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III Semester B.Sc. (NEP) Degree Examination, March/April - 2023

KANNADA (Basic)

ದಾರಿಯ ಬುತ್ತಿ

(Regular)

Time : 2 Hours **Maximum Marks : 60**

Instructions to Candidates:

ಭಾಷೆ ಮತ್ತು ಬರಹದ ಶುದ್ಧಿಗೆ ಗಮನ ಕೊಡಲಾಗುವುದು.

1. a) 'ಸಕಲ ಜೀವಾತ್ಮರಿಗೆ ಲೇಸನು ಬಯಸುವುದೇ ಧರ್ಮ' ವಚನಗಳನ್ನಾಧರಿಸಿ ವಿವರಿಸಿರಿ.(10)

(ಅಥವಾ)

b) ಸಂಸಾರದ ನಿಸ್ಸಾರತೆಯನ್ನು 'ಬಿದ್ದಿಯಬೇ ಮುದುಕಿ' ತತ್ವಪದ ಹೇಗೆ ನಿರೂಪಿಸುತ್ತದೆ.

2. a) ಭದ್ರಾವತಿ ಪುರದ ಪ್ರಾಕೃತಿಕ ವರ್ಣನೆ ಹೇಗೆ ಮೂಡಿ ಬಂದಿದೆ ವಿವರಿಸಿರಿ. (10)

(ಅಥವಾ)

b) ಹೊಸನಾಡ ಕಟ್ಟುವ ಹಂಬಲ 'ಕಟ್ಟುವೆವು ನಾವು' ಕವಿತೆಯಲ್ಲಿ ಹೇಗೆ ಅಭಿವ್ಯಕ್ತಗೊಂಡಿದೆ ವಿವರಿಸಿರಿ.

3. a) 'ದೇವರು ಮತ್ತು ಧರ್ಮ' ಶೋಷಣೆಯ ಸಾಧನಗಳಾಗಿವೆ ಚರ್ಚಿಸಿರಿ. (10)

(ಅಥವಾ)

b) ವಚನಕಾರರ ದೃಷ್ಟಿಯಲ್ಲಿ ಸ್ತ್ರೀ ಸಂವೇದನೆಯ ನೆಲೆಗಳನ್ನು ವಿವರಿಸಿರಿ.

4. a) ಲೌಕಿಕ ಜೀವನದ ಅನಿತ್ಯತೆಯನ್ನು 'ಮಿಲರೇಪ' ಕವಿತೆ ಹೇಗೆ ಧ್ವನಿಸುತ್ತದೆ ವಿವರಿಸಿರಿ. (10)

(ಅಥವಾ)

b) 'ಶಿಕ್ಷಣ ಮತ್ತು ಅರಿವು ಶೋಷಿತ ಸಮುದಾಯಗಳಿಗೆ ಬೆಳಕಾಗಬಲ್ಲವು' ಸೂರ್ಯಚಂದ್ರರಿಲ್ಲದ ನಾಡಿನಲ್ಲಿ ಕಥೆ ಹೇಗೆ ಧ್ವನಿಸುತ್ತದೆ ವಿವರಿಸಿರಿ.

5. ಬೇಕಾದ **ಎರಡಕ್ಕೆ** ಟಿಪ್ಪಣಿ ಬರೆಯಿರಿ. (2×5=10)

a) ಬೆಲ್ಲದ ಕಟ್ಟೆಯ ಕಟ್ಟಿ

b) ಶಂ.ಬಾ. ಜೋಶಿ.

c) ಹಿರಿಯ ಪೌರರಿಗೆ ಸೌಲಭ್ಯ

d) ಹಾ.ಮಾ. ನಾಯಕ

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6. ಒಂದೇ ವಾಕ್ಯದಲ್ಲಿ ಉತ್ತರಿಸಿರಿ. (10×1=10)

a) ಕಡಕೋಳ ಮಡಿವಾಳಪ್ಪನವರ ತತ್ವಪದಗಳ ಅಂಕಿತವೇನು?

b) ಕವಿ ಲಕ್ಷ್ಮೀಶನಿಗಿದ್ದ ಬಿರುದು ಯಾವುದು?

c) ಗೊರೂರು ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರರ ತಂದೆ–ತಾಯಿಯ ಹೆಸರೇನು?

d) ಕೆ.ವಿ. ಸುಬ್ಬಣ್ಣನವರ ಪೂರ್ಣ ಹೆಸರೇನು?

e) ಡಾ. ಎಸ್.ಎಸ್. ಅಂಗಡಿಯವರ ಜನ್ಮಸ್ಥಳ ಯಾವುದು?

f) ಶಂ.ಬಾ. ಜೋಶಿಯವರ ಪ್ರಥಮ ಕೃತಿ ಯಾವುದು?

g) 'ಸೂರ್ಯಚಂದ್ರರಿಲ್ಲದ ನಾಡಿ'ನಲ್ಲಿ ಕಥೆಯನ್ನು ಯಾವ ಕಥಾ ಸಂಕಲನದಿಂದ ಆಯ್ದುಕೊಳ್ಳಲಾಗಿದೆ?

h) ಡಾ. ವಿಷ್ಣು. ಶಿಂದೆಯವರ ಪಿಎಚ್.ಡಿ ಪ್ರಬಂಧ ಯಾವುದು?

i) 'ಒಬ್ಬ ನಿಷ್ಠಾವಂತ ಅಧ್ಯಾಪಕ' ಲೇಖನವನ್ನು ಯಾವ ಕೃತಿಯಿಂದ ಆಯ್ದುಕೊಳ್ಳಲಾಗಿದೆ?

j) ಸಿರಗೂರ ಕಲ್ಮೇಶರವರ ತಂದೆ–ತಾಯಿಯ ಹೆಸರೇನು?

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III Semester B.Sc. (NEP) Degree Examination, March/April - 2023

GENERIC ENGLISH -3 (AECC)

(Regular)

Time : 2 Hours **Maximum Marks : 60**

Text : **The Fire and the Rain**

I. Answer any **Five** of the following questions in a sentence or **Two** : **(5×2=10)**

1. Why are Raibhya and Bhardwaja jealous of Paravasu?
2. Name the wife of Paravasu.
3. To whom does Arvasu love?
4. Who killed Yavakri?
5. How was Vishakha related to Yavakri?
6. How did Raibhya intend to punish Yavakri?
7. Why did Yavakri spend ten years in the jungle?

II. Answer any **Two** of the following in a paragraph. **(2×5=10)**

1. Arvasu
2. Yavakri
3. Vishakha

III. A) Sketch the character of Nittilia. **(1×10=10)**

(OR)

B) Explain Anger and it's complications in Girish Karnad's 'The Fire and The Rain'.

IV. Write a short notes on any **Two** of the following. **(2×5=10)**

1. Constituent Assembly speech of Dr. B.R. Ambedkar.
2. 'Dream' of Martin Luther King.
3. Kiran Bedi's views on the visionary leadership.

V. A) 'A good presentation is an index of your impressive personality' - Elucidate.**(1×5=5)**

(OR)

B) How do the 'charts' and 'diagrams' help in the effective presentation?

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VI. A) Analyze the features of an impressive writing. (1×5=5)

(OR)

B) Write a letter of enquiry regarding a job opportunity in 'Nestle' company.

(OR)

C) Write an essay on 'Natural Disasters' or 'Deforestation'.

VII. A) Draft an advertisement copy for the sale of 'Samsