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Reg. No. :

Name :

**First Semester B.A./B.Sc./B.Com. Degree Examination,
March 2023**

First Degree Programme under CBCSS

Language Course – I – English

EN 1111.1/EN 1111.2/EN 1111.3 : LANGUAGE SKILLS

**(Common for B.A./B.Sc. (EN 1111.1), B.Com. (EN 1111.2) &
Career Related Group 2(a) (EN 1111.3))**

(2019 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** questions, each in a word or sentence.
1. The rate at which our vocal cord vibrates or the frequency of vibration is called _____.
2. Stress is marked by the sign _____.
3. There are _____ Pure vowels in English.
4. _____ intonation is used to express requests.
5. What is RP?
6. Since letters do not correspond to sounds, English is known as _____ Language.
7. When the listener is actively involved consciously, it is called _____ Listening.

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8. The influence of mother-tongue while speaking English becomes a barrier called _____.
9. _____ are sounds during the production of which air escapes through the mouth freely and continuously without any audible friction.
10. A word with many syllables is called a _____ word.

(10 × 1 = 10 Marks)

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

11. What is podcasting?
12. What is the difference between Skimming and Scanning?
13. What is Descriptive writing?
14. What is Plagiarism?
15. What is the role of gestures in communication?
16. Explain Netiquette.
17. Mention any four telephone etiquette one must be aware of.
18. What are entropy, redundancy and noise?
19. What are the barriers faced by a second language learner while learning English?
20. What are the major non-verbal cues one must watch out for in communication?
21. How can we improve listening skills?
22. What are diphthongs?

(8 × 2 = 16 Marks)

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

23. Complete the conversation given below :

Seena : Hi John! How was the interview?

John : _____

Seena : Did they ask you a lot of questions?

John : _____

Seena : What was the first question?

John : _____

Seena : How many people were there in the panel?

John : _____

Seena : Will they take your experience into consideration?

John : _____

Seena : Hope you get your dream job, John. All the best!

John : _____

24. You are the anchor of the Union Inauguration at your college. Write a script for the same.

25. Prepare a speech motivating students to refrain from drug and substance abuse.

26. Write not less than ten exchanges of a telephone interview you are attending for the post of an HR executive.

27. Write a blog on the rise in atrocities against children.

28. Draft an email to request your Municipality authorities requesting them to install a plastic decomposing unit in your locality.

29. Write a script for a podcast on environmental issues.

30. Edit the passage given below :

Children are our little selves. They are here to remind us that the world has innocence left to make life beautiful. Little meenu is only 3 years old. But she is more sensitive to her Environment than adults. Every day, she takes time to feed the birds and squirrels in her back yard. The last day, she asked a curious question to her mother when she gave her scrambled eggs: "Mamma, are these babies not allowed to be born? Then I don't want them. Their mother will be crying". The mother was not able to answer her. That's how children are. They make us think about things we choose to conveniently forget. Yes, as the poet said, *Child is the father of man.*

31. You are the General Captain of your college. Prepare the minutes of the meeting conducted to decide about the conduct of the Annual Sports Day.

(6 × 4 = 24 Marks)

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

32. Write a paragraph on any **two** of the following :

(a) The World Cup Football

(b) Videogames

(c) Safe Driving

33. Write a telephone conversation between you and your manager regarding applying for a week's leave for a family function.

34. Prepare a speech to be delivered on World Human Rights Day.

35. Prepare a covering letter and a CV for the post of a reporter in a Sports Magazine in response to an advertisement you came across in a newspaper.

(2 × 15 = 30 Marks)

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Reg. No. :

Name :

First Semester B.A./B.Sc. Degree Examination, March 2023

First Degree Programme under CBCSS

Language Course : Additional Language – Hindi

HN 1111.1 – HINDI KATHA SAHITYA

(2020 Admission onwards)

Time : 3 Hours

Max. Marks : 80

- I. एक शब्द या वाक्य में उत्तर लिखिए।
1. सुकुमारी किसकी पत्नी है?
2. दुखी चमार की मृत्यु कैसे हुई?
3. किशोर सिंह के पास शरण मांगकर कौन आये?
4. मां की रसोई कैसे दिखती थी?
5. 'अमरूद का पेड़' कहानी का रचयिता कौन है?
6. घोष बाबू के माली ने मां से क्या कहा?
7. कमल गाँव क्यों आया था?
8. मोबाईल उपन्यास की नायिका कौन हैं?
9. नवीन खन्ना कौन है?
10. रिद्धी और सिद्धी कौन हैं?

(10 × 1 = 10 Marks)

P.T.O.

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

11. पंडित घासीराम दुखी चमार से क्या-क्या काम करवाये?
12. किशोर सिंह कैसा व्यक्ति था?
13. चित्रा मुद्गल के दो उपन्यासों के नाम लिखिए।
14. डोमिन क्या काम करती थी?
15. अमरुद के पेड़ को लेकर क्या अंधविश्वास फैला था?
16. सलाम रिवाज़ क्या है?
17. हरीश सलाम के लिए क्यों नहीं जाना चाहता?
18. प्रेमचंद का साहित्यिक परिचय दीजिये।
19. आदित्य कौन है?
20. नवीन खन्ना कैसा व्यक्ति है?
21. मोबाइल उपन्यास में फरहत की भूमिका क्या है?
22. मधुलिका और नवीन की मुलाकात कैसे हुई?

(8 × 2 = 16 Marks)

III. किन्हीं छः प्रश्नों के उत्तर करीब 120 शब्दों में लिखिए।

23. नवीन खन्ना ने मधुलिका को धोखा कैसे दिया?
24. आदित्य की चरित्रगत विशेषताएं लिखिए।
25. फरहत के परिवार का परिचय दीजिये।
26. दुखी चमार के शव के साथ घासीराम ने कैसा अनादर प्रकट किया?

27. क्षमा शर्मा का साहित्यिक परिचय दीजिये।
28. ऐलिस और विल्फ्रेड शरणार्थी कैसे बने?
29. अमरुद के पेड़ से सम्बंधित क्या-क्या यादें लेखक के मन में अब भी ताज़ा है?
30. अपने घर में हरीश को लाने से कमल की मां नाराज़ क्यों थी?
31. सद्गति कहानी में अभिव्यक्त सामाजिक विसंगति पर टिप्पणी लिखिए?

(6 × 4 = 24 Marks)

IV. किन्हीं दो प्रश्नों के उत्तर करीब 250 शब्दों में लिखिए।

32. 'मोबाइल' उपन्यास का सारांश लिखिए।
33. नवीन खन्ना के नायक-खलनायक भूमिका पर प्रकाश डालिए।
34. 'सलाम' कहानी में अभिव्यक्त जातिगत भेदभाव पर प्रकाश डालिए।
35. 'मां रसोई में रहती है' कहानी में चित्रित मां-बेटे के आत्मीय सम्बन्ध पर प्रकाश डालिए।

(2 × 15 = 30 Marks)

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Reg. No. :

Name :

First Semester B.A./B.Sc. Degree Examination, March 2023

First Degree Programme under CBCSS

Language Course II – Additional Language I – Malayalam

ML 1111.1 : മലയാളകവിത

(2021 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

- I. ഒരു വാക്കിലോ വാക്യത്തിലോ ഉത്തരം എഴുതുക.
1. മലയാളത്തിലെ ഏറ്റവും പ്രാചീനമായ പാട്ടുകൃതി ഏത്?
2. “എന്നുടെ ഭർത്താവു തുണയിനിക്ക്” ആരുടെ വാക്കുകൾ?
3. “ചീർക്കുന്ന മോദത്തെ പൂണ്ടു കണ്ണൻ” - എപ്പോൾ?
4. ‘മാസലപർവ്വം’ കഥ പറയുന്നതാര്? ആരോട്?
5. ‘മലയാളത്തിലെ മഹോപനിഷത്ത്’ എന്നറിയപ്പെടുന്ന കൃതിയേത്?
6. ചന്ദ്ര എന്നാൽ എന്ത്?
7. ‘കരുണ’യുടെ വൃത്തം ഏത്?
8. “ചന്ദനത്തയ്യാണെങ്കിലുരഞ്ഞാൽ മണം പൊങ്ങും” ആരെക്കുറിച്ചാണ് ഈ പരാമർശം?

P.T.O.

