Reg. No. : ....

Name : ....

Third Semester B.A./B.Sc. Degree Examination, October 2019

First Degree Programme Under CBCSS

Hindi Language

Language Course — (Additional Language III)

HN 1311.1 – POETRY AND GRAMMAR

(2017 Admission Onwards)

Time : 3 Hours   Max. Marks : 80

I.   एक या दो वाक्यों में उत्तर लिखिए। 1 से 10 के सभी प्रश्नों के उत्तर अनिवार्य है।

1.   हिन्दी में निर्गुण भक्तिधारा के प्रवर्तक के रूप में किसे मानते हैं?

2.   तुलसी दास के सर्वश्रेष्ट रचना का नाम लिखिए।

3.   अज्ञेय का पूरा नाम क्या है?

4.   'मुरझाया फूल' किसकी रचना है?

5.   यशोधरा के अनुसार सिद्धार्थ क्यों उसे छोड़कर चले गए थे?

6.   कवयित्रि के अनुसार स्त्रियों को कैसे पढ़ा गया है?

7.   कवि क्यों लगातार सुख या दुख नहीं चाहता है?

8.   विशेषण किसे कहते है?

9.   वचन किसे कहते है? हिन्दी के कितने वचन है?

10.   वर्ण कितने प्रकार के होते हैं?

(10 × 1 = 10 Marks)

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

11. कवि "मछली" के आँखों में क्या देखता है?

12. जाति की निस्सारता के बारे में कबीरदास क्या कहते है?

13. कवि ने हारिल पक्षी की तुलना किससे की है और क्यों?

14. तुलसीदास के अनुसार मुखिया किस तरह होना चाहिए? क्यों?

15. निराला ने भिक्षुक का वर्णन कैसे किया?

16. कवयित्रि मुरझाए फूल को क्यों 'दानी सुमन' कहती है?

17. यशोदा क्या कहकर कृष्ण को दूध पिलाती है?

18. कबीर क्यों पहले गुरु का चरण स्पर्श करना चाहता है?

19. संज्ञा किसे कहते है? उसके कितने भेद है?

20. क्रिया धातु किसे कहते है?

21. भाव वाचक संज्ञा रूप लिखिए – चुराना, मीठा, उदार, लिखना

22. अधिकरण कारक और करण कारक के लक्षण लिखिए।   (8 × 2 = 16 Marks)

III. किन्हीं छः प्रश्नों के उत्तर लिखिए।

23. क्रिया की परिभाषा देकर उसके भेदों को सोदाहरण समझाइए।

24. कारक किसे कहते है? उसके कितने भेद है?

25. "मछली" कविता का सारांश लिखिए।

26. 'सखी, वे मुझसे कहकर जाते' में अभिव्यक्त यशोधरा की मनोव्यथा का वर्णन कीजिए।

27. 'मैया कबही बढ़ेगी चोटी' पद के आधार पर नटखट कृष्ण एवं यशोधरा के वात्सल्य का वर्णन कीजिए।

28. 'उड़ चल हारिल' कविता की विषय वस्तु समझाइए।

29. बुरा जो देखन मैं चला, बुरा न मिल्या कोय जो दिल खोणा आपना, मुझ से बुरा न कोय।

30. 'उड़ चल हारिल' कविता की विशेषता क्या है?

31. "मुरझाया फूल" कविता में व्यक्त भाव को समझाइए।

IV. किन्हीं दो प्रश्नों के उत्तर लिखिए।

32. दस साल बाद अपने गाँव में लौट आए बैरागी ने गाँव में क्या-क्या स्थितियाँ उत्पन्न हुईं।

33. सुख-दुख कविता में व्यक्त दार्शनिक चिंता को व्यक्त कीजिए।

34. "महादेवी वर्मा ने 'मुरझाया फूल' कविता में जीवन की क्षणभंगुरता का वर्णन किया है"। इस पर विचार कीजिए।

35. सर्वनाम की परिभाषा देकर उसके भेदों को सोदाहरण समझाइए।

(2 × 15 = 30 Marks)

H – 1346

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, October 2019

First Degree Programme under CBCSS

Complementary Course for Mathematics

PY 1331.1 – OPTICS, MAGNETISM AND ELECTRICITY

(2018 Admission)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. Write down the expression for the optical path differences for constructive and destructive interferences.

2. Which among the following has the higher bandwidth? Red or violet monochromatic light. Give reason.

3. Mention the use of diffraction grating.

4. While observing diffraction at straight edge, only few bands are seen. Why?

5. What are the components of a laser?

6. Draw the refractive index profile of a step index and graded index fibre.

7. Define magnetisation.

8. What are the components of magnetic dipole moment of an atom?

P.T.O.

