Reg. No. : ....

Name : ....

Third Semester B.A./B.Sc. Degree Examination, March 2021

First Degree Programme under CBCSS

Malayalam

Language Course – Additional Language III

ML 1311.1 : ദൃശ്യകലാസാഹിത്യം

(2019 Admission - Regular)

Time : 3 Hours

Max. Marks : 80

I.   ഒരു വാക്കിലോ ഒന്നോ രണ്ടോ വാക്യത്തിലോ എല്ലാ ചോദ്യത്തിനും ഉത്തരമെഴുതുക.

1.   നളചരിതം ആട്ടക്കഥയ്ക്ക് കാന്താരതാരകം എന്ന വ്യാഖ്യാനം രചിച്ചതാര് ?

2.   തുള്ളൽപ്രസ്ഥാനത്തിന്റെ ഉപജ്ഞാതാവാര് ?

3.   'ബൈസിക്കിൾ തീവ്സ്' സിനിമയുടെ സംവിധായകൻ ആര് ?

4.   'കനലാട്ടം' ആരുടെ കൃതിയാണ് ?

5.   വറീത് ഏതു കൃതിയിലെ കഥാപാത്രമാണ് ?

6.   ഘോഷയാത്ര തുള്ളലിന്റെ കഥ അരങ്ങേറുന്ന വനപ്രദേശം ഏത് ?

7.   'നല്ലതു നല്ലതിനോടേ ചേരണം' - ആരുടെ വാക്കുകളാണിത് ?

8. കാളിദാസന്റെ അഭിജ്ഞാനശാകുന്തളം നാടകത്തിന് ഏ.ആർ. തയ്യാറാക്കിയ പരിഭാഷയുടെ പേരെന്ത് ?

9. നളന്റെ രാജ്യം ഏത് ?

10. 'ഇവൾ തന്നേക്കൂടി അറിയുന്നില്ല. പിന്നെയാണോ അതിഥിയെ?' - ആരായിരുന്നു ആ അതിഥി?

(10 × 1 = 10 Marks)

II. ഒരു ഖണ്ഡികയിൽ കവിയാതെ എട്ടു ചോദ്യത്തിന് ഉത്തരം എഴുതുക.

11. 'പ്രാന്തനാ, മരിക്കാതെ, മരണമില്ലാതെ എവിട്യോ കഴിയ്യ്' - ആരെക്കുറിച്ചാണ് പരാമർശം ? വ്യക്തമാക്കുക.

12. 'അഗ്നിയല്ലാതെ ദഹിപ്പിക്കുമോ?' - സന്ദർഭവും ആശയവും വ്യക്തമാക്കുക.

13. 'നിനക്കറിയോ, നാട്ടിലോരോ കമ്പിക്കാലിനും ഞാൻ കടക്കാരനാ' - സൂചിതമെന്ത് ?

14. ഭർത്യഗൃഹത്തിലേക്കു പോകുന്ന ശകുന്തളയെ ആശ്രമവൃക്ഷങ്ങൾ അനുഗ്രഹിച്ചതെങ്ങനെ ?

15. 'വിധി മികവേറും നിന്നെ മമ സഖിയായിട്ടല്ല നല്ല നിധിയായിട്ടല്ലോ തന്നു' - സന്ദർഭം വ്യക്തമാക്കുക.

16. 'എനിക്കീ വേദാന്തമൊന്നും വേണ്ട' - ആരുടെ വാക്കുകൾ ? സന്ദർഭം എഴുതുക.

17. 'ഭഗവാനേ, ഇതൊരാശ്ശീസല്ല, വരം തന്നെയാണ്' - സൂചിതമെന്ത് ?

18. സഖിമാരേ ! നമുക്കു ജനകപാർശ്വേ

ചെന്നാലല്ലീ കൗതുകം? - വിവക്ഷിതമെന്ത്?

19. 'ഞങ്ങളെ നീ ആരുടെ കൈയിലാണ് ഏല്പിക്കുന്നത്?' - ആരുടെ വാക്കുകൾ ? സന്ദർഭമേത് ?

20. തന്നെ പിടികൂടിയ നളമഹാരാജാവിനെ ഹംസം പുകഴ്ത്തുന്നതെങ്ങനെ ?

21. 'ചേതമില്ലാത്തതാർക്കും ചെയ്തുകൊടുക്കണമമ്രാ!' - ആരുടെ വാക്കുകൾ ? സന്ദർഭം എഴുതുക.

22. 'യൗവനം വന്നുദിച്ചിട്ടും ചെറുതായില്ല ചെറുപ്പം' - വക്താവാര് ? സൂചിതമെന്ത് ?

23. 'കേട്ടാലും ദുരിതശാന്തി കേവലം നമുക്കുണ്ടാകും' - സൂചിതം വ്യക്തമാക്കുക.

24. വിറ്റോറിയോ ഡിസീക്കയെക്കുറിച്ച് കുറിപ്പെഴുതുക.

25. തുള്ളലിന്റെ ഉത്ഭവത്തെക്കുറിച്ചുള്ള ഐതിഹ്യമെന്ത് ?

26. 'ഒന്നിനയച്ചാലക്കഥമാത്രം
    വന്നു പറഞ്ഞീടുകിലതു പോരും'
    - ആരുടെ വാക്കുകൾ ? വ്യക്തമാക്കുക.

(8 × 2 = 16 Marks)

III. ഓരോന്നിനും ഒന്നരപ്പുറത്തിൽ കവിയാതെ ആറു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

27. ഗൃഹിണീധർമ്മത്തെപ്പറ്റി കണ്വമഹർഷി ശകുന്തളയ്ക്കു നൽകുന്ന ഉപദേശമെന്ത്?

28. 'ഗുണവുമനവധി ദോഷമായിതു' - ആരുടെ വാക്കുകൾ ? സാരസ്യമെന്ത് ?

29. ശാകുന്തളത്തിലെ അനസൂയയും പ്രിയംവദയും സ്വഭാവം കൊണ്ട് വ്യത്യസ്തരാകുന്നതെങ്ങനെ ?

30. 'സബർമതി ദൂരെയാണ്. നവഖലിയാണ് സമീപം. നവഖലി !' - സന്ദർഭം എഴുതുക.

31. 'പുകകൊണ്ടുകണ്ണുമറഞ്ഞിരുന്നുവെങ്കിലും   ഹോതാവ്   ഹോമിച്ചത്   ഭാഗ്യവശാൽ
    അഗ്നിയിൽത്തന്നെ പതിച്ചു' വക്താവാര് ? വിവക്ഷിതമെന്ത് ?

32. 'നല്ലതു നല്ലതിനോടേ ചേരണം' - സന്ദർഭവും സ്വാരസ്യവും വെളിപ്പെടുത്തുക.

33. കുഞ്ഞമ്പുവെന്ന കഥാപാത്രം 'രാവുണ്ണി' നാടകത്തിൽ വഹിക്കുന്ന പങ്കെന്ത് ?

34. 'മാറ്റാരിൽ കനിവേറ്റമതുള്ളൊരു
    കൂറ്റാരേക്കാൾ മാറ്റാർ നല്ല'
    - ദുര്യോധനൻ ഇങ്ങനെ പറയാൻ കാരണമെന്ത് ?

35. ഉത്തമദൂതനെന്ന നിലയിൽ ഹംസത്തിന്റെ സ്വഭാവം നിരൂപിക്കുക.

36. 'ആ ഇക്കണ്ട നെലത്തിന് ഇങ്ങനെ എത്രയെത്ര കഥ പറയാൻ കാണും.' – രാവുണ്ണി ഇങ്ങനെ പറയാൻ കാരണമെന്ത് ?

37. പാണ്ഡവരുടെ വനജീവിതത്തെക്കുറിച്ചറിയാൻ ദുര്യോധനൻ അയച്ച ദൂതൻ തിരികെയെത്തി പറഞ്ഞ കാര്യങ്ങളെന്തെല്ലാം ?

38. ചലച്ചിത്രനിർമ്മിതിയിൽ തിരക്കഥ വഹിക്കുന്ന പങ്കെന്ത് ?

(6 × 4 = 24 Marks)

IV. മൂന്നു പുറത്തിൽ കവിയാതെ **രണ്ടു** ചോദ്യത്തിന് ഉത്തരം എഴുതുക.

39. നളചരിതം ആട്ടക്കഥയുടെ ഭാഷാപരവും സാഹിത്യപരവുമായ സവിശേഷതകൾ വ്യക്തമാക്കുക.

40. ഘോഷയാത്രയെ ആധാരമാക്കി നമ്പ്യാർക്കവിതയുടെ സവിശേഷതകൾ വിശദമാക്കുക.

41. ശാകുന്തളത്തിലെ നാലാമങ്കത്തിന്റെ പ്രാധാന്യത്തെക്കുറിച്ച് ഉപന്യസിക്കുക.

42. രാവുണ്ണി നാടകത്തെ ആധാരമാക്കി, പി.എം. താജിന്റെ നാടകസങ്കല്പത്തെക്കുറിച്ച് പ്രതിപാദിക്കുക.

43. 'ബൈസിക്കിൾ തീവ്സ്' സിനിമയിൽ അവതരിപ്പിക്കുന്ന യാഥാർത്ഥ്യങ്ങളുടെ ആഴം വെളിപ്പെടുത്തുക.

44. ഗാന്ധിയൻദർശനങ്ങളുടെ ആവിഷ്കാരം 'സബർമതി ദൂരെയാണ്' നാടകത്തിൽ നിർവ്വഹിക്കപ്പെടുന്നതെങ്ങനെ ?

(2 × 15 = 30 Marks)

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Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

Statistics

Core Course II

ST 1341 – PROBABILITY AND DISTRIBUTION – I

(2019 Admission Regular)

Time : 3 Hours

Max. Marks : 80

Use of calculator is permitted.

SECTION – A

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

1. Define supremum of a set.

2. What do you meant by neighbourhood of set?

3. Write an example for a countable set.

4. Find the limit of a sequence (a_n), where $a_n = \left(\dfrac{3 + 2\sqrt{n}}{\sqrt{n}} \right)$.

5. Define monotone sequence.

6. Define convergence of a sequence.

7. Define sample space.

8. State multiplication theorem of probability.

9. Define probability mass function.

10. Write an example for a continuous random variable.

(10 × 1 = 10 Marks)

SECTION – B

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

11. Define open set. Write an example for open set.

12. When do you say that a set is bounded? Write an example for bounded set.

13. Prove that the set of all rational numbers is countable.

14. Define Cauchy sequence.

15. Show that the sequence (a_n) where $a_n = \left(\dfrac{n^2 + 3n + 5}{2n^2 + 5n + 7} \right)$ converges to $\dfrac{1}{2}$.

16. Define root test.

17. Define oscillating sequence. Write an example.

18. What is the use of Raabes test?

19. Examine whether the series $\sum_{n=1}^{\infty} \dfrac{1}{n^2 \log n}$ convergent or not.

20. Define conditional probability.

21. Given $P(A) = 0.30$, $P(B) = 0.78$ and $P(A \cap B) = 0.16$. Compute $P(A^c \cap B^c)$ and $P(A \cap B^c)$.

22. If A and B are two independent events then prove that A^c and B^c are independent.

23. If the probability mass function of a random variable X is

    $f(x) = x / 6$, $x = 1, 2, 3$, find $P(X \geq 2)$.

24. Define distribution function. Write any two properties of distribution function.

25. Define marginal density function.

26. What is meant by mutual independence of events?

(8 × 2 = 16 Marks)

SECTION – C

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

27. Prove that the union of an arbitrary family of open set is open.

28. Show that

    (a) every finite set is bounded

    (b) every subset of bounded set is bounded.

29. Examine the convergence of the sequence $\{S_n\}$ where
$$S_n = \frac{1}{n+1} + \frac{1}{n+2} + \dots + \frac{1}{n+n}.$$

30. Using Cauchy's first theorem on limits prove that
$$\lim_{n \to \infty} \left[\frac{1}{\sqrt{n^2+1}} + \frac{1}{\sqrt{n^2+2}} + \dots + \frac{1}{\sqrt{n^2+n}} \right] = 1.$$

31. Prove that every absolutely convergent series is convergent.

32. Describe Cauchy's condensation test.

33. Write the mathematical and axiomatic definitions of probability.

34. State and prove addition theorem of probability for two events.

35. Prove that pairwise independence does not imply mutual independence.

36. If X is a random variable with probability density function
$$f(x) = \begin{cases} \frac{1}{2}, & 0 \le x \le 2 \\ 0, & otherwise \end{cases}$$
find the distribution function of X.

37. X is a random variable with probability density function $f(x) = \begin{cases} 3x^2 e^{-x^3}, & x > 0 \\ 0, & otherwise \end{cases}$

    and $Y = X^3$. Derive the probability density function of Y.

38. Joint probability density function of a bivariate random variable (X, Y) is given by
$$f(x, y) = \begin{cases} c(x^2 + y^2) & 0 < x < 2, 1 < y < 4 \\ 0, & otherwise \end{cases}$$
Determine c.

(6 × 4 = 24 Marks)

3

K– 2447

SECTION – D

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

39. State and prove Bolzano Weierstrass theorem.

40. Establish Leibnitz test.

41. Let $\{a_n\}$ and $\{b_n\}$ be two sequences with limits a and b respectively. Prove that

    (a) sequence $\{a_n + b_n\}$ converges to $a + b$

    (b) sequence $\{a_n b_n\}$ converges to ab and

    (c) sequence $\left\{\dfrac{a_n}{b_n}\right\}$ converges to $\dfrac{a}{b}$ if $b \neq 0$ and $b_n \neq 0$ for all n.

42. State and prove ratio test.

43. (a) State and prove Baye's theorem.

    (b) 60% of the students in a class are males and remaining are females. 50% of the male students and 80% of the female students are football lovers. If the elected class representative is football lover, find the probability that the representative is a female.

44. Joint probability density function of a bivariate random variable (X, Y) is given by

$$f(x) = \begin{cases} \dfrac{4(x + y)}{5x^3}, & 1 < x < \infty, \, 0 < y < 1 \\ 0, & \text{otherwise} \end{cases}$$. Examine the independence of X and Y

and compute $P(0 < Y < 0.5 | X = 2)$.

(2 × 15 = 30 Marks)

4   K– 2447

K – 2446

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, March 2021

First Degree Programme under CBCSS

Physics

Complementary Course for Statistics

PY 1331.3 – OPTICS, MAGNETISM AND ELECTRICITY

(2019 Admission Regular)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer any **ten** questions, each carries **1** mark.

1. Name an experiment to study interference.

2. Write any one use of Newton's ring experiment.

3. What do you mean by diffraction?

4. Write the use of a transmission grating in laboratory.

5. Write the expansion of LASER.

6. Define optical fibre.

7. Define magnetic susceptibility.

8. Define Curie temperature.

9. Define resonance in an LCR circuit.

10. Define *r.m.s* value of current.

SECTION – B

Answer **any eight** questions, each carries **2** marks.

11. State the principle of superposition of waves.

12. What are coherent sources.

13. What are the essential conditions to get interference of light?

14. What are the difference between interference and diffraction?

15. Write any two differences between Fresnel and Fraunhofer diffractions

16. Explain the resolving power of a grating.

17. Define grade index fibre.

18. Explain the propagation of light through an optical fibre.

19. Explain population inversion.

20. What are the properties of laser light?

21. Write the relations connecting M, B and H in magnetism.

22. Explain the term Hysteresis.

23. Define ferromagnetic domains.

24. Define power factor in an ac circuit

25. What is the use of a choke coil?

26. Write the working of a transformer.

(8 × 2 = 16 Marks)

K – 2446

SECTION – C

Answer any **six**, each question carries **4** marks.

27. In Newton's ring experiment the diameter of the 4th and 12th dark rings are 0.42 cm and 0.6 cm respectively . Obtain the wavelength of light used. Given that the radius of curvature of the lens used is 1 m

28. Intensity ratio of two coherent sources are 36:16. Calculate the ratio of amplitudes of the waves produced by the sources.

29. In a Young's double slit experiment, the slits are separated by 0.3 mm and the screen is placed 2 m away. The distance between the central bright fringe and the fourth fringe is measured to be 1.6 cm. Determine the wavelength.

30. A grating has 6000 lines per cm. Find the angular separation of the two yellow lines of mercury of wavelengths *577 nm* and *579 nm* in the 1st order.

31. A plane wave front is incident on a circular aperture of diameter 2.4 mm. Calculate the wavelength if the most intense point on the axis is at a distance of *2.5m.*

32. Calculate the smallest angular separation of two stars in radian, that may be observed through a telescope. The objective of the telescope has a diameter of 250 cm and the wavelength.

33. Calculate the ratio of spontaneous emission to stimulated emission by an incandescent bulb at 2000K. Given that frequency $v = 6 \times 10^{14}$ Hz

34. A step index fibre has the following parameters. n1 = 1.68, n2 = 1.44 and n_{air}= 1. Calculate the critical angle and maximum angle of refraction.

35. A rod of magnetic material 1 m in length has a coil of 200 turns wounded over it uniformly. If current of 2 A is passing through it, calculate the magnetic field H, the intensity of magnetization M, and magnetic induction B and the relative permittivity μ_r Given that susceptibility $\chi_m = 6 \times 10^{-3}$.

36. Derive the relation connecting magnetic permeability and magnetic susceptibility of a material

37. Derive the expression for ac current passing through a circuit containing a capacitance and resistance in series?

38. An electric lamp works in a 120 V dc, 10 A source is connected to an alternating voltage of 220 V at 50 Hz. Calculate the required inductance of choke of the circuit.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** each question carries **15** marks

39. Explain the interference in thin films by a reflected system and a transmitted system. How colours of thin films are observed?

40. Explain the Fresnel's theory of rectilinear propagation of light.

41. Explain the Fraunhofer diffraction in a single slit. Derive the expression for intensity distribution and draw the intensity distribution.

42. Explain the working of ruby laser in detail. Write any four applications of lasers.

43. Explain various types of magnetic behaviour shown by materials.

44. Discuss the behaviour of a series ac LCR circuit. Derive the expressions for the current, impedance and condition for resonance.

(2 × 15 = 30 Marks)

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Reg. No. : ....

Name : ....

Third Semester B.A./B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

English – (Language Course)

EN 1311.1/EN 1311.3 : ENGLISH FOR CAREER

(Common for B.A./B.Sc. and Career Related 2(a))

(2019 Admission, Regular)

Time : 3 Hours　　　　　　　　　　　　　　　　　　Max. Marks : 80 .

I.　Answer **all** the following questions. Follow the instructions given in the brackets wherever needed.

1.　The correct spelling of the word 'exibition' is _____

2.　The word that is the antonym of "economical" is _____

3.　'Fragrance' is a word related to the sense of _____

4.　_____ is the noun form of 'emigrate'.

5.　It _____ (be) an honour for him to lead and serve the company. (Use the correct tense form of the verb in brackets)

6.　Do you know where is the church. (Correct the sentence)

7.　What number of students are in this class? (Underline the error)

8.　The term 'epidemiological' is related to the study of _____

9. How much costs it to buy a diamond necklace?

(Correct the sentence)

10. They had to _____ the meeting yesterday due to the sudden bus strike.

(Use the appropriate phrasal verb which means "cancel or stop")

(a) Call up   (b) Call for

(c) Call off   (d) None of these

(10 × 1 = 10 Marks)

II. Answer **any eight** of the following questions.

11. Provide one word substitutes for any two of the phrases

(a) Stood up and applauded

(b) A piece of writing about the writer's journeys to different places

(c) A person who collects stamps

(d) A person who walks in her/his sleep

12. Give the antonyms of two of the following words

(a) convergence

(b) sensibility

(c) unknown

13. Give the synonym of two of the following words

(a) hilarious

(b) outlook

(c) modify

14. Make sentences of your own with any two of the following phrasal verbs

    (a) ran into

    (b) turned up

    (c) to make light of

    (d) made off with

15. Choose the correct option from the brackets :

    (a) The Manager _____ all the claims of the employee and dismissed him. (reputed / refuted).

    (b) I suppose the headmaster himself will _____ the matter now. (look into / look out for)

16. Fill in the blanks using a collective noun from those given below
(band, pride, herd, bunch, clutch) :

    (a) We saw a _____ of elephants moving across the river bed.

    (b) The rock _____ has been on tour for months.

17. Fill in the blanks using the suitable degree of the adjective given in brackets :

    (a) Lead is _____ than any other metal. (heavy)

    (b) He thinks he is _____ than his father. (wise)

Correct the error in the words / phrases given in italics :

18. (a) *Poorness* is not an enviable condition.

    (b) Here are the mangoes; please don't *take this* that are rotten.

19. (a) Suman studied in a *girls'* school till her tenth class.

    (b) Can you give me some *informations* on the uses of lasers?

20. (a) Environmental degradation is a *pereniel* problem for humans today.

    (b) My cousin likes fruits of *forin* countries.

21. (a) Your targets are *to achieving* before the end of this month.

    (b) The clothes were all washed and *hanged out* to dry.

22. Fill in the blanks with suitable words from those given in brackets.

    (when, enough, leisurely, rather)

    (a) He is a _____ careless fellow.

    (b) These are days _____ no one can have a sense of security.

    (c) He was foolish _____ to believe her.

    (d) I had a _____ walk.

23. Fill in the blanks with suitable words from those given in brackets.

    (medical, deliberate, grand, constant)

    (a) The battle of Waterloo ended in a _____ victory.

    (b) The injured man wants _____ advice.

    (c) _____ anxiety has undermined his health.

    (d) It is a _____ lie.

Read the paragraph and answer the question given below :

24. The global anti-ageing market is worth at least $250 billion - an astonishing amount, and it's growing. Anti-ageing treatments are supposedly used to correct 'premature ageing'. But what does this really mean? Surely ageing is just ageing. It is a process that occurs over time- at the time that it's supposed to.

(i) The word 'premature' is used in the passage to mean :

(ii) What is meant by the 'anti-ageing market' and what is it worth?

25. We do not know how to manage our machines. Machines were made to be man's servants: yet he has grown so dependent on them that they are in a fair way to become his masters. Already most men spend most of their lives looking after and waiting upon machines. And machines are very stern masters. They must be fed with coal, and given petrol to drink, and oil to wash with, and must be kept at the right temperature, and if they do not get their meals when they expect them, they grow sulky and refuse to work, or burst with rage, and blow up and spread ruin and destruction all around them.

(i) What has gone wrong in man's handling of machines?

(ii) What does "stern masters" mean?

26. Bacon calls the riches, the baggage of virtue :

For, as the baggage is to an army, so riches are to virtue. They cannot be spread nor left behind. Yet only hinder the march. Wealth brings care in its train. Pride goes with it. And where there is pride, there can be no real virtue.

What did Christ say of a rich man? "Verily, I say unto you, it is easier for a camel to go through the eye of a needle, than for rich man to enter the Kingdom of God".

(i) Riches are called the baggage of virtue. Why?

(ii) It is difficult for a man of riches to get into the kingdom of God. Why?

(8 × 2 = 16 Marks)

III. Answer **any six** of the following questions.

27. Fill in the blanks with the correct option

    (a) He was asked to take his aged mother to see a _____ physician.

    (paediatric / geriatric)

    (b) The server at the bank was _____ by cybercriminals.

    (morphed / hacked)

    (c) Prof. Harvey uses a lot of scientific _____ in his speeches.

    (jokes / jargon)

    (d) I'm just waiting for my father's nod of _____ so that I can go abroad to work.

    (assent / asset)

28. Fill in the blanks with suitable phrases from those given in brackets

    (make up, turned up, went off, ran out, called off, look into, look up, look for)

    (a) The workers _____ the strike.

    (b) The boys _____ at the stroke of the ball.

    (c) Surprisingly, very few guests _____ for the wedding.

    (d) A bomb _____ near the park yesterday.

29. Correct the error in **four** of the following sentences :

    (a) More than one attempt were made to rush on to the stage.

    (b) The Central Government not only provided the funds but the personnel also.

    (c) His wife, as well as his children are ashamed of him.

    (d) John thinks he is superior than everybody else.

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30. Fill in the blanks with the correct option

   (a) All kinds of foreign consumer brands are now available at our store, because of the _____ policy (loacalisation / liberalisation)

   (b) His decision to relocate to his native town was a _____ one.

   (judicious / judicial)

   (c) Why don't you _____ me instead of sending long e mails?

   (next / text)

   (d) The story is about two families that have an ongoing _____ that goes back three generations. (food / feud)

31. Fill in the blanks with suitable phrases from those given in brackets :

   (step down, held up, gave up , cut off, made up, found out)

   (a) The energy company _____ our electricity because we didn't pay.

   (b) I _____ playing football a long time ago because of a knee injury.

   (c) The Prime Minister has decided to _____ after 10 years in office.

   (d) The traffic on the motorway was _____ by construction work.

32. Correct the error, if any, in the section in italics in **four** of the following sentences :

   (a) I have spoken to him, but *what he could do* is another matter.

   (b) Dr. Shah will be leading the surgical team, *will he*?

   (c) I am supposed to join you at two in the afternoon, *aren't I*?

   (d) *Don't she know* that she has a seminar presentation tomorrow?

   (e) *You don't walk* on the grass, the signboard says.

33. Fill in the blanks with the suitable pronouns from those given in brackets :

(they, he, me, our, you, it, they, them, its, mine, him)

(a) You are stronger than _____

(b) I looked behind _____

(c) He said he had reported the incident to two constables but that none of _____ was willing to intervene.

(d) Nobody but _____ was present.

(e) There were doors all around the hall, but _____ were all locked.

(f) My parents like Latin music. The CD is for _____

(g) Here is another souvenir. I don't know what to do with _____

(h) Dad is coming with _____ to buy school supplies.

34. Correct the error in the sections in italics :

(a) She *must has been* on holiday.

(b) Vani is *as tall as* all other girls in her class.

(c) Your college is good, but mine *is best.*

(d) It rains heavily in Assam, *is'nt it?*

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K – 2116

35. Fill in the blanks with suitable words from those given in brackets :

(failure, contact, agonisingly, crash-landed, probe, journeying, successfully)

Over the weekend, India attempted to make history by becoming just the fourth nation to _____ land a _____ on the Moon. It came _____ close, but after _____ millions of kilometres, Vikram lander lost _____ in the final few hundred metres and _____ on the lunar surface. But it would be both unfair and plain wrong to label the mission a _____

36. Fill in the blanks with suitable words from those given in brackets :

(alarmed, embodiment, ambitious, necessities, sceptical, melancholic, improved, revoked)

(a) The Manager says that the order cannot be _____

(b) We should use _____ varieties of seeds to increase production of grains.

(c) Bruto was an unselfish worker. Yet people said that he was _____

(d) His father is _____ about the son getting a top rank.

(e) The residents were _____ by the fury of the storm.

(f) The music had a _____ touch.

(g) Many of the villages in India do not even have the bare _____ of life.

(h) Mother Teresa is regarded as an _____ of kindness and love.

37. Read the passage and answer the questions given below :

Raman was a voracious reader and pored eagerly over all books in his father's collection, among which were original writings of great scientists. These books were to him like old friends, never to be forgotten. He once said, 'Out of this welter of subjects and books, can I pick anything really to mould my mental and spiritual outlook and determine my chosen path'?

(i) _____ in the passage means 'highly enthusiastic'.

(ii) 'Pored eagerly over' means _____

    (a) read with great interest (b) studied carefully

    (c) both (a) and (b)   (d) skimmed trough

(iii) In the given passage, 'mould' is related to

    (a) the smithy   (b) pottery

    (c) baking   (d) character

(iv) 'Welter' means _____

38. Read the passage and answer the questions given below :

There has never been conceived or made by man any instrument, machine or contrivance, capable of such diversity of usefulness as the human hand. Nothing has ever existed with such infinite adaptability to various need, or capable of being trained to such degrees of dexterity and versatility. Nor is it likely that as perfect a machine, will ever be produced by human skill, for the only thing, the human hand cannot do is, to create an instrument as perfect as itself.

(i) Why is the human hand so useful?

(ii) 'Adaptability' means _____

(iii) _____ in the passage means 'an apparatus using mechanical power and having several parts, each with a definite function and together performing a particular task'.

(iv) Can as perfect an instrument as the human hand be ever created by man?

    (a) Can be created.

    (b) There are similar instruments as useful as the human hand.

    (c) Human hand or mind is incapable of making a similar machine as human hand. **(6 × 4 = 24 Marks)**

IV. Answer **any two** of the following questions, choosing **one from each group**.

GROUP – A

39. Read the following passage and answer the questions given below :

Once the casting is done, I am ready to plunge headlong into the business of shooting. The studios of Calcutta show their hallowed past in every crevice in the wall, in every tatter on the canvas that covers the ceiling. Some of the families of rodents that inhabit the rafters have lived there ever since the foundation of the industry. The floor is pitted, the camera groans as it turns, the voltage begins to drop after sundown. The general air of shabbiness is unnerving. And yet I do not mind these at all. I do not think of these as hindrances. After all, we have the essentials to make a film, and it is within us to make it badly or well. It is the bareness of means that forces us to be economical and inventive, and prevents us from turning craftsmanship into an end in itself. And there is something about creating beauty in the circumstances of shoddiness and privation that is truly exciting...Yes, I am happy to be working where I am.

1. 'Plunge headlong into' means _____

    (a) dive into water   (b) bang your head

    (c) to get fully involved   (d) none of the above

2. 'Hallowed' is closest in meaning to _____

    (a) holy   (b) hollow

    (c) ancient   (d) unknown

3. _____ is a synonym for 'creative'.

4. Another word from the passage that is close in meaning to 'shabbiness' is _____

5. 'Privation' is a word related to _____

   (a) privatisation   (b) privacy

   (c) piracy   (d) deprivation

6. 'Tattered' is related _____

   (a) paper   (b) cloth

   (c) noise   (d) music

7. The word opposite in meaning to the word 'pitted' is

   (a) smooth   (b) rough

   (c) full of holes   (d) clean

8. The word that is spelt correctly is

   (a) privetisation   (b) shoddiness

   (c) craftmanship   (d) crivice

9. The word that is spelt wrongly is : _____

   (a) ceiling   (b) voltage

   (c) hinderance   (d) business

Find the synonym of the words in Italics :

10. She cried *copious* tears when she lost her new shoes.

    (a) vast   (b) copying

    (c) plentiful   (d) messy

11. They burned the *effigy* of the despot in the town square.

    (a) dummy   (b) poster

    (c) reflection   (d) statue

Find the antonyms of the words in italics :

12. February 14 was set as a *tentative* date for the wedding.

    (a) temporary   (b) final

    (c) casual   (d) convenient

13. I must say you look very *urbane* in this suit.

    (a) elegant   (b) slow

    (c) crude   (d) foolish

Choose the most suitable one-word substitute for the phrase in italics :

14. Satyajit Ray is a world famous Bengali *film director who is involved in all the audio- visual elements of his films.*

    (a) producer   (b) actor

    (c) author   (d) auteur

15. Find the meaning of the word 'hindrance' from the passage given above and use it in a sentence of your own.

40. Spot the error in the underlined sections in the following sentences. If there is no error, the answer is 'd'

1. <u>You may go</u> <u>to your classes now,</u> <u>The Teacher said.</u> <u>No error</u>
       a   b   c   d

2. <u>Ravi asked Megha whether</u> <u>she is submitted her assignment</u>
             a   b

   <u>the class teacher.</u> <u>No error</u>
       c   d

3. <u>'I will not go into the hall</u> <u>until Resmi comes'</u>, <u>said Jyothi.</u> <u>No error.</u>
       a   b   c   d

4. <u>'Where did you</u> <u>lose your purse'</u>, <u>asked my mother.</u> <u>No error.</u>
       a   b   c   d

5. <u>The group promised that</u> <u>they would meet again</u> <u>next year.</u> <u>No error</u>
         a   b   c   d

6. <u>Twenty hundred weights</u> <u>make</u> <u>one ton.</u> <u>No Error.</u>
       a   b   c   d

7. <u>All the three commander-in chiefs</u> <u>are meeting</u> <u>the President today.</u>
             a   b   c
   <u>No error.</u>
       d

8. <u>I</u> <u>who your leader</u> <u>will give the signal.</u> <u>No error.</u>
     a   b   c   d

9. <u>Nothing</u> <u>is given</u> <u>for nothing.</u> <u>No error.</u>
       a   b   c   d

10. <u>Let</u> <u>you and he</u> <u>go together.</u> <u>No error.</u>
      a   b   c   d

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11. He failed in he attempted. No error.
        a   b   c   d