- കൂടി മനസ്സിലാക്കി നോക്കുക. കൃഷിയിൽ ഉപയോഗിക്കേണ്ടതെന്താണ്?

ചോദ്യങ്ങൾക്കു മറുപടി എഴുതുക. -

15. "പാടാമെന്നു പറയുന്നതെന്താണ്? പാടാമെന്നു പറയുന്നതെന്താണ്?"

- ആരുടെ പാടാമെന്നു പറയുന്നതാണ്?

14. "പുതിയതേ, പഴയതേ, പഴയതേ, പഴയതേ" എന്ന് പറയുന്നതെന്താണ്?

- നവംബർ 1950-ൽ എഴുതിയത്.

പുതിയതേ, പഴയതേ, പഴയതേ, പഴയതേ.

13. "കൊടുക്കുക" എന്നാണിതിന്റെ അർത്ഥം.

- നവംബർ 1950-ൽ എഴുതിയത്.

അതേ, അതേ, അതേ, അതേ.

12. "മനസ്സിലാക്കുക" എന്നാണിതിന്റെ അർത്ഥം.

- ആരുടെ മനസ്സിലാക്കുക? മനസ്സിലാക്കുക.

11. "ആ മനസ്സിലാക്കുക" എന്നാണിതിന്റെ അർത്ഥം.

11. "ആ മനസ്സിലാക്കുക" എന്നാണിതിന്റെ അർത്ഥം.

(10 x 1 = 10 Marks)

നവംബർ 1950-ൽ എഴുതിയത്. -

10. "പുതിയതേ, പഴയതേ, പഴയതേ, പഴയതേ" എന്ന് പറയുന്നതെന്താണ്?

9. "കൊടുക്കുക" എന്നാണിതിന്റെ അർത്ഥം.

(8 x 2 = 16 Marks)

- 16. "ഈ തെറ്റിപ്പോയിത്തോന്നിപ്പോയി" - നവദശകാലം - നവദശകാലം - നവദശകാലം
- 17. "ആശയം തന്നെ" - നവദശകാലം - നവദശകാലം - നവദശകാലം
- 18. "ഈ നവദശകാലം" - നവദശകാലം - നവദശകാലം - നവദശകാലം
- 19. "ഈ നവദശകാലം" - നവദശകാലം - നവദശകാലം - നവദശകാലം
- 20. "ഈ നവദശകാലം" - നവദശകാലം - നവദശകാലം - നവദശകാലം
- 21. "ഈ നവദശകാലം" - നവദശകാലം - നവദശകാലം - നവദശകാലം
- 22. "ഈ നവദശകാലം" - നവദശകാലം - നവദശകാലം - നവദശകാലം

28. അസ്തമയപർവ്വത്തിൽ ഭാസ്കരഭഗവാൻ മറഞ്ഞപ്പോഴുള്ള കാഴ്ചകൾ വർണ്ണിക്കുക.

29. 'സൗന്ദര്യലഹരി' എന്ന കവിതയിൽ തെളിയുന്ന ചങ്ങമ്പുഴയുടെ ജീവിതദർശനം വിവരിക്കുക.

30. "പകലും രാത്രിയുമോരോ

പരുന്തുകൾ പോലെ വന്നെൻ

കവിളിന്മേൽ നഖം പോറി-

പ്പറന്നുപോകെ"

- സന്ദർഭം വെളിപ്പെടുത്തി സൂചിതത്തിന്റെ ഭംഗിയും ഔചിത്യവും വ്യക്തമാക്കുക.

31. "നല്ലതുവല്ലോ മോഷ്ടിച്ചാലുടനേ

അവനേ - വെറുതേ

കള്ളനാക്കും നിങ്ങളെ ചട്ടം"

- ആക്ഷേപഹാസ്യത്തിന്റെ ശക്തിയും ഔചിത്യവും ഈ വരികളെ മുൻനിർത്തി വിലയിരുത്തുക.

(6 x 4 = 24 Marks)

IV. മൂന്നുരു വാക്കിൽ ഏതെങ്കിലും രണ്ടു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

32. കലികാലവർണ്ണനയിൽ തെളിയുന്ന എഴുത്തച്ഛന്റെ വർണ്ണനാപാടവം വിവരിക്കുക.

33. പെണ്ണ് അനുഭവിക്കുന്ന ദുരിതലോകങ്ങളെ പെൺകുഞ്ഞു 90, കുള്ളക്കടവിൽ, ഓർമ്മകൾ മറയുന്നത് എന്നീ കവിതകളെ മുൻനിർത്തി വിശദീകരിക്കുക.

34. പെരുന്തച്ചന്റെ മനോവിചാരങ്ങളെ മനഃശാസ്ത്രരീत्या അപഗ്രഥിക്കുക.

35. കവിജീവിതം തെരഞ്ഞെടുക്കുന്നതിന്റെ ദുഃഖങ്ങൾ കാടിന്റെ മടിയിൽ, വിരാമം, എഴുത്ത് എന്നീ കവിതകളെ അന്വദമാക്കി ചർച്ച ചെയ്യുക.

(2 × 15 = 30 Marks)

(Pages : 4)

P – 7702

Reg. No. :

Name :

First Semester B.Sc. Degree Examination, March 2023

First Degree Programme under CBCSS

Physics

Complementary Course for Mathematics

PY 1131.1 : MECHANICS AND PROPERTIES OF MATTER

(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. What are the uses of a fly wheel?
2. State parallel axis theorem.
3. Define radius of gyration.
4. Define simple harmonic motion.
5. Define centre of suspension of a pendulum.
6. What is bending moment?
7. What is called surface energy?
8. 'Antiseptics have low surface tension'. Why?

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9. Why mercury does not wet glass?
10. A tiny liquid drop is spherical but a larger drop has oval shape. Why?

(10 × 1 = 10 Marks)

SECTION – B

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

11. Why the circular ring has more moment of inertia than a circular disc?
12. Obtain an expression for moment inertia of a uniform bar of rectangular cross section.
13. Obtain an expression of, kinetic energy of rotating body.
14. What is progressive wave and its types?
15. What is compound pendulum? Write the time period of a compound pendulum.
16. How do you find the acceleration due to gravity using bar pendulum?
17. What are the limitations of Poiseulli's formula?
18. How does Young's modulus increase?
19. How is Poiseulli's equation used in determining the relative viscosity?
20. Explain the term angle of shear and angle of twist.
21. What is the difference between free oscillations and forced oscillations?
22. How to measure the viscosities of liquid using an Ostwald's viscometer?

(8 × 2 = 16 Marks)

SECTION – C

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

23. Calculate the moment of inertia of a uniform circular disc of mass 500gm and radius 10 cm about axis tangent to the disc and parallel to diameter.
24. A rectangular metal hoop of mass 1 kg and radius 0.2 meter makes 10 revolutions per second about its centre. The axis of rotation being normal to the plane of the hoop. Find the moment of inertia about this axis? Also determine angular momentum about the same axis?
25. A particle moves in the potential energy field $U = U_0 - Px - Qx^2$. Find the expression for the force. Also calculate the force constant and time period.
26. If in air a plane wave of frequency 256 Hz and amplitude 1/1000 mm is produced. Calculate the radiated energy per unit volume and the energy current. Given velocity of sound = 332m/sec and density of air = 1.29kg/m^3 .
27. A body having a mass of 4gm executes simple harmonic motion. The force acting on the body, when displacement is 8 cm, is 24gm. Find the period? If the maximum velocity is 500 cm/sec, find the amplitude and maximum acceleration.
28. A sphere of mass 0.8 kg and radius 0.03 m is suspended from a wire of length 1m and radius 5×10^{-4} m. If the period of torsional oscillations of this system is 1.23 sec. Calculate the modulus of rigidity of the wire.
29. A cylindrical rod of diameter 14 mm rests on two knife - edges 0.8 m apart and a load of 1 kg is suspended from its mid-point. Neglecting the weight of the rod, calculate the depression of the mid-point if Y for its material be $2.04 \times 10^{11} \text{N/m}^2$.
30. Calculate the mass of water flowing in 10 minutes through a tube of 0.1cm in diameter, 40 cm long, if there is a constant pressure head of 20 cm of water. The coefficient of viscosity of water is 0.0089 SI units.
31. Calculate the work done against surface tension force in blowing a soap bubble of 5 cm radius if the surface tension of soap solution is 0.025n/m.

(6 × 4 = 24 Marks)

SECTION – D

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

32. Derive an expression for moment of inertia of a rectangular bar about an axis passing through its centre of gravity and perpendicular to its length.
33. Derive the one dimensional general equation of wave motion.
34. Describe the Jaeger's method for determining the surface tension of given liquid.
35. Obtain an expression for the twisting couple per unit twist of a uniform solid cylinder.

(2 × 15 = 30 Marks)

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P – 7700

Reg. No. :

Name :

First Semester B.Sc. Degree Examination, March 2023

First Degree Programme under CBCSS

Statistics

Complementary Course for Mathematics

ST 1131.1 – DESCRIPTIVE STATISTICS AND BIVARIATE ANALYSIS

(2022 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer all questions. Each question carries 1 mark.

1. What is a questionnaire?
2. Define nominal scale with an example.
3. If the sum of N observations is 630 and their mean is 42, find the value of N.
4. Define harmonic mean.
5. Mean deviation is minimum when deviations are taken from
6. Define skewness.
7. What is scatter diagram?
8. What is the principle of least squares?
9. What is the relation between the correlation coefficient and the regression coefficients?
10. Interpret the value of 0 for the product moment correlation coefficient.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

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

11. Distinguish between census and sampling.
12. Define systematic sampling.
13. What is classification and tabulation of data?
14. Show that $A.M \geq G.M. \geq H. M$ for any data set.
15. In a moderately asymmetrical distribution median is 41.6, mode is 48.4. Find mean.
16. Show that standard deviation is not affected by change of origin.
17. If the coefficient of variation of a distribution is 50 and its variance is 400. What will be the value of arithmetic mean?
18. Write the normal equations required for fitting of a straight-line $y = ax + b$.
19. Write the relationship between first four central moments in terms of raw moments.
20. Define coefficient of determination.
21. The correlation coefficient between two variables X and Y is $r = 0.60$. If the means and standard deviations of X and Y are 10, 20, 1.50 and 2.00 respectively, find the regression equation of Y on X .
22. Distinguish between positive and negative correlation.

(8 × 2 = 16 Marks)

SECTION – C

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

23. Distinguish between sampling and non-sampling errors.
24. Explain simple random sampling with replacement and without replacement

25. Calculate the geometric mean for the following data.

| | | | | |
|-------------|-----|-----|-----|-------|
| Class : | 1-3 | 4-6 | 7-9 | 10-12 |
| Frequency : | 8 | 16 | 15 | 3 |

26. Calculate mean deviation about mean of 8, 24, 12, 16, 10, 20.

27. The mean marks of 80 students of a class are 65. The mean marks of boys are 70 and that of girls is 62. Find the number of girls in the class.

28. Find the first, second and third moments about the origin for the set of numbers 1, 3, 5, 7.

29. Explain the least square method of fitting of a parabola.

30. Calculate the rank correlation coefficient from the following data specifying the ranks of 7 students in two subjects.

| | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|---|
| Rank in 1 st subject : | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Rank in 2 nd subject : | 4 | 3 | 1 | 2 | 6 | 5 | 7 |

31. Show that correlation coefficient is independent of change of origin and scale.
(6 × 4 = 24 Marks)

SECTION – D

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

32. Calculate mean, median and mode for the following data.

| | | | | | | |
|-------------|------|-------|-------|-------|-------|-------|
| Class : | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 |
| Frequency : | 5 | 15 | 40 | 32 | 20 | 8 |

33. Calculate Karl Pearson's coefficient of skewness for the following frequency distribution.

| | | | | | | | | |
|-------------|-------|-------|-------|-------|-------|-------|-------|---------|
| Class : | 65-69 | 70-74 | 75-79 | 80-84 | 85-89 | 90-94 | 95-99 | 100-104 |
| Frequency : | 8 | 15 | 18 | 25 | 14 | 9 | 6 | 5 |

34. Fit an equation of the form $y = ab^x$ to the following data.

| | | | | | | | |
|----|----|----|----|----|-----|-----|-----|
| x: | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y: | 32 | 47 | 65 | 92 | 132 | 190 | 275 |

Estimate y when $x = 8$.

35. The following are the data on the average height of the plants and weight of yield per plot recorded from 10 plots of rice crop.

| | | | | | | | | | | |
|-------------|----|----|----|----|----|----|----|----|----|----|
| Height (X): | 28 | 26 | 32 | 31 | 37 | 29 | 36 | 34 | 39 | 40 |
| Yield (Y): | 75 | 74 | 82 | 81 | 90 | 80 | 88 | 85 | 92 | 95 |

Find :

- correlation coefficient between X and Y
- the regression coefficients and hence write down the regression equations and
- probable value of the yield of a plot having an average plant of height of 98 cm.

(2 × 15 = 30 Marks)

Reg. No. :

Name :

First Semester B.A./B.Sc. Degree Examination, March 2023

First Degree Programme Under CBCSS

Foundation Course — I

EN 1121/CG 1121.3 : WRITINGS ON CONTEMPORARY ISSUES

(Common for B.A./B.Sc./English and Communicative English)

(2019 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** questions, each in a word or a sentence.
 1. Name two NGOs mentioned in the article on drug abuse.
 2. Expand UTM and AI.
 3. When was the term secular first used?
 4. Which 'gizmo' is the author wary of?
 5. Which organization was created to oversee changing labour and trade laws?
 6. What is meant by selective abortion of fetuses?
 7. What is the single most pressing challenge to the welfare of an older person in our country?
 8. Mention one reason for religious fundamentalism in our country.
 9. What do you mean by 'shock therapy'?
 10. What was the League of Nations?

(10 × 1 = 10 Marks)

II. Attempt **any eight** in not more than **50** words.

11. What is one of the major reasons for drug abuse as stated by Mukherjee?
12. What is the basis of the argument made by the Physicist Roger Penrose?
13. What is the role of social laws and civil laws?
14. Mention the role of the authority in the practice of secularism.
15. Describe briefly the phantom cat incident.
16. Why do we say that the notion of human rights is universal?
17. List out the first attempts made at writing down human rights in the form of a document.
18. Explain the phrase "natality discrimination".
19. What is the focus of Adam Smith's discussion, in *The Theory of Moral Sentiments*?
20. How does the lack of social support affect old age care in India?
21. Explain corporate globalism.
22. How has privatization affected healthcare in India?

(8 × 2 = 16 Marks)

III. Answer **any six** in around **100** words.

23. How do drugs affect the communication system of the brain?
24. "That I think is more humbling". Explain the context.
25. Comment on the relationship between religion and state.
26. What does Khyrunnisa say about apps?

27. What are the civil and political rights enshrined in the Universal Declaration of Human Rights?
28. Explain the attempts made by China and South Korea to empower women.
29. What are the differences between caring for the elderly in a rural versus an urban setting?
30. Discuss Sainath's ideas on 'engineered inequality' in India.
31. According to Amartya Sen, what are the advantages of women's education?

(6 × 4 = 24 Marks)

IV. Attempt **any two** questions in not less than **300** words.

32. Elucidate the solutions offered by Samudranil Mukherjee to the threat of drug abuse and the various initiatives to fight it.
33. Explain Romila Thapar's views on the idea of Indian Secularism and how they differ from other notion of secularism.
34. Trace the development of international recognition for and formulation of a written body of human rights.
35. Discuss the social challenges faced by elderly people in India.

(2 × 15 = 30 Marks)

(Pages : 4)

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Reg. No. :

Name :

First Semester B.Sc. Degree Examination, March 2023

First Degree Programme under CBCSS

Mathematics

Core Course

MM 1141 : METHODS OF MATHEMATICS

(2018 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – I

All questions are compulsory. Each question carries 1 mark.

1. What is the local linear approximation of $f(x) = \sqrt{x}$ at $x_0 = 1$.
2. Define point of inflection.
3. Define critical point.
4. State Extreme value theorem.
5. For a particle in rectilinear motion, the acceleration and position functions $a(t)$ and $s(t)$ are related by the equation _____
6. Let $A(x)$ be the area under the graph of a nonnegative continuous function f over an interval $[a, x]$, then $A'(x) =$ _____.
7. Integrals over infinite intervals are known as _____

P.T.O.

8. $\cosh x + \sinh x =$ _____.
9. Define the work done by a force F .
10. The total mass of a homogeneous lamina of area A and density δ is _____.

(10 × 1 = 10 Marks)

SECTION – II

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

11. Evaluate $\lim_{x \rightarrow 0^+} \left(\frac{1}{x} - \frac{1}{\sin x} \right)$.
12. Find the subintervals of $[0, 2\pi]$ in which the function $f(x) = x + 2\sin x$ is decreasing.
13. Find all critical points of $f(x) = x^3 - 3x + 1$.
14. What are the geometrical implications of the multiplicity of a root of a polynomial?
15. Find the horizontal and vertical asymptotes of the curve given by $y = \frac{\ln x}{x}$.
16. Find the absolute extrema of $f(x) = 6x^{4/3} - 3x^{1/3}$ on the interval $[-1, 1]$.
17. 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 distance traveled by the particle during the time interval $0 \leq t \leq 3$.
18. Find the average value of the function $f(x) = \sqrt{x}$ over the interval $[1, 4]$.
19. Define hyperbolic sine and draw its graph.
20. Define improper integral. Is $\int_0^3 \frac{dx}{x^2 - 3x + 2}$ an improper integral? Explain.

21. Use Pappus Theorem to find the volume V of the torus generated by revolving a circular region of radius b about a line at a distance a (greater than b) from the center of the circle.
22. Evaluate $\int_0^{\infty} e^{-x} dx$.

(8 × 2 = 16 Marks)

SECTION – III

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

23. Evaluate $\lim_{x \rightarrow 0} (\cos x)^{1/x^2}$.
24. Find all the inflection points of $f(x) = xe^{-x}$.
25. Find the radius and height of the right circular cylinder of largest volume that can be inscribed in a right circular cone with radius 6 inches and height 10 inches.
26. State and prove Rolle's theorem.
27. Find the volume of the solid generated when the region between the graphs of the equations $f(x) = \frac{1}{2} + x^2$ and $g(x) = x$ over the interval $[0, 2]$ is revolved about the x -axis.
28. Using the notion of surface of revolution, show that the area of the surface of a sphere of radius r is $4\pi r^2$.
29. Find the length of the arc of the curve $y^2 = x^3$ from the origin to the point $(1, 1)$.
30. A spring exerts a force of 5 N when stretched 1 m beyond its natural length.
- (a) Find the spring constant k .
- (b) How much work is required to stretch the spring 1.8 m beyond its natural length?
31. Evaluate $\int_0^{\infty} (1-x)e^{-x} dx$.

(6 × 4 = 24 Marks)

SECTION – IV

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

32. (a) Find the radius and height of the right circular cylinder of largest volume that can be inscribed in a right circular cone with radius 6 inches and height 10 inches. 5
- (b) Using Roll's theorem show that between any two real root of $e^{-x} = \sin x$, there is at least one real root of $e^{-x} = -\cos x$. 5
- (c) Find the points of inflection of the cubic $y = \frac{a^2 x}{x^2 + a^2}$. 5
33. (a) Explain the 7 steps in sketching the graph of a rational function. 6
- (b) Sketch the graph of $y = \frac{x^2 - 1}{x^3}$. 9
34. (a) Find the length of the curve $y = \log \sec x$ between the points given by $x = 0$ and $x = \pi/3$. 5
- (b) Find the volume when the loop of the curve $y^2 = x(2x - 1)^2$ revolves about the x-axis. 5
- (c) Find the area of the surface that is generated by revolving the portion of the curve $y = x^2$ between $x = 1$ and $x = 2$ about the y-axis. 5
35. (a) A space probe of mass $m = 5.00 \times 10^4$ kg travels in deep space subjected only to the force its own engine. Starting at a time when the speed of the probe is $v = 1.10 \times 10^4$ m/s. the engine is fired continuously over a distance of 2.50×10^6 m with a constant force of 400×10^5 N in the direction of motion. What is the final speed of the probe? 6
- (b) Evaluate $\int_1^4 \frac{dx}{(x-2)^{2/3}}$. 5
- (c) Find the mass and center of gravity of the lamina bounded by the x-axis, the line $x = 1$, and the curve $y = \sqrt{x}$. Given $\delta = 2$. 4

(2 × 15 = 30 Marks)