9. What is the significance of form factor?

10. Q factor determines the degree of selectivity of the circuit while tuning. Explain why?

SECTION – B

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

11. Distinguish between interference due to wavefront division and amplitude division.

12. What is the correction made on optical path difference on the interference in thin films due to reflected light? Why is it necessary?

13. Briefly explain the methods for producing fringes of equal inclination and equal thickness.

14. If an opaque object is placed in the path of light, there should be illumination in the geometrical shadow region, But this not commonly observed. Explain why?

15. Compare single and double slit Fraunhofer diffraction pattern.

16. How does overlapping of spectral lines occur in diffraction gratings? How can you avoid this?

17. Explain population inversion.

18. Why cladding is necessary in optical Fibres?

19. Compare Curie temperature and Neel's temperature.

20. Why do we prefer choke coil to ohmic resistance to diminish current?

21. Briefly explain the energy losses in transformers.

22. Derive the relation connecting the relative permeability and susceptibility.

(8 × 2 = 16 Marks)

SECTION – C

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

23. Prove that the fringe width of both bright and dark interference fringes formed by the double slit experiment is the same.

24. A soap film of refractive index 1.34 is illuminated by 600nm light incident at an angle 45°, Find the thickness of the film using the condition for dark fringes.

25. A single slit Fraunhofer pattern is formed with white light. For what wavelength of the light the second maximum in the diffraction pattern coincides with the third maximum in the pattern for 464.2 nm.

26. A circular aperture is illuminated by plane waves of monochromatic light of wavelength 625nm. The diffracted light is received on a distant screen which is gradually moved towards the aperture. If the centre of the circular patch of the first becomes dark when the screen is 0.2m from the aperture, find the diameter of the aperture.

27. An iron rod of 10cm long, 10mm in diameter and of relative permeability 1000 is placed inside a long solenoid wound with 100 turns/ metre. If a current of 0.1A is passed through the rod, find the magnetic moment of the rod.

28. If the critical angle for a fibre made up of silica is 42°, find the refractive index of it. Also find the critical angle when the fibre is immersed in water (n_{water}=1.33).

29. Show that in an ac circuit containing inductance and resistance in series the current lags in phase behind the emf by an angle $\tan^{-1}(L\omega/R)$.

30. A resistance of 100Ω is joined in series with an inductance of 100mH. What capacitance must be put in series with the combination to obtain maximum current? What will be the potential drop across each element of circuit, if it is connected to 230V, 50Hz mains?

31. Find the ratio of the populations of the two states in a laser that produces a light of wavelength 628nm at 27°C.

(6 × 4 = 24 Marks)

SECTION – D

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

32. Describe the Newton's ring experiment to determine the refractive index of a liquid. Also explain the necessary theory.

33. Give Fresnel's explanation to diffraction of light and its rectilinear propagation.

34. Compare the various magnetic materials with examples.

35. Explain the induction of emf in a coil rotating in a magnetic field, Find the mean, rms and effective value of ac current and voltage during a complete and half cycle.

(2 × 15 = 30 Marks)

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Reg. No. : ....

Name : ....

Third Semester B.A./B.Sc. Degree Examination, October 2019

First Degree Programme under CBCSS

Malayalam Language

Language Course VII – Additional Language III

ML 1311.1 : DRISHYAKALASAHITHYAM

ദൃശ്യകലാസാഹിത്യം

(2018 Admission)

Time : 3 Hours   Max. Marks : 80

I.   ഒരു വാക്യത്തിലോ പരമാവധി രണ്ടു വാക്യത്തിലോ ഉത്തരമെഴുതുക.

1.   രാമനാട്ടത്തിന്റെ ഉപജ്ഞാതാവ് ആര്?

2.   കോട്ടയത്തു തമ്പുരാന്റെ ഏതെങ്കിലും ഒരു ആട്ടക്കഥയുടെ പേരെഴുതുക.

3.   ജി. ശങ്കരപ്പിള്ളയുടെ ആദ്യ നാടകം ഏത്?

4.   മലയാള നാടക സാഹിത്യചരിത്രം ആരുടെ കൃതിയാണ്?

5.   നളചരിതത്തെ മലയാളത്തിന്റെ ശാകുന്തളം എന്ന് വിശേഷിപ്പിച്ചതാര്?

6.   നാടകം സംബന്ധിച്ച് സി.ജെ. തോമസ്സ് രചിച്ച കൃതി ഏത്?

7.   അടവിവാസവുമടവുനന്നു നന്നൊരു
     കടവുമില്ല തടവുമില്ലവർക്കിഹ - ആർക്ക്?

19. മുല്ലയിൻമേൽ ആരെങ്കിലും കാഞ്ഞ വെള്ളമൊഴിക്കുമോ? സന്ദർഭം എന്ത്? - ഇങ്ങനെ പറയുന്നതിന്റെ കാരണം?

20. പെയ്യുന്നിതേ വെള്ളില വള്ളിതോറും - കാരണമെന്ത്?

21. പ്രാന്തനാ മരിക്കാതെ മരണമില്ലാതെ എവിട്യോ കഴിയാ എന്നാലോ ജീവിക്കുന്നുന്നൊട്ടു പറയാനുമാകില്ല - സന്ദർഭം എന്ത്?

22. മങ്ങിക്കത്തുന്ന റാന്തരി വിളക്കിന് സബർമതി ദൂരെയാണ് എന്ന നാടകത്തിലുള്ള പ്രാധാന്യമെന്ത്?

(8 × 2 = 16 Marks)

III. ഓരോന്നിനും **120** വാക്കിൽ കവിയാതെ ഏതെങ്കിലും ആറു ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

23. നളചരിത ഭാഷയുടെ സവിശേഷതകൾ എന്തെല്ലാം?

24. നളൻ ദമയന്തി എന്നിവരുടെ നേരിട്ടു കാണാതെയുള്ള അനുരാഗം അതീവസുന്ദരമായി അവതരിപ്പിക്കുകയാണ് നളചരിതം ആട്ടക്കഥയിൽ - ചർച്ച ചെയ്യുക.

25. ഒരു ഉത്തമ പിതാവിന്റെ ദൗത്യം നിർവ്വഹിക്കുകയാണ് കണ്വമഹർഷി - നാലാമങ്കത്തിന്റെ പശ്ചാത്തലത്തിൽ വിവരിക്കുക.

26. ശകുന്തള ആശ്രമം വിട്ടു പോകുമ്പോൾ ആശ്രമത്തിനുണ്ടാകുന്ന മാറ്റങ്ങൾ എന്തെല്ലാം?

27. നമ്പ്യാരുടെ സാമൂഹിക പരിഹാസം ഘോഷയാത്ര എന്ന ഒട്ടൻതുള്ളലിൽ പ്രതിഫലിക്കുന്നതെങ്ങനെ?

28. ആൾക്കൂട്ടം ബൈസിക്കിൾ തീപ്പിലെ സുപ്രധാന കഥാപാത്രമാണ് - ചർച്ച ചെയ്യുക.

29. പ്രത്യാശയാണ് ബൈസിക്കിൾ തീപ്പ് എന്ന ചലച്ചിത്രത്തിന്റെ അടിസ്ഥാനം - പരിശോധിക്കുക.

30. കടം വാങ്ങൽ വ്യക്തിയെ അങ്ങേയറ്റം ദുരന്തങ്ങളിലേക്ക് തള്ളിയിടുന്നു. രാവുണ്ണി എന്ന നാടകത്തെ മുൻനിർത്തി ചർച്ച ചെയ്യുക.

31. എഴുപതുകളിലെ മലയാള നാടകത്തെപ്പറ്റി ഒരു കുറിപ്പെഴുതുക.

(6 × 4 = 24 Marks)

3

H – 1788

IV. മൂന്നു പുറത്തിൽ കവിയാതെ **രണ്ടു** ചോദ്യത്തിന് ഉത്തരമെഴുതുക.

32. അനുരാഗബദ്ധരായ നളനെയും ദമയന്തിയെയും അവരുടെ മനോവ്യാപാരങ്ങളിൽ കൂടി അവതരിപ്പിക്കുകയാണ് ഉണ്ണായി വാര്യർ - ഉപന്യസിക്കുക.

33. സാമൂഹികവിമർശനമാണ് നമ്പ്യാർ കൃതികളുടെ ലക്ഷ്യം - ചർച്ച ചെയ്യുക.

34. ജി. ശങ്കരപ്പിള്ളയുടെ നാടകങ്ങളെപ്പറ്റി ലഘു ഉപന്യാസം തയ്യാറാക്കുക.

35. രണ്ടാം ലോകയുദ്ധം സൃഷ്ടിച്ച കെടുതികളാണ് ബൈസിക്കിൾ തീവ്സ് എന്ന സിനിമ ചർച്ച ചെയ്യുന്നത്. - പരിശോധിക്കുക.

(2 × 15 = 30 Marks)

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Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, October 2019

First Degree Programme under CBCSS

Mathematics

Core Course – 2

MM 1341 ELEMENTARY NUMBER THEORY AND CALCULUS I

(2018 Admission)

Time : 3 Hours   Max. Marks : 80

PART – A

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

1. Multiply 1011_{two} and 101_{two}.

2. Let *f(n)* denote the number of positive integers $\leq n$ and relatively prime to it. Find *f(24)*.

3. Find the domain of *r(t)* and the value of $r(t_0)$.

    where $r(t) = \cos t\, i - 3t\, j; t_0 = \pi$

4. Find *r'(t)* if

    $r(t) = (\tan^{-1} t) i + t \cos t\, j - \sqrt{t} k$

5. Evaluate $\int \langle te^t, \ln t \rangle dt$.

6. Find the unit tangent vector to the graph of $r(t) = t^2 i + t^3 j$ at the point where $t = 2$.

7. Determine whether the statement "If $r(s)$ is parameterized by arc length, then the curvature of the graph of $r(s)$ is the length of $r'(s)$." Is true or false?

8. Find $\lim\limits_{(x,y)\to(0,0)} \ln(1 + x^2 y^3)$.

9. Find $f_x(x, y), f_y(x, y)$ of $f(x, y) = \dfrac{1}{xy^2 - x^2 y}$.

10. Find the gradient of $f(x, y) = 5x^2 + y^4$ at $(4, 2)$.

(10 × 1 = 10 Marks)

PART – B

Answer **any eight** questions from this section. Each question carries **2** marks.

11. Show that $n^3 - n$ is divisible by 2.

12. Express 3014 in base eight.

13. Using recursion, evaluate (18, 30, 60, 75, 132).

14. Find the parametric equations that correspond to the given vector equation.

$$r = 3t^2 i - 2j$$

15. Evaluate the definite integral $\int\limits_0^2 (2t\, i + 3t^2\, j)dt$.

16. Find the arc length of the parametric curve.

17. Find the curvature of $x = e^t \cos t,\ y = e^t \sin t,\ z = e^t$ at $t = 0$.

18. Suppose that $w = xy + yz,\ y = \sin x,\ z = e^x$. Use an appropriate form of the chain rule to find $\dfrac{dw}{dx}$.

H – 1545

19. Find the displacement of $r = t^2 i + \frac{1}{3} t^3 j$ in the interval $1 \le t \le 3$.

20. Describe the largest region on which the function $f(x, y, z) = 3x^2 e^{yz} \cos(xyz)$ is continuous.

21. Given $f(x, y) = x^3 y^5 - 2x^2 y + x$, find f_{xxy} and f_{yxy}.

22. Find an equation for the tangent plane to the surface $x^2 + y^2 + z^2 = 25$ at the point P(−3, 0, 4).

(8 × 2 = 16 Marks)

PART − C

Answer **any six** questions from this section. Each question carries **4** marks.

23. Show that the number of leap years l after 1600 and not exceeding a given year y is given by $l = \lfloor y/4 \rfloor - \lfloor y/100 \rfloor + \lfloor y/400 \rfloor - 388$.

24. Show that "If p and $p^2 + 2$ are primes, then $p^3 + 2$ is also a prime."

25. A six-digit positive integer is cut up in the middle into two three-digit numbers. If the square of their sum yields the original number, find the number.

26. Find the escape speed in km/s for a space probe in a circular orbit that is 300 km above the surface of the Earth.

27. A particle moves along the parabola $y = x^2$ with a constant speed of 3 units per second. Find the normal scalar component of acceleration as a function of x.

28. Suppose that a particle moves along a circular helix in 3-space so that its position vector at time t is $r(t) = (4 \cos t\pi)i + (4 \sin \pi t)j + tk$. Find the distance traveled and the displacement of the particle during the time interval $1 \le t \le 5$.

29. Locate all relative maxima, relative minima, and saddle points, if any for the function $f(x, y) = y^2 + xy + 3y + 2x + 3$.

30. Find the point on the plane $x + 2y + 3z = 13$ closest to the point (1, 1, 1).

31. Find the dimensions of the closed right circular cylindrical can of smallest surface area whose volume is 16π cm^3. **(6 × 4 = 24 Marks)**

PART – D

Answer **any two** questions from this section. Each question carries **15** marks.

32. (a) Find the number of positive integers ≤ 3000 and divisible by 3, 5, or 7.

(b) Every positive integer n can be written as $n = 2^a 5^b c$, where c is not divisible by 2 or 5.

(c) Find the canonical decomposition of 2520.

33. (a) Solve the vector initial-value problem for $y'(t) = 2ti + 3t^2 j, y(0) = i - j$ by integrating and using the initial conditions to find the constants of integration.

(b) Find the arc length of that portion of the circular helix $x = \cos t$, $y = \sin t$, $z = t$ from $t = 0$ to $t = \pi$.

(c) Find the curvature and the radius of curvature $x = e^t \cos t$, $y = e^t \sin t$, $z = e^t$ at the point t=0.

34. A particle moves along a circular path in such a way that its x– and y–coordinates at time t are

$$x = 2 \cos t, \; y = 2 \sin t.$$

(a) Find the instantaneous velocity and speed of the particle at time t.

(b) Sketch the path of the particle, and show the position and velocity vectors at time t = $\pi/4$ with the velocity vector drawn so that its initial point is at the tip of the position vector.

(c) Show that at each instant the acceleration vector is perpendicular to the velocity vector.

35. (a) Find $\lim\limits_{(x,y) \to (0,0)} \tan^{-1}\left[\dfrac{x^2 + 1}{x^2 + (y - 1)^2} \right]$.

(b) Let $f(x, y) = \begin{cases} -\dfrac{xy}{x^2 + y^2} & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$ Show that $f_x(x, y)$ and $f_y(x, y)$ exist at all points

(x, y).

(c) Use the method of Lagrange multipliers to find the dimensions of a rectangle with perimeter p and maximum area. **(2 × 15 = 30 Marks)**

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Reg. No. : ....

Name : ....

Third Semester B.A./B.Sc. Degree Examination, October 2019

First Degree Programme under CBCSS

English – (Language Course)

EN 1311.1/EN 1311.3 : WRITING AND PRESENTATION SKILLS

(Common for B.A./B.Sc. (Language Course VI) and Career related 2 (a) (Language Course V))

(2015 Admission onwards)

Time : 3 Hours

Max. Marks : 80

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

  A. Rewrite the following sentences, correcting the errors, if any.

  1. Everybody in the class know the answer.

  2. Ten miles are a long distance to walk.

  3. I prefer coffee than tea.

  4. I congratulated him for his success.

  5. One of the teachers are absent today.

  B. Write **one** synonym each for the following words :

  6. strange

  7. train

  8. pause

  9. observe

  10. negotiate.

(10 × 1 = 10 Marks)

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

11. Write a note on the importance of writing.

12. What is blogging?

13. What does the term 'conventions of language' refer to?

14. What is a memorandum?

15. Define collocation.

16. What is syntax?

17. Why is 'clubbing or clustering' important?

18. What is a report?

19. What is the difference between a précis and a summary?

20. What are morphemes?

21. What is a topic sentence? Explain its importance.

22. Explain the difference between writing and speaking.

(8 × 2 = 16 Marks)

III. Answer any **six** as directed :

23. Prepare an email to the HR manager of a company that is recruiting fresh graduates as trainee executives. Attach your resume.

24. Write a précis of the following passage reducing it to one third of its length

Malayalam is the mother-tongue of 35 million Malayalis, eighty percent of whom live in Kerala. The remainder are scattered over different parts of India and the world, including Malaysia, Singapore, the countries surrounding the Persian Gulf, Africa, Europe and North America.

Malayalis are well-known for their ability to adjust easily to their surroundings. Wherever a Malayali goes, from New Delhi to New York, he becomes a part of the local scene, though Kerala is always present in his heart.

Like its speakers, the Malayalam language also has been open to foreign influences. Malayalam literature reflects this spirit of accommodation and has, over the centuries, developed a tradition which, although deeply rooted in the native soil of Kerala, is truly universal in spirit. It is remarkably free from the prejudices that have marred the literature of certain other parts of our country. To its basic Dravidian stock have been added elements borrowed or adopted from non-Dravidian languages such as Sanskrit, Arabic, French, Portuguese and English. The earliest of these associations was with Tamil, which according to many linguists is the root language from which Malayalam was born. Sanskrit, however, accounts for the largest of the 'foreign' influences, followed closely in recent times by English. This broad-based cosmopolitanism has indeed become a distinctive feature of Malayalam language and literature.

25. Imagine that you are the secretary of the arts club in your college. Prepare a report on the various activities conducted by the arts club.

26. Write a letter to the principal of your college, making an enquiry about the courses offered there.

27. Prepare a questionnaire to evaluate the quality of the waste disposal system in your locality.

28. What is the difference between formal and informal letters?

29. Distinguish between academic and creative writing.

30. Imagine that you are the General Manager of a company. Prepare a memo to remind an employee to attend a quarterly sales meeting.

31. Create content for 8 to 12 slides on "The Festival of Onam".

(6 × 4 = 24 Marks)

IV. Answer any **two** as directed.

32. Write an essay on, "The impact of cinema on youth" in about 300 words.

33. Discuss the various stages of writing that enable a writer to create an ideal piece of writing.

34. What is an essay? What are the guidelines for writing a good essay?

35. Request the manager of a bank, in writing, for a replacement of the debit card you have lost.

(2 × 15 = 30 Marks)

_____

Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, October 2019

First Degree Programme under CBCSS

Complementary Course for Mathematics

ST 1331.1 – STATISTICAL DISTRIBUTIONS

(2018 Admission)

Time : 3 Hours   Max. Marks : 80

SECTION – A

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

1. If the standard deviation of a Poisson random variable X is 3, write the probability mass function of X.

2. Moment generating function of a random variable Y is $(0.65 + 0.35e^t)^5$. Identify the statistical distribution and its parameters.

3. Write the mean and variance of geometric distribution.

4. Write the mode for the Poisson distribution with mean 7.5.

5. Let X follows discrete uniform with parameter n. Compute the coefficient of variation of X.

6. What is odd order moment about mean of normal distribution?

7. Define statistic.

8. Define t statistic.

9. Let Y be a random variable and Y follows exponential distribution with mean 3. Compute $P(Y=3)$.

10. Write the variance of random variable follows Chi square distribution with 10 degrees of freedom.

(10 × 1 = 10 Marks)

SECTION – B

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

11. Define Bernoulli distribution. What is its mean?

12. If X follows Binomial (n,p), derive the distribution of $n-X$.

13. Define hyper geometric distribution.

14. Derive the MGF of a discrete uniform random variable.

15. Let X be a continuous uniform random variable with mean 1 and variance 4/3. Find $P(X<0)$.

16. State the additive property of gamma distribution.

17. Write the relationship between Beta I and Beta II random variables.

18. Let X be standard Normal random variable, compute $P(1< X < 2)$.

19. Define convergence in probability.

20. State central limit theorem for i.i.d random variables.

21. Justify the statement "every statistic is a random variable".

22. Write probability density functions of t and F distributions.

(8 × 2 = 16 Marks)

SECTION – C

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

23. If $X \sim$ Binomial $(6, p)$ and $P(X = 4) = P(X = 2)$, find the value of p.

24. Let X_1 and X_2 be independent and identically distributed geometric random variables. Show that the conditional distribution of X_1 given $X_1 + X_2$ is uniform.

25. For a Normal distribution, the first moment about 10 is 40 and the fourth moment about 50 is 48. What is the mean and variance of the distribution?

26. Derive the mean and variance of Beta I distribution.

27. State and prove lack of memory property of exponential distribution.

28. Derive Bernoulli's law of large numbers.

29. Derive the moment generating function of Chi square distribution and hence derive its mean and variance.

30. Let X_n assumes the values $\frac{1}{\sqrt{n}}$ and $-\frac{1}{\sqrt{n}}$ with probabilities $\frac{2}{3}$ and $\frac{1}{3}$ respectively. Check whether the weak law of large numbers holds good for the sequence $\{X_n\}$ of independent random variables.

31. Derive the relationships between Chi square, t and F distributions.

(6 × 4 = 24 Marks)

SECTION – D

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

32. (a) Derive the recurrence relation for central moments of Poisson distribution.

    (b) Prove that under certain conditions Binomial distribution tends to Poisson distribution.

33. (a) Define Normal distribution.

    (b) Derive the mean, median and mode of Normal distribution.

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34. (a) Derive Chebyshev's inequality.

(b) Suppose that the lifetime of an electronic device follows exponential distribution with mean 1. Determine the upper bound of $P(|X-1| \geq 2)$ using Chebyshev's inequality.

35. (a) Let X_1 and X_2 be two independent random variables follow Chi square distribution with 1 degrees of freedom. Determine the value of k if $P(X_1 + X_2 > k) = 0.5$.

(b) Establish the sampling distribution of the sample variance of random sample drawn from Normal distribution.

(2 × 15 = 30 Marks)