12. He knows better than to quarrel. No error.
        a   b   c   d

13. Few Indian towns are so big as Madras. No error.
          a   b   c   d

14. Why should I suspected by you. No error.
     a   b   c   d

15. Either he or I are mistaken. No error.
      a   b   c   d

41. Read the passage and answer the questions given below :

Monday morning found Tom Sawyer miserable. Monday morning always found him so- because it began another week's slow suffering in school. He generally began that day with wishing he had had no intervening holiday, it made the going into captivity and fetters again so much more odious. Tom lay thinking. Presently it occurred to him that he wished he was sick; then he could stay home from school. Here was a vague possibility. He canvassed his system. No ailment was found, and he investigated again. This time he thought he could detect colicky symptoms, and he began to encourage them with considerable hope. But hey soon grew feeble, and presently died wholly away. He reflected further. Suddenly he discovered something. One of his upper front teeth was loose. This was lucky; he was about to begin to groan as a 'starter', as he called it, when it occurred to him that if he came into court with that argument, his aunt would pull it out, and that would hurt. So he thought he would hold the tooth in reserve for the present, and seek further. Nothing offered for some little time, and then he remembered hearing the doctor tell about certain thing that laid up a patient for two or three weeks and threatened to make him lose a finger. So the boy eagerly drew his sore toe from under the sheet and held it up for inspection. But now he did not know the necessary symptoms. However, it seemed well worthwhile to chance it, so he fell to groaning with considerable spirit.

1. The word 'reflected' in the passage is closest in meaning to :

    (a) consider   (b) echoed

    (c) returned   (d) replicated

2. The phrase 'canvassing the system' in the passage means :

    (a) appeal   (b) campaign

    (c) fight   (d) check

3. The word in the passage which is the opposite of 'pleasing' is :

    (a) suffering   (b) intervening

    (c) colicky   (d) odious

4. Identify the statement which is true :

    (a) Tom thought it was bad luck to have a shaky front tooth

    (b) Tom hated being sick

    (c) Tom began to encourage the colicky pain with hope

    (d) None of the above

5. Monday morning found Tom Sawyer miserable. Why?

    (a) Tom was feeling colicky

    (b) Tom had a tooth ache

    (c) Tom was scared of going to the doctor

    (d) Tom did not like going to school

6. Why did Tom wish he had had no intervening holiday?

    (a) It made going back to school so much more hateful

    (b) Tom did not want to stay at home

    (c) School was always great fun for Tom

    (d) All of the above

7. "Ailment" means _____

8. The synonym for "fetters" is

   (a) fritters   (b) chains

   (c) fight   (d) check

9. By which phrase does Tom describe his experience in school?

10. The word "sore" in the phrase "sore toe" means

   (a) big   (b) broken

   (c) letters   (d) none of the above

11. Why did Tom canvass his system?

12. Why did Tom hold up the sore toe for inspection?

13. What was the 'starter' for Tom Sawyer?

14. Based on the incident mentioned here, comment briefly on the character of Tom Sawyer?

15. Suggest a suitable title for the passage.

GROUP – B

42. Answer **all** the following questions :

Fill in the blanks with suitable **tense** forms of the verbs given in brackets :

1. Nadella ————— (choose) to join Microsoft because he ————— (want) to make a difference.

2. It _____ (be) an honour for him to lead and serve the company.

3. We ————— (go) for a movie yesterday. ————— (Do) you ————— (know) that my friend's daughter ————— (act) in that movie? She ————— (play) the role of the heroine's younger sister, but it —————. (be) an important role. None of us ————— (expect) her to do so well, but she ————— (do) a great job. I ————— (hear) that she even ————— (win) an award for her role. Our club ————— (host) a reception for her when she ————— (come) to our town next month.

Fill in the blanks with suitable prepositions :

4. He warned you ——————— the danger, but you did not listen ——————— him.

5. France is famous ——————— its perfumes. You are looking ——————— some ——————— the most expensive brands available ——————— this country.

6. This company deals ——————— electronic goods. Ajay's been working here as Manager ——————— two years now.

7. Rewrite the following sentence into active voice :

   (a) Cricket is played in most countries today.

   (b) Will you be supported by your friends in this venture?

43. Read the passage and answer the questions given below :

Muhammad Yunus, the founder of Grameen Bank, is a Bangladeshi banker, author and economist whose focus on microcredit and microfinance concepts led to him being awarded the Nobel Price in 2006 for efforts to create economic and social development from below'. Yunus was born in 28 June 1940 in Chittagong. His father was jeweler and his mother was his role model; a women who helped anyone that knocked on their door. After high school and college, Yunus completed his PhD in Economics in the US and worked as an assistant professor of Economics till 1972, when he returned to Bangladesh. It was during this time that Yunus would stumble across an idea that lead to him helping millions of poverty people and would lead to him being awarded the Nobel Prize.

In 1974, Bangladesh suffered from a famine, resulting from rain and massive flooding that devastated crops. And the people of Bangladesh received no relief or aid from other countries. Yunus began to be actively involved in poverty reduction. He established a rural economic program as a research project and visited the poorest households in a village near Chittagong. He interviewed a woman who was making bamboo stools and learnt that she was being charged

exorbitant rates for her loans, and thus was barely making a profit. He realized the potential for recovery then and there and in an exhibition of practical economics, loaned the equivalent of twenty-seven US dollars to forty-two women in the village. It was his first loan. With more advantageous rates, these women were able to raise their profits and manage better than before. Without these new rates, the women would likely have been stuck in a rut for the rest of their lives. Yunus realized that on a smaller scale, microfinance and microcredit could really help Bangladesh's struggle with poverty.

1. The prefix _____ is used in the passage for 'small scale'

2. The word 'devasted' means _____

   (A) Devoid   (B) Desperate

   (C) Destroyed   (D) Deserted

3. The phrase that means 'without any change or improvement' is

   _____

4. The phrase 'from below' in the first sentence is used in the sense of

   _____

   (A) Below sea level   (B) From a disadvantaged country

   (C) Below poverty line   (D) None of the above

5. The word closest in meaning to "exorbitant" is _____

   (A) Ineffective   (B) Expected

   (C) Easily available   (D) Highly priced

6. The word 'rates' is related to _____

   (A) Cost   (B) Interest

   (C) Profit   (D) Loss

7. The word that is the antonym of 'urban' is _____

8. 'Exhibition of ' means _____

   (A) Display   (B) Open Mindedness

   (C) Expression   (D) None of the above

9. The wrongly spelt word is :

   (A) Exorbitant   (B) Advantageus

   (C) Microcredit   (D) Potential

10. The correctly spelt word is :

    (A) Povertystruck   (B) Exhibition

    (C) Famin   .(D) Poverty Stricken

11. I suppose the headmaster himself will _____ the matter now.

    (A) Look into   (B) Look at

    (C) Look out for   (D) Look up

12. In spite of our best efforts at secrecy, my mother _____ our plans for a surprise party.

    (A) Turn up   (B) Got wind of

    (C) Caught up with   (D) Wound up

13. A person who studies human cultures and societies is _____

    (A) A philologist   (B) An archaeologist

    (C) An anthropologist   (D) A linguist

14. Correct the spelling of the following word and make a sentence of your own 'necessity'.

Find the antonyms of the words in italics :

15. *Escalating* prices cause hardship to the poor

    (A) Fixed   (B) Falling

    (C) Reasonable   (D) Fluctuating

44. Answer **all** the following questions :

Fill in the blanks with suitable modal auxiliaries from the list given below :

(will, would, should, can, must, might, need, dare, used to)

1. Sara _____ to do some exercises for her shoulder, otherwise she _____ need a surgery.

2. You _____ have spoken rudely to her, otherwise she _____ not have left soon.

3. _____ you sing a song for Tara's birthday? You _____ sing so well when we were in school.

4. I _____ not climb up the hill, it _____ be slippery after such heavy rain.

5. _____ you be coming tomorrow? We really _____ complete that file.

Complete the following sentences with suitable verbs and corresponding question tags :

6. You aren't coming to college tomorrow, _____?

7. Rahman _____ the boy who stood first in class, isn't he?

8. Jaya goes to the library every Saturday, _____?

9. Let us all go for a movie next Sunday, _____? .

10. _____ as tall as Rosy, aren't I?

Insert the adverb given in brackets in the correct position in the sentence :

11. She impressed him by her singing. (greatly)

12. There was nothing to do but wait for the next bus to arrive. (else)

13. He admires my clothes. (always)

14. This room is big enough for all of us to sleep in. (enough)

15. The new tax structure is tough on the middle classes. (rather)

(2 × 15 = 30 Marks)

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

Mathematics

Complementary Course for Statistics

Mathematics III

MM 1331.4 – FOURIER SERIES, NUMERICAL METHODS AND ODE

(2018 Admission)

Time : 3 Hours   Max. Marks : 80

PART – A

Answer all questions. Each question carries 1 mark.

1. Define periodic function.

2. Test whether $f(x) = \sin 3x$ is odd function?

3. What is the value of $f(x)$ at the point of discontinuity?

4. What is the degree of a differential equation?

5. Find the order of the differential equation $\left[1+\left(\dfrac{dy}{dx}\right)^2\right]^3 = \left(\dfrac{d^2y}{dx^2}\right)^2$.

6. Find the integrating factor of $x\dfrac{dy}{dx} + y\log y = xye^x$

7. Write down the condition for the differential equation $Mdx + Ndy = 0$.

8. Give the general form of homogeneous linear equation.

9. Is $x^4 + x^3 - 7 = 0$ algebraic equation?

10. Which expression is known as trapezoidal rule?

<div align="right">(10 × 1 = 10 Marks)</div>

<div align="center">PART – B</div>

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

11. Write down at least three Dirichlet's condition for a Fourier series.

12. Find the Fourier coefficient b_n of the function $f(x) = \begin{cases} -k & \text{if } -\pi < x < 0 \\ k & \text{if } 0 < x < \pi \end{cases}$.

13. Write down Fourier Cosine Transforms.

14. Find the Fourier transform of $f(x) = \begin{cases} 1 \text{ for } |x| < a \\ 0 \text{ for } |x| > a \end{cases}$

15. Obtain the differential equation associated with the primitive $Ax^2 + By^2 = 1$.

16. Solve the equation $\dfrac{dy}{x} = \tan y.dy$.

17. Solve $\dfrac{dy}{dx} + 3y = 2e^{2x}$.

18. Solve $xp^2 + 4x = 2yp$.

19. Find the complementary function of $\dfrac{d^2y}{dx^2} - 6\dfrac{dy}{dx} + 9y = 0$.

20. Find the integrating factor of $x\dfrac{dy}{dx} + y\log y = xye^x$.

21. Define a transcendental function with two examples.

22. Write short note about Gaussian elimination method for system of linear equations.

(8 × 2 = 16 Marks)

PART – C

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

23. Find the Fourier series of the function $f(x) = \pi - x$ for $0 < x < 2\pi$.

24. Find the Fourier series of the function $f(x)$ if $f(x) = \begin{cases} -\pi & \text{if } -\pi < x < 0 \\ x & \text{if } 0 < x < \pi \end{cases}$.

Deduce that $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + \dots\dots\dots = \dfrac{\pi^2}{8}$.

25. Obtain the complex form of the Fourier series of the function

$f(x) = \begin{cases} 0 & \text{if } -\pi < x \le 0 \\ 1 & \text{if } 0 \le x < \pi \end{cases}$.

26. Solve $\cos(x + y)dy = dx$.

27. Solve $x^2 dy + y(x + y)dx = 0$.

28. Solve $\dfrac{d^2y}{dx^2} + y = \cos ecx$.

29. Find the solution of $(D^2 - 5D + 6)y = e^x \cos 2x$.

3

K – 2412

30. Use Taylor's series method, solve the equation $\dfrac{dy}{dx} = -xy, y(0) = 1$.

31. Starting from $x_0 = 3$, find a rot of $x^3 - 3x - 5 = 0$, correct to three decimal place use Newton-Raphson method.

<div align="right">(6 × 4 = 24 Marks)</div>

PART – D

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

32. Obtain the Fourier series of $f(x) = \pi \sin \pi x$ if $0 < x < 1$.

33. Solve the differential equation $(2x + y + 1)dx(4x + 2y - 1)dy = 0$.

34. Solve completely $(D^2 - 4D + 4)y = e^{2x} + x^2 + \cos 2x$.

35. Use Gauss – Seidel method solve the system of equations

$3x + y + z = 1; x + 3y - z = 11; x - 2y + 4y = 21$.

<div align="right">(2 × 15 = 30 Marks)</div>

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, March 2021

First Degree Programme under CBCSS

Mathematics

Complementary Course for Statistics

MM 1331.4 — MATHEMATICS III – FOURIER SERIES, NUMERICAL METHODS AND ODE

(2019 Admission – Regular)

Time : 3 Hours   Max. Marks : 80

PART – A

Answer all questions. Each question carries 1 mark.

1. Determine the period of the function $\cos^2 x$.

2. How to identify a given function is odd or even?

3. Write down the Fourier cosine series.

4. Define general solution of a differential equation.

5. Find the degree of the differential equation $\left[1 + \left(\dfrac{dy}{dx}^2\right)\right]^4 = \left(\dfrac{d^2y}{dx^2}\right)^3$.

6. Write short note about singular solution.

7. Check the equation $x^3 \dfrac{d^2y}{dx^2} - 2x \dfrac{dy}{dx} - 4y = x^4$ is homogeneous linear equation or not.

8. Find the integrating factor of $\dfrac{dy}{dx} + y \tan x = \cos^3 x$.

9. Write the Newton — Raphson iteration formula.

10. Write down the expression for trapezoidal rule?

<div align="right">(10 × 1 = 10 Marks)</div>

PART – B

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

11. Write down at least three Dirichlet's condition for a Fourier series.

12. Find the Fourier coefficient b_n of the function $f(x) = \begin{cases} -x & if & -\pi < x < 0 \\ x & if & 0 < x < \pi \end{cases}$.

13. Let n be any positive integer. Prove that $\sin nx$ is a periodic function with period $2\pi/n$.

14. Find the Fourier transform of $f(x) = \begin{cases} 1 & for & |x| < a \\ 0 & for & |x| > a \end{cases}$

15. Find the differential equation associated with the primitive $y = \cos(x + 3)$.

16. Solve $(x + 1)\dfrac{dy}{dx} = x(x^2 + 1)$

17. Solve the equation $\dfrac{dy}{dx} + \dfrac{1}{x}y = x^3 - 3$.

18. Test the differential equation $(e^x + 1)\cos x\,dx + e^x \sin x\,dy = 0$ is exact or not?

19. Solve the differential equation $xp^2 + x = 2yp$.

20. Explain the term complementary function of linear differential equation.

21. Solve $(D^2 + 3D + 2)y = 2x$.

22. Find the differential equation of all circles passing through the origin and having their centers on the x axis.

23. Define an algebraic expression with suitable example.

24. Write short note about Gaussian elimination method for system of linear equations.

25. Write short note about trapezoidal rule for numerical integration.

26. Write short note about Simpsons rule for numerical integration.

(8 × 2 = 16 Marks)

PART – C

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

27. If $f(x) = \begin{cases} -1 & in & -\pi < x < 0 \\ 1 & in & 0 < x < \pi \end{cases}$ with period 2π, find the Fourier series for $f(x)$.

28. Find the Fourier series of the function $f(x) = x$ for $0 < x < 2\pi$

29. Represent the function $f(t) = \begin{cases} t & if & 0 < t \leq \dfrac{\pi}{2} \\ \dfrac{\pi}{2} & if & \dfrac{\pi}{2} < x \leq \pi \end{cases}$ by a Fourier sine series.

30. Obtain the complex form of the Fourier series of the function $f(x) = \begin{cases} 0 & if & -\pi < x \leq 0 \\ 1 & if & 0 \leq x < \pi \end{cases}$.

31. Solve $\dfrac{dy}{dx} = \dfrac{y}{x} + x \sin \dfrac{y}{x}$.

32. Solve $\dfrac{d^2 y}{dx^2} - 3 \dfrac{dy}{dx} + 2y = e^{2x}$.

33. Solve $(D^2 + 5D + 4)y = 3 - 2x$.

34. Solve the Differential equation $\dfrac{d^2 x}{dt^2} + \dfrac{g}{l} x = \dfrac{g}{l} L$ where g, l, L are constants subject to the conditions. $x = a$, $\dfrac{dx}{dt} = 0$ at $t = 0$.

35. Use Taylofs series method, to solve the equation $\dfrac{dy}{dx} = -xy$, $y(0) = 1$.

36. Use the Newton – Raphson method, to find the real root of $x = e^{-x}$, correct to three decimal places with $x_0 = 1$.

3   **K – 2445**

37. Apply the trapezoidal rule to obtain a value of the integral $\int_4^5 f(x)dx$ given

x:	4.0	4.2	4.4	4.6	4.8	5.0
f(x):	1.386	1.435	1.482	1.526	1.569	1.609

38. Evaluate $\int_{2.2}^{2.8} \dfrac{x}{1+3x} dx$ using Simpson's 1/3 rule.

(6 × 4 = 24 Marks)

PART – D

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

39. Develop the Fourier series off $f(x) = \begin{cases} \dfrac{1}{2} + x & if \quad -\dfrac{1}{2} < x < 0 \\ \dfrac{1}{2} - x & if \quad 0 < x < \dfrac{1}{2} \end{cases}$

40. Find the Fourier series for $f(x) = x^2$ in $-\pi < x \le \pi$ and reduce that

(a) $\sum_{n=1}^{\infty} \dfrac{1}{n^2}$ (b) $\sum_{n=1}^{\infty} \dfrac{1}{(2n-1)^2}$.

41. Solve $\dfrac{dy}{dx} = \dfrac{x+9y-20}{6x+2y-10}$.

42. Solve completely $(D^2 - 4D + 4)y = e^{2x} + x^2 + \cos 2x$.

43. Apply Runge – Kutta method to find an approximate value of y when $x = 0.02$, given that $\dfrac{dy}{dx} = x + y^2$ and $y = 1$ when $x = 0$.

44. Use Gauss – Seidel method solve the system of equations $3x + y + z = 1$; $x + 3y - z = 11$; $x - 2y + 4y = 21$.

(2 × 15 = 30 Marks)

K – 2418

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Name : ....

Third Semester B.Sc. Degree Examination, March 2021

First Degree Programme under CBCSS

Physics

Complementary Course for Statistics

PY 1331.3 — OPTICS, MAGNETISM AND ELECTRICITY

(2018 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions in **1** or **2** sentences; each question carries **1** mark)

1. Explain the phenomena of color of thin film.

2. What is meant by bandwidth of an interference fringes?

3. Why the center of Newton's rings is dark for reflected light?

4. What is meant by diffraction of light?

5. What are the essential requirements of a laser?

6. Explain how light wave is propagated through a fiber.

7. What is Bohr magneton?

8. Define the term magnetic susceptibility.

9. Explain the difference between ferromagnetism and antiferromagnetism.

10. What are the advantages of ac over dc?

<div align="right">(10 × 1 = 10 Marks)</div>

<div align="center">SECTION – B</div>

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

11. What are Newton's ring?

12. What are the condition for producing sustained interference?

13. Distinguish between Fresnel's and Fraunhofer diffraction.

14. Distinguish between grating and prism spectra.

15. Explain the diffraction by a circular aperture.

16. What are Einstein coefficients?

17. What are the properties of laser?

18. Distinguish between step index and graded index fibre.

19. Distinguish between diamagnetism and paramagnetism.

20. Discuss adiabatic demagnetization in paramagnetic salts.

21. Write down the properties of magnetic field lines.

22. Distinguish between reactance and impedance.

<div align="right">(8 × 2 = 16 Marks)</div>

SECTION – C

Answer any **six**, **each** question carries **4 marks**.

23. The source intensities I_1 and I_2 are superimposed so that the ratio of maximum to minimum intensity is found to be 25. Find $\dfrac{I_1}{I_2}$.

24. Newton's rings observed in reflected light of $\lambda = 5.9 \times 10^7$ m. The diameter of the 10th ring is 0.5 cm. Find the radius of curvature of the lens and the thickness of the air film.

25. Find the half angular width of the central bright maximum in the Fraunhofer diffraction pattern of a slit of width 12×10^{-5} cm when the slit is illuminated by monochromatic wavelength 6000 A.

26. A plane transmission grating has 14000 lines to an inch for a length of 6 inches. If the wavelength region is 5×10^{-5} cm, find the resolving power of the grating in the first and the smallest wavelength difference that can be resolved.

27. A glass fibre is made with core glass of refractive index 1.55 and cladding is doped to give a refractive index 1.5. Calculate the numerical aperture, acceptance angle and the fractional index change?

28. An ac voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which L = 25.48 MH, C = 796 μF and R = 3 Ω. Find the impedance of the circuit?

29. A solenoid of 2000 turns and area of cross section 1.6×10^{-4} m^2 carrying a current of 4 A is suspended through its centre allowing it to turn in a horizontal plane. What is the magnetic moment associated with the solenoid?

30. A bar magnet place with its axis at 30° with a uniform magnetic field of 0.25T experiences a torque of magnitude equal to 4.5×10^{-2} J. What is the magnitude of magnetic moment of the magnet?

31. In a series LCR circuit the applied voltage is 5 V, drops across the resistance and the inductance are 3V and IV respectively. What is the. voltage across the capacitor?

(6 x 4 = 24 Marks)

SECTION – D

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

32. Explain the theory of Fraunhofer diffraction pattern. Also draw the intensity distribution pattern.

33. With energy level diagrams explain the working of Ruby laser.

34. Obtain an expression for numerical aperture of an optical fibre. List out the application of optical fibre.

35. With circuit diagram, explain briefly AC voltage applied to an LCR circuit. Describe resonance condition also.

(2 × 15 = 30 Marks)

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Reg. No. : ....

Name : ....

Third Semester B.A./B.Sc. Degree Examination, March 2021

First Degree Programme Under CBCSS

Hindi

Language Course — (Additional Language — III)

HN 1311.1 — POETRY AND GRAMMAR

(2019 Admission Regular)

Time : 3 Hours   Max. Marks : 80

I.   एक या दो वाक्यों में उत्तर लिखिए।

1.   सूरदास के गुरु कौन है?

2.   हिन्दी किस लिपि में लिखी जाती है?

3.   अष्टछाप की स्थापना किसने की?

4.   तुलसीदास के बचपन का नाम क्या है?

5.   तारसप्तक के सम्पादक कौन थे?

6.   राष्ट्रकवि की उपाधि से सम्मानित कवि कौन है?

7.   उजाला किसकी रचना है?

8.   'लड़का' शब्द का भाववाचक संज्ञा लिखिए।

9. नागार्जुन ने मैथिली में किस नाम से लेखनी चलाई?

10. छायावाद के चार स्तंभ कौन-कौन है?

<div align="right">(10 × 1 = 10 Marks)</div>

II. किन्हीं आठ प्रश्नों का उत्तर दो या तीन वाक्यों में लिखिए।

11. कबीरदास ईश्वर से भी अधिक महत्व किस को देते है? क्यों?

12. दूध पिलाने के लिए यशोदा कृष्ण को क्या प्रलोभन देती है?

13. तुलसीदास क्यों कहते हैं कि सन्त आम के पेड के समान है?

14. "जाति न पूछो साधु की, पूछि लीजिये ज्ञान।
मोल करो तलवार का, पड़ा रहन दो म्यान।"
    – भाव समझाइए।

15. "आवत ही हरषै नहीं नैनन नहीं स्नेह।
तुलसी तहाँ न जाइये कंचन बरसे मेघ।"
    – भाव समझाइए।

16. संज्ञा किसे कहते है? उसके भेद क्या-क्या है?

17. 'को' विभक्ति के विविध कारक रूपों का परिचय दीजिए।

18. भाववाचक संज्ञायें किस प्रकार के शब्दों से बनती है? उदाहरण सहित लिखिए।

19. विभक्ति और कारक में क्या भेद है?

20. आदिवासी नौजवान नदी को कैसे मलिन करता है?

21. उदयप्रकाश का लघु परिचय दीजिए।

22. यशोधरा क्यों दुखी है? स्पष्ट कीजिए।

23. सुमित्रानंदन पंत क्यों कहते है कि वे चिर सुख और दुख नहीं चाहते?

24. मुरझाया फूल किसका प्रतीक है? स्पष्ट कीजिए।

25. "सुनो हमें अनहद की तरह
    और समझो जैसे समझी जाती है
    नयी-नयी सीखी हुई भाषा।"
       — भाव समझाइए।

26. "शक्ति रहे तेरे हाथों में –
    छूट न जाये यह चाह सृजन की
    शक्ति रहे तेरे हाथों में
    रुक न जाए यह गति जीवन की।"
       — भाव समझाइए।

(8 × 2 = 16 Marks)

III. किन्हीं छः प्रश्नों का उत्तर लिखिए।

27. बाल कृष्ण अपनी माता से किस बात की शिकायत करता है?

28. 'सुख और दुख' कविता में कवि के दार्शनिक विचार क्या है?

29. नैरागी के अनुसार वर्तमान मथुरा की स्थिति कैसी है?

30. 'उड़ चल हारिल' कविता में चित्रित कर्मरत जीवन पर प्रकाश डालिए।

31. "गोधन, गज धन, बाजि धन और रतन धन खान।
    जन आवत संतोष-धन सन धन धूरि समान।"
       — सप्रसंग व्याख्या कीजिए।

32. "बुरा जो देखन मैं चला, बुरा न मिल्या कोय।
    जो दिल खोजा आपना, मुझ से बुरा न कोय।"
       — सप्रसंग व्याख्या कीजिए।

33. आदरसूचक 'आप' और निजवाचक 'आप' में क्या अन्तर है? उदाहरण सहित लिखिए।

34. संख्यावाचक विशेषण और परिमाण वाचक विशेषण में क्या अन्तर है ?

35. स्त्रीलिंग संज्ञाओं के पहचान के किन्हीं पाँच नियम लिखिए।

36. "विश्व में है फूल, तू सबके हृदय भाता रहा,

   दान कर सर्वस्व भी तू हाय हर्षाता रहा।

   जन न तेरी दशा पर दुखा हुआ संसार को ?

   कौन रोएगा सुमन, हम से मनुज निस्सार को।"

   — सप्रसंग व्याख्या कीजिए।

37. स्वयं सुसज्जित करके क्षण में

   प्रियतम को प्राणों के पण में,

   हमें भेज देती है रण में —

   क्षात्र धर्म के नाते।

   — सप्रसंग व्याख्या कीजिए।

38. 'उजाला' कविता में कवि ने क्या व्यक्त किया है?

(6 × 4 = 24 Marks)

IV. किन्हीं दो प्रश्नों के उत्तर लिखिए।

39. पठित पाठ के आधार पर कबीरदास के काव्य की विशेषताओं पर प्रकाश डालिए।

40. 'स्त्रियां' कविता का भाव समझाइए।

41. भिक्षुक कविता की समीक्षा कीजिए।

42. 'वह फिर जी उठी' कविता हमारे वर्तमान परिस्थिति से जुडी है। स्पष्ट कीजिए।

43. कारक की परिभाषा देकर उसके भेदों को उदाहरण सहित समझाइए।

44. सर्वनाम किसे कहते है उसके भेदों को सोदाहरण समझाइए।

(2 × 15 = 30 Marks)

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, March 2021

First Degree Programme under CBCSS

Statistics

Core Course – 3

ST 1341 — PROBABILITY AND DISTRIBUTION – I

(2018 Admission)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. When do we say that two events are mutually exclusive?

2. State multiplication theorem of probability.

3. Define probability space.

4. Define probability mass function.

5. Find the constant k such that $f(x) = kx^2$, $0 < x < 3$; 0, otherwise is a probability density function.

6. If $P(A) = 0.4$, $P(A \cup B) = 0.7$ and $P(A \cap B) = 0.1$ find $P(B)$.

7. Define expectation of a random variable.

8. If $\text{Cov}(X, Y) = 25$ compute $\text{Cov}(2X + 7, Y + 10)$.

9. Find $M_{a+bx}(t)$, where a and b are constants.

10. Write an example of a random variable whose moment generating function do not exist.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

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

11. Define sample space. Write an example.

12. If A and B are two events such that $P(A) = 1/3$, $P(B) = 1/2$ and $P(A \cup B) = 17/24$, compute $P(A \mid B^c)$.

13. Write the axiomatic definition of probability.

14. Examine whether the following function is a distribution function or not.

$$F(x) = \begin{cases} 0, & x < -2 \\ \dfrac{x+2}{4}, & -2 \le x \le 2. \\ 1, & x > 2 \end{cases}$$

15. Probability mass function of random variable X is given below. Find the value of k

x:	0	1	2	3	4	5
$P(X = x)$	1/16	1/16	5/8	1/16	1/8	k

16. If (X, Y) has joint pdf $f(x,y) = \dfrac{3}{4} - \left(\dfrac{x+y}{8}\right)$, $0 < x < 2$, $2 < y < 4$. Determine the marginal density functions of X and Y.

17. Define joint distribution function of a bivariate random variable. Express $P(a < X \le b, c < Y \le d)$ in terms of distribution function.

18. If X and Y are independent, then show that $\rho_{xy} = 0$, where ρ is the correlation coefficient.

19. Let (X, Y) be a bivariate continuous random variable. Show that $E[E(X \mid Y)] = E[X]$.

20. Define conditional expectation and conditional variance.

21. State and prove the additive property of cumulant generating function.

22. Define probability generating function. Establish the relationship between probability generating function and moment generating function.

(8 × 2 = 16 Marks)

SECTION – C

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

23. A problem in statistics is given to three students A, B and C whose chances of solving it are ½, ¾ and ¼ respectively. What is the probability that the problem will be solved if all of them try independently?

24. State and prove Baye's theorem.

25. Let X be a random variable with probability density function
$f(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0, & otherwise \end{cases}$. Find the probability mass function of $g(x)$ where

$g(x) = \begin{cases} 0 & if & 0 < x \le \frac{1}{3} \\ 1 & if & \frac{1}{3} < x < \frac{2}{3} \\ 2 & if & x > \frac{2}{3} \end{cases}$.

26. Distribution function of a random variable X is given by $F(x) = \begin{cases} 0, & x < 0 \\ x^2, & 0 \le x \le 1. \\ 1, & x > 1 \end{cases}$

Find the probability density function of X. Also determine (a) $P(X \le 0.5)$ (b) $P(0.5 \le x \le 0.8)$ and (c) $P(X > 0.9)$.

27. Let the joint probability distribution of (X, Y) be

(x, y)	(0,0)	(0,1)	(0,2)	(1,0)	(1,1)	(1,2)	(2, 0)	(2, 1)	(2,2)
f(x, y)	1/15	3/15	2/15	2/15	2/15	1/15	1/15	1/15	2/15

Find (a) the marginal distributions of X and Y (b) $P(Y \mid X = 0)$ (c) $P(X \le 1 \mid Y \ge 1)$.

28. If X is a random variable having probability density function
$f(x) = \begin{cases} \dfrac{x + 1}{2}, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$, find variance of X.

29. Derive Cauchy — Schwartz inequality.

30. Find the moment generating function of a random variable X with probability mass function $P(X = x) = {}^nC_x p^x q^{n-x}$, $x = 0,1,2,\ldots,n$. $p + q = 1$. Also derive $E(X)$ and $E(X^2)$ using m.g.f.

31. Explain bivariate moment generating function and write its properties.

(6 × 4 = 24 Marks)

SECTION – D

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

32. (a) For n events $A_1, A_2\ldots,A_n$ prove that $P\left(\bigcap_{i=1}^{n} A_i\right) \geq \sum_{i=1}^{n} P(A_i) - (n - 1)$.

    (b) It is found that in 70% of cases Dr. Raj diagnosed a disease X correctly. The chance that a patient will die by his treatment after correct diagnosis is 20% and the chance of death by wrong diagnosis is 70%. A patient of Dr. Raj, who had disease X, died. What is the probability that his disease was diagnosed correctly?

33. Derive the characteristic function of a random variable X with probability density function $f(x) = \dfrac{1}{\sigma\sqrt{2\pi}} e^{\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$, $-\infty < x < \infty$, $-\infty < \mu < x$, $\sigma > 0$.

34. Let the joint probability density function of a bivariate random variable (X, Y) be $f(x,y) = \begin{cases} 8xy, & 0 < x < y < 1 \\ 0, & \text{otherwise} \end{cases}$. Find the conditional mean and conditional variance of $X \mid Y = y$.

35. Consider a bivariate random variable (X, Y) with joint probability density function $f(x) = \begin{cases} \alpha^{-2}e^{-(x+y)/\alpha}, & x, y > 0, \alpha > 0 \\ 0, & \text{otherwise} \end{cases}$. (a) Test whether X and Y are independent or not (b) Find the distribution of $\dfrac{1}{2}(X - Y)$.

(2 × 15 = 30 Marks)