 30 minutes. ( $\sigma = 5.7 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$ )
31. Calculate the surface temperature of the sun from the following data. Radius of the sun =  $6.96 \times 10^5 \text{ Km}$ ., Mean distance of the sun and earth =  $1.497 \times 10^8 \text{ Km}$ . Solar constant =  $1400 \text{ J m}^{-2} \text{ s}^{-1}$ , Stefan's constant =  $5.7 \times 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$ .

(6 × 4 = 24 Marks)

#### SECTION - D

Answer any **two**; **each** question **15** marks.

32. Describe the working of an Otto engine. Derive an expression for its efficiency.
33. Explain first law of thermodynamics. Prove that (a)  $PV^{\gamma} = \text{constant}$  (b)  $TV^{\gamma-1} = \text{constant}$  in an adiabatic process.
34. Define entropy. What is its physical significance? Calculate the total change in entropy when 1 Kg of ice at  $0^{\circ}\text{C}$  is converted into steam at  $100^{\circ}\text{C}$ .
35. With the help of a diagram, explain the determination of the thermal conductivity of a poor conductor by Lee's disc method.

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, May 2020

First Degree Programme under CBCSS

Complementary Course for Physics

MM 1231.1: MATHEMATICS II – CALCULUS WITH APPLICATIONS  
IN PHYSICS – II

(2018 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

## SECTION – I

Answer the **first ten** questions are compulsory. They carry **1** mark each.

1. Find the complex conjugate of the complex number  $z = (x + 5i)^{(3y+2ix)}$ .
2. Find the sum of the complex numbers  $1 + 2i$ ,  $-3 + 4i$  and  $2 - 6i$ .
3. Find the argument of the complex number  $z = 1 + \sqrt{3}i$ .
4. Evaluate  $\frac{d}{dx} \left( \sinh^{-1} \left( \frac{3}{x} \right) \right)$ .
5. Let  $f(x, y) = \tan^{-1} \left( \frac{y}{x} \right)$  Find  $\frac{\partial f}{\partial x}$ .
6. State Pappu's second theorem.
7. Find  $\int_0^1 \int_0^1 \int_0^1 dx dy dz$ .

8. Find the Laplacian of the scalar field  $\varphi = xy^2z^3$ .
9. Define  $\nabla \cdot \mathbf{a}$  in spherical polar coordinates, where  $\mathbf{a}$  is a vector field.
10. The position vector of a particle at time  $t$  in Cartesian coordinates is given by  $\mathbf{r}(t) = 2t^2\mathbf{i} + (3t - 2)\mathbf{j} + (3t^2 - 1)\mathbf{k}$ . Find the velocity of the particle.

## SECTION II

Answer **any eight** questions among the questions **11 to 22**. These questions carry **2 marks each**.

11. Evaluate  $\text{Im}(\cosh^2 z)$ .
12. Solve the hyperbolic equation  $\cosh x - 5\sinh x - 5 = 0$ .
13. Evaluate  $\int e^{2x} \sin 3x dx$ .
14. Show that the differential  $df = x^2 dy - (y^2 + xy) dx$  is not exact.
15. Find the total derivative of  $f(x, y) = x^2 + 3xy$  with respect to  $x$ , given that  $y = \sin^{-1} x$ .
16. Find the Taylor expansion, up to quadratic terms in  $x - 2$  and  $y - 3$  of  $f(x, y) = ye^{xy}$  about the point  $x = 2, y = 3$ .
17. Evaluate  $\int_1^3 \int_2^4 (40 - 2xy) dy dx$ .
18. A semi-circular uniform lamina is freely suspended from one of its corners. Show that its straight edge makes an angle of  $23.0^\circ$  with the vertical.
19. Evaluate the double integral  $\iint_R x^2 y \, dx dy$ , where  $R$  is the triangular area bounded by the lines  $x = 0, y = 0$  and  $x + y = 1$ .
20. Find  $\text{div } \mathbf{F}$  and  $\text{curl } \mathbf{F}$  for the vector field  $\mathbf{F}(x, y, z) = x^2\mathbf{i} - 2y\mathbf{j} + yz\mathbf{k}$ .

21. For the function  $\varphi = x^2y + yz$  at the point  $(1, 2, -1)$ , find its rate of change with distance in the direction  $a = i + 2j + 3k$ .
22. The position vector of a particle in plane polar coordinates is  $r(t) = p(t)\hat{e}_p$ . Find expressions for the velocity and acceleration of the particle in these coordinates.

### SECTION III

Answer any **six** questions among the questions **23 to 31**. These questions carry **4** marks each.

23. By writing  $\frac{\pi}{12} = \frac{\pi}{3} - \frac{\pi}{4}$  and considering  $e^{\frac{i\pi}{12}}$ , evaluate  $\cot\left(\frac{\pi}{12}\right)$ .
24. Prove that  $\tanh^{-1}x = \frac{1}{2}\ln\left(\frac{1+x}{1-x}\right)$ ,  $-1 < x < 1$ .
25. Prove that  $z^n + \frac{1}{z^n} = 2\cos n\theta$  and  $z^n - \frac{1}{z^n} = 2i\sin n\theta$ , where  $z = e^{i\theta}$ .
26. The function  $f(x, y)$  satisfies the differential equation  $y\frac{\partial f}{\partial x} + x\frac{\partial f}{\partial y} = 0$ . By changing to new variables  $u = x^2 - y^2$  and  $v = 2xy$ , show that  $f$  is a function of  $x^2 - y^2$  only.
27. The temperature of a point  $(x, y)$  on a unit circle is given by  $T(x, y) = 1 + xy$ . Find the temperature of the two hottest points on the circle.
28. Identify the curved wedge bounded by the surface  $y^2 = 4ax$ ,  $x + z = a$  and  $z = 0$  and hence calculate its volume  $V$ .
29. Find the Jacobin  $\frac{\partial(x, y, z)}{\partial(u, v, w)}$  of the transformation  $u = xy$ ,  $v = y$ ,  $w = x + z$ .
30. Prove that  $\text{curl } a = \nabla \times (\nabla \times a) = \nabla(\nabla \cdot a) - \nabla^2 a$ .

31. For the twisted space curve given parametrically by  $x = au(3 - u^2)$ ,  $y = 3au^2$ ,  $z = au(3 + u^2)$ . Show that the radius of curvature at  $u$  is  $3a(1 + u^2)^2$ .

#### SECTION IV

Answer any **two** questions among the question **32 to 35**. These questions carry **15** marks each.

32. (a) Use the Moivre's theorem with  $n = 4$  to prove that  $\cos 4\theta = 8\cos^4 \theta - 8\cos^2 \theta + 1$ , and deduce that  $\cos \frac{\pi}{8} = \left( \frac{2 + \sqrt{2}}{4} \right)^{\frac{1}{2}}$ .
- (b) By differentiating  $e^{(a+ib)x}$  and separating real and imaginary parts, find the derivatives of  $e^{ax} \cos bx$  and  $e^{ax} \sin bx$ .
33. (a) Find the stationary values of  $f(x, y) = 4x^2 + 4y^2 + x^4 - 6x^2 - y^2 + y^4$  and classify them as maxima, minima or saddle points.
- (b) Suppose that  $w = \sqrt{x^2 + y^2 + z^2}$ ,  $x = \cos \theta$ ,  $y = \sin \theta$ ,  $z = \tan \theta$ . Find  $\frac{dw}{d\theta}$  when  $\theta = \pi/4$ .
34. (a) Evaluate  $\int_{-\infty}^{\infty} e^{-x^2} dx$ .
- (b) A tetrahedron is bounded by the three coordinate surfaces and the plane  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$  and has density  $\rho(x, y, z) = \rho_0 \left( 1 + \frac{x}{a} \right)$ . Find the average value of the density.
35. (a) Express the vector field  $a = yzi - yj + xz^2k$  in cylindrical polar coordinates, and hence calculate its divergence.
- (b) Derive Frenet-Serret formulae.

Reg. No. : .....

Name : .....

**Second Semester B.Sc. Degree Examination, May 2020**

**First Degree Programme Under CBCSS**

**Complementary Course for Chemistry/Polymer Chemistry**

**MM 1231.2 : Mathematics II**

**CALCULUS WITH APPLICATIONS IN CHEMISTRY – II**

**(2018 Admission onwards)**

Time : 3 Hours

Max. Marks : 80

PART – A

Answer **all** the **ten** questions. **Each** question carries **1** mark.

1. Find  $\frac{\partial f}{\partial y}$  if  $f(x, y) = \sin(x / y)$ .
2. Define the gradient of a scalar field.
3. Give an example for an alternating series.
4. What is the sum of the numbers from 1000 to 2000.
5. State D' Alembert's Ratio test.
6. Find the divergence of the vector field  $\vec{a} = x^2y^2z^2\vec{i} + y^2z^2\vec{j} + x^2z^2\vec{k}$ .
7. Evaluate  $\int_0^3 \int_1^2 (1 + 8xy) dy dx$ .

8. Define irrotational vector field.
9. Evaluate  $1^3 + 2^3 + 3^3 + \dots + 6^3$ .
10. Evaluate  $\int_0^1 \int_0^1 \int_0^1 (x^2 + y^2 + z^2) dz dy dx$ .

(10 × 1 = 10 Marks)

### PART – B

Answer **any eight** questions from among questions 11 to 22. **Each** question carries **2** marks.

11. Find the total derivative of  $f(x, y) = x^2 + 3xy$  with respect to  $x$ , given that  $y = \sin^{-1} x$ .
12. Verify whether  $df = x^2 dy - (y^2 + xy) dx$  is an exact differential.
13. Sum the series  $S = 2 + \frac{5}{2} + \frac{8}{2^2} + \frac{11}{2^3} + \dots$ .
14. Evaluate the sum  $\sum_{n=1}^N \frac{1}{n(n+2)}$ .
15. Determine whether the following series converges:  

$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{n} = 1 - \frac{1}{2} + \frac{1}{3} - \dots$$
16. Find the equations of the tangent plane and normal line to the surface of the sphere  $\phi = x^2 + y^2 + z^2$  at the point  $(0, 0, a)$ .
17. Show that  $\text{curl grad } \phi = \vec{0}$ .
18. Show that  $\nabla \cdot (\nabla \phi \times \nabla \psi) = 0$  where  $\phi$  and  $\psi$ , are scalar fields.
19. Evaluate the double integral  $I = \iint_R x^2 y dx dy$  where  $R$  is the triangular area bounded by the lines  $x = 0$ ,  $y = 0$  and  $x + y = 1$ .

20. Find the Laplacian of  $\phi = x^2 + y^2 - 2z^2$ .
21. Find the centre of mass of the solid hemisphere bounded by the surfaces  $x^2 + y^2 + z^2 = a^2$  and the xy-plane, assuming that it has a uniform density  $\rho$ .
22. Find an expression for a volume element in spherical polar coordinates.

(8 × 2 = 16 Marks)

### PART – C

Answer **any six** questions from the questions 23 to 31. **Each** question carries **4** marks.

23. Transform the expression  $\frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2}$  into polar co-ordinates.
24. The temperature of a point  $(x, y)$  on a unit circle is given by  $T(x, y) = 1 + xy$ . Find the temperature of the two hottest points on the circle.
25. Determine the range of values of  $x$  for which the following power series converges:  $P(x) = 1 + 2x + 4x^2 + 8x^3 + \dots$
26. Expand  $f(x) = \cos x$  as a Taylor series about  $x = \pi / 3$ .
27. Prove that the area of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  is  $\pi ab$ .
28. Find the volume of the tetrahedron bounded by the three coordinate surfaces  $x = 0$ ,  $y = 0$  and  $z = 0$  and the plane  $x/a + y/b + z/c = 1$ .
29. Find and evaluate the maxima, minima and saddle point of the function  $f(x, y) = xy(x^2 + y^2 - 1)$ .
30. Find the moment of inertia of a uniform rectangular lamina of mass  $M$  with sides  $a$  and  $b$  about one of the sides of length  $b$ .
31. Find the Taylor expansion up to quadratic terms in  $x - 2$  and  $y - 3$ , of  $f(x, y) = y \exp(xy)$  about the point  $x = 2$ ,  $y = 3$ .

(6 × 4 = 24 Marks)

PART – D

Answer **any two** questions from the questions 32 to 35. Each question carries **15** marks.

32. Find the stationary points of  $f(x, y, z) = x^3 + y^3 + z^3$  subject to the constraints,  $g(x, y, z) = x^2 + y^2 + z^2 = 1$  and  $h(x, y, z) = x + y + z = 0$ .

33. Derive the Frenet-Serret formulae for space curves.

34. Determine whether the following series converges:

(a)  $\sum_{n=1}^{\infty} \frac{1}{n!+1} = \frac{1}{2} + \frac{1}{3} + \frac{1}{7} + \frac{1}{25} + \dots$

(b)  $\sum_{n=1}^{\infty} \frac{1}{(n!)^2} = 1 + \frac{1}{2^2} + \frac{1}{6^2} + \dots$

35. Evaluate the double integral  $I = \iint_R (a + \sqrt{x^2 + y^2}) dx dy$  where R is the region bounded by the circle  $x^2 + y^2 = a^2$ ..

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

Second Semester B.Sc. Degree Examination, May 2020

First Degree Programme Under CBCSS

Complementary Course for Chemistry

PY 1231.2 – THERMAL PHYSICS

(2018 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **one** or **two** sentences. **Each** question carries **1** mark.

1. State Fick's law.
2. State Graham's law of diffusion..
3. Define coefficient of thermal conductivity
4. State Wiedemann and Franz law.
5. What is perfect blackbody?
6. State Planck's radiation law.
7. Define isothermal process.

8. State Kelvin-Planck statements.
9. Define entropy.
10. State the second law of thermodynamics in terms of entropy.

(10 × 1 = 10 Marks)

#### SECTION – B

Answer any **eight** questions, **not** exceeding a paragraph. **Each** question carries **2** marks.

11. Compare liquid diffusion and heat conduction.
12. Explain the terms emissive power and absorptive power.
13. Derive an expression for the work done during an adiabatic process.
14. Obtain the relation between isothermal and adiabatic elasticity.
15. Briefly explain Carnot cycle.
16. Derive an expression for the change of entropy during irreversible cycle.
17. Briefly discuss Temperature-Entropy diagram.
18. State and explain the principle of degradation of energy.
19. State and explain Kirchhoffs law of heat radiation.
20. Briefly discuss entropy and disorder.
21. State and explain Clausius's statement.
22. Explain the cycle of petrol engine.

(8 × 2 = 16 Marks)

## SECTION – C

Answer any **six** questions. **Each** question carries **4** marks.

23. An icebox is built of wood 1.75cm thick, lined inside with cork 3cm thick. If the temperature of the inner surface of the cork is  $0^{\circ}\text{C}$  and that of the outer surface of wood is  $12^{\circ}\text{C}$ . What is the temperature of the interface? The thermal conductivity of wood and cork are 0.0006 and 0.000 12 CGS units respectively.
24. The sun radiates energy at the rate of  $6.4 \times 10^7 \text{ W/m}^2$ . Calculate its temperature assuming it to be a black body.  $\sigma = 5.67 \times 10^{-8} \text{ MKS units}$ .
25. Calculate the surface temperature of the sun, given that  $\lambda_m = 4753^{\circ}\text{A}$ ,  $\lambda_m$  being wavelength of maximum intensity of emission,  $b = 2.898 \times 10^{-3} \text{ mK}$ .
26. A quantity of air at  $27^{\circ}\text{C}$  and one atmospheric pressure is suddenly compressed to half its original volume. Find the final pressure  $\gamma = 1.4$ .
27. A gas occupying a volume of  $10^{-2} \text{ m}^3$  at a pressure of 5 atmosphere expands isothermally to a pressure of 1 atmosphere. Calculate the work done.
28. A Carnot engine has an efficiency of 30 % when the temperature of the sink is  $27^{\circ}\text{C}$ . What must be the change in temperature of the source to make its efficiency 50%?
29. In a Carnot engine the temperature of source and sink are 500K and 375K. If the engine consumes  $25 \times 10^5 \text{ J}$  per cycle. Find the (i) efficiency of the engine (ii) Work done per cycle (iii) Heat rejected to the sink per cycle.
30. Calculate the change in entropy when 100 grams of ice at  $0^{\circ}\text{C}$  is converted into water at the same temperature. Latent heat of ice 80cal/g.
31. Calculate the number of modes in a chamber of volume 50cc in the frequency range  $4 \times 10^{14}$  and  $4.01 \times 10^{14} \text{ s}^{-1}$ .

(6 × 4 = 24 Marks)

## SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. Describe Lee's method to find the coefficient of thermal conductivity of metals.
33. Briefly discuss Wein's displacement law and Rayleigh Jeans's law. What are its limitations?
34. Draw the Diesel cycle. Explain the cycle of a diesel engine and write the expression for efficiency.
35. Derive an expression for the change in entropy when 1Kg of ice at  $0^{\circ}\text{C}$  is converted to steam at  $100^{\circ}\text{C}$ .

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

**Second Semester B.Com. Degree Examination, May 2020**

**First Degree Programme under CBCSS**

**Language Course**

**Additional Language II — Malayalam**

**ML 1211.2 : കവിത, കഥ, ഉപന്യാസം, വിവർത്തനം  
(2014-2017 admission)**

Time : 3 Hours

Max. Marks : 80

- I. ഒരു വാക്കിലോ രണ്ടു വാക്യത്തിലോ ഉത്തരമെഴുതുക.
1. മലയാളത്തിലെ 'ഓർഫ്യൂസ്' എന്ന് വിളിക്കപ്പെടുന്ന കവിയാർ?
  2. ആദ്യത്തെ ജ്ഞാനപീഠ ജേതാവായ കവിയാർ?
  3. അഗ്നിസാക്ഷി ആരുടെ നോവലാണ്?
  4. മയ്യഴിയുടെ കഥാകാരൻ എന്നറിയപ്പെടുന്ന മലയാള നോവലിസ്റ്റ് ആര്?
  5. ആർക്കാണ് "കൊല്ലം കൊലയും കുലാധികാര"മായുള്ളത്?
  6. 'തറവാടും തന്മോളം പോയ പാവം' എന്ന് പറയുന്നതാരെക്കുറിച്ചാണ്?
  7. ടാഗൂർ സ്ഥാപിച്ച വിശ്വവിദ്യാലയം ഏത്?

8. കായദാസ്യവും ജീവനദാസ്യവും ഉറപ്പുവരുത്താനും ദീർഘകാലം നിലനിർത്താനുമുള്ള ഉപാധിയെന്ത്?

9. 'ഒരു തീയക്കുട്ടിയുടെ വിചാരം' ആരുടെ കവിതയാണ്?

10. കാമ്പിഗ്ലേരി കരുണാകരൻ ഏതു പത്രത്തിന്റെ എഡിറ്ററായിരുന്നു?

(10 × 1 = 10 Marks)

II. ഒരു ഖണ്ഡികയിൽ കവിയാതെ എട്ടു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

11. 'സ്നന്ദിക്കുന്ന അസ്ഥിമാടത്തി'ൽ നിന്നുയരുന്ന പല്ലവി എന്തായിരിക്കും എന്നാണ് കവി പറയുന്നത്?

12. വെമ്പലനാട്ടിന്റെ തമ്പുരാന്റെ തമ്പുരാട്ടിക്കുള്ള കട്ടിൽ എങ്ങനെയായിരിക്കണം?

13. ചന്ദനമരത്തിന്റെ പൊത്തിൽ കണ്ട കുട്ടിയുടെ സൗന്ദര്യം കവി വർണ്ണിക്കുന്നതെങ്ങനെ?

14. "മറ്റൊരാളുടെ കരച്ചിൽ മാറ്റാൻ മനുഷ്യനാരാണേടത്തി" - ആര്, ആരോടാണിങ്ങനെ ചോദിക്കുന്നത്?

15. "എന്താണു നിങ്ങൾക്കൊക്കെ പറ്റിയിരിക്കുന്നത്?" ഇങ്ങനെ ചോദിക്കുന്നതാരാണ്? സന്ദർഭം വിവരിക്കുക.

16. 'ഉറവയുടെ ഉണർവ്' എന്ന കവിത രചിക്കാനുണ്ടായ അനുഭവം ടാഗൂർ വിവരിക്കുന്നതെങ്ങനെ?

17. 'ടാഗൂറിന്റെ 'ക്രസന്റ്' മൂൺ' (ചന്ദ്രക്കല) എന്ന കവിതയുടെ രചനാപശ്ചാത്തലം എന്ത്?

18. ജീവനദാസ്യം ഉറപ്പുവരുത്താൻ കോളനിമേധാവികൾ സ്വീകരിച്ച ഉപാധികൾ എന്തെല്ലാമായിരുന്നു?

19. ഏകാന്തതയുടെ നൂറു വർഷങ്ങൾ ഗ്രഹിക്കണം എങ്കിൽ എന്തൊക്കെ അറിയണം എന്നാണ് കോവിലൻ പറയുന്നത്?

20. "കൂട മൂലം അയാളെന്റെ രോഗമന്വേഷിക്കാൻ പോലും തിരിഞ്ഞു നോക്കുകയുണ്ടായില്ല." - സന്ദർഭം എന്ത്?
21. "അടി വാങ്ങിയിട്ടുള്ളത് അധികവും ആ വിഷയത്തിലാണ്." ഏതു വിഷയത്തിൽ? സന്ദർഭം വിവരിക്കുക.
22. ചുവടെ കാണുന്ന ഇംഗ്ലീഷ് ശൈലികൾ മലയാളത്തിലേക്ക് വിവർത്തനം ചെയ്യുക.
- (a) Read between lines
  - (b) Storm in the teacup
  - (c) Between the devil and sea
  - (d) Brutal majority

(8 × 2 = 16 Marks)

III. നൂറ്റിയിരുപത് വാക്കിൽ കവിയാതെ ആറു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

23. ചലച്ചിത്രവും നാടകവും തമ്മിലുള്ള വ്യത്യാസങ്ങൾ എന്തെല്ലാം?
24. ആശയവും അറിവും ജനഭാഷയിലേക്കുതന്നെ വരണം എന്ന് എ.പി. ഉദയഭാനു അഭിപ്രായപ്പെടുന്നത് എന്തുകൊണ്ട്?
25. മലയാളിയുടെ മനസ്സ് 'ഏകാന്തതയുടെ നൂറുവർഷങ്ങളിൽ കോവിലൻ വായിച്ചെടുക്കുന്ന തെങ്ങനെ?
26. സ്വാതന്ത്ര്യസങ്കല്പങ്ങളിൽ തീർത്തും വ്യത്യസ്തമായ ഒരു സ്വരം കുമാരനാശാന്റെ കവിതകളിൽ കേൾക്കുന്നതെങ്ങനെ?
27. വിശ്വഭാരതിയും ടാഗൂറും - കുറിപ്പെഴുതുക.
28. സ്നേഹത്തിന്റെ താക്കോൽ എന്ന കഥയ്ക്ക് ഒരു ആസ്വാദനക്കുറിപ്പ് തയ്യാറാക്കുക.
29. "നീ രാധയല്ല, നിന്നെ ഞങ്ങൾക്കറിയില്ല" എന്ന് ആരൊക്കെയാണ് തീർപ്പു കൽപ്പിക്കുന്നത്?

30. സർഗ്ഗശക്തിയുടെ അശ്വത്തെ അശ്വമേധം എന്ന കവിതയിൽ വയലാർ എങ്ങനെയാണ് ആവിഷ്കരിക്കുന്നത് ?

31. സ്വപ്നങ്ങൾ വിൽക്കുന്ന സെയിൽസ്കാൻ മാധവിയുടെ ജീവിതം തിരുത്തീയതെങ്ങനെയെല്ലാമാണ് ? -

(6 × 4 = 24 Marks)

IV. മൂന്നു പുറത്തിൽ കവിയാതെ ഏതെങ്കിലും രണ്ടു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

32. ചന്ദനക്കട്ടിൽ എന്ന കഥാകാവ്യത്തിന് ഒരാസ്വാദനം തയ്യാറാക്കുക.

33. സീതയുടെ ജീവിതത്തെ സ്ത്രീപക്ഷത്തുനിന്നുകൊണ്ട് സാരാ ജോസഫ് 'അശോക' എന്ന കഥയിൽ ആവിഷ്കരിക്കുന്നതെങ്ങനെയെന്ന് വിശകലനം ചെയ്യുക.

34. സ്വാതന്ത്ര്യം എന്ന സങ്കല്പം ആധുനികകവിത്രയത്തിന്റെ കവിതകളിൽ തെളിയുന്നതെങ്ങനെ ? - ഉപന്യസിക്കുക.

35. ഒരു സാധു യുവതിയുടെ ജീവിതസങ്കടങ്ങൾ 'മുടുപടത്തിൽ' എന്ന കഥയിൽ തെളിയുന്നതെങ്ങനെ ? വിശദീകരിക്കുക.

(2 × 15 = 30 Marks)

Reg. No. : .....

Name : .....

Second Semester B.Com. Degree Examination, May 2020

First Degree Programme under CBCSS

Language Course (Additional Language) – Latin

LT 1211.2 – TRANSLATION AND COMMUNICATION SKILLS IN LATIN

(2015 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

PART – A

Responde omnibus.

Delige verbum aptissimum.

1. Ante sacerdotem in \_\_\_\_\_ (templo, templi, templorum) fuerimus.
2. Multae vaccae in agros nostros \_\_\_\_\_ (veni, venisti, veniunt).

Indica verum (T) an falsum (F).

3. *Audi alteram partem* means listen to the judge when necessary.
4. *Caveat emptor* means let a purchaser beware.

Scribe quod non aptum:

5. Caelum, Virum, Aurum, Argentum
6. Montis, Collis, Claris, Ducis.

### Qui dicit sequentia verba

7. Ego tibi famam et gloriam maximam dabo. (Venus, Minerva, Juno).
8. Beati qui lugent quoniam ipsi consolabuntur (Sanctus Augustinus, Iesus Christi, Sanctus Paulus).

### Imple loca vacua propria verba:

9. Ante \_\_\_\_\_ (signi, signum, signo) in horto fuero.
10. Aves caelum \_\_\_\_\_ (amo, amat, amant).

(10 × 1 = 10 Marks)

### PART – B

Responde octo de datis.

### Explica verba et significationem verba insequentia

11. De lege ferenda.
12. Inter vivos.
13. Lex scripta.
14. Lex fori.

### Scribe Anglica verba quae derivantur de verbis datis:

15. Quies.
16. Miles.
17. Custodire.
18. Petere.

**Corrige sententiam:**

19. Milites claras viri cineres in aquam mittunt.
20. Iam sacerdos pueris bonos imaginem dederat.

**Scribe diversitatem inter verba:**

21. Corpus et Hortus.
22. Civis et Avis.

**(8 × 2 = 16 Marks)**

**PART – C**

**Responde sex de datis**

**Explica sententias datas:**

23. In eo pomo erant duo verba: "deae pulcherrimae".
24. Paris Venerem elegit et pomum ei dedit.
25. Beati qui lugent quoniam ipsi consolabuntur.
26. Videns autem turbas ascendit in montem.

**Redde in Latinam linguam**

27. Oh man! you are dust. The priest was carrying the ashes of a holy man into the temple. Thieves wounded the traveller with stones. Maid-servant, I see dust on the table. The colour of our blood is red.
28. And opening his mouth he taught them, saying: Blessed are the poor in spirit: for theirs is the kingdom of heaven. Blessed are the meek: for they shall possess the land.

Redde in Anglicam linguam.

29. Beati mundo corde quoniam ipsi Deum videbunt. Beati pacifici quoniam filii Dei vocabuntur. Beati qui persecutionem patiuntur propter iustitiam quoniam ipsorum est regnum caelorum.
30. Latrones non viderunt aurum, quod a servis in templum portabatur. Hae sunt spinae, quibus puella vulnerabitur. Caelum stellis, et terra floribus ornatur. Rosa spinis armature. Lupi crudeles ab agricolis necabuntur.
31. Post multos annos Agricola iucundam senectutem habebat. In iuventute ludos amamus, in senectute quietem. Caritas et pietas sunt magnae virtutes. Parvus mus puellas et mulieres terruit.

(6 × 4 = 24 Marks)

PART – D

Responde duo de datis

32. Discepta fabulam deorum dearumque in matrimonio et significationem iudicii Paridis.
33. Explica edictum Iesu in Sermone de Monte.

Scribe sententias verbis aptis:

34. Hic iuvenis <sup>1</sup> \_\_\_\_\_ (delectantur, delectatur, delectamur) ludis, ille libris.
- Vitia a civibus bonis <sup>2</sup> \_\_\_\_\_ (vitantur, vitare, vitatur).
- Oratores a <sup>3</sup> \_\_\_\_\_ (poetarum, poetas, poetis), et poetae ab <sup>4</sup> \_\_\_\_\_ (orator, oratoribus, oratorem) saepe laudantur.
- Agri ab <sup>5</sup> \_\_\_\_\_ (apis, aper, aprorum) et silvae ab <sup>6</sup> \_\_\_\_\_ (elephantis, elephantum, elephantis) vastabantur.

Caput vaccae \_\_\_\_\_ 7 \_\_\_\_\_ (duos, duas, duobus)  
\_\_\_\_\_ 8 \_\_\_\_\_ (cornibus, cornua, cornuum) ornatur et armatur.

Sacerdotes preces longas \_\_\_\_\_ 9 \_\_\_\_\_ (dicere, dicit, dicunt).

Filia agricolae vocem \_\_\_\_\_ 10 \_\_\_\_\_ (pulchram, pulcher, pulchro) habebit.

Multi homines ante \_\_\_\_\_ 11 \_\_\_\_\_ (crux, crucem, cruci) preces dicunt.

Pastor, post \_\_\_\_\_ 12 \_\_\_\_\_ (nox, noctis, noctem) duc \_\_\_\_\_ 13 \_\_\_\_\_  
(gregem, grege, grex) in silvam.

In schola \_\_\_\_\_ 14 \_\_\_\_\_ (nostri, nostrae, nostra) iudicum filios docebas.

Iudex \_\_\_\_\_ 15 \_\_\_\_\_ (pigri, pigros, pigras) pueros monebit.

35. Milites clari viri cineres in \_\_\_\_\_ 1 \_\_\_\_\_ (aquae, aquam, aquarum)  
\_\_\_\_\_ 2 \_\_\_\_\_ (mittunt, mitto, mittere).

\_\_\_\_\_ 3 \_\_\_\_\_ (Radicis, Radicum, Radices) arborum non videmus.

Iam sacerdos pueris bonis imaginem \_\_\_\_\_ 4 \_\_\_\_\_ (dederam, dederat, dederamus).

Legionis milites ante \_\_\_\_\_ 5 \_\_\_\_\_ (aestas, aestatis, aestatem, multos)  
\_\_\_\_\_ 6 \_\_\_\_\_ (ager, agros, agri) vastaverint.

Sacerdos viri \_\_\_\_\_ 7 \_\_\_\_\_ (sancti, sanctorum, sanctum) cineres in templum  
\_\_\_\_\_ 8 \_\_\_\_\_ (portabo, portabat, portabam).

Latrones viatorem lapidibus \_\_\_\_\_ 9 \_\_\_\_\_ (vulneravi, vulneravis, vulneraverunt).

Homo, pulvis \_\_\_\_\_ 10 \_\_\_\_\_ (sum, es, sunt).

Ancilla \_\_\_\_\_ 11 \_\_\_\_\_ (pulver, pulveris, pulverem) in mensa \_\_\_\_\_ 12 \_\_\_\_\_  
(video, videre, viderant).

Color sanguinis nostri \_\_\_\_\_<sup>13</sup> (sum, es, est) ruber.

In regione nostra non \_\_\_\_\_<sup>14</sup> (sumus, estis, sunt) leones.

Multitudo clari oratoris orationem \_\_\_\_\_<sup>15</sup> (audit, audire, audiverunt).

(2 × 15 = 30 Marks)

\_\_\_\_\_

St. Xavier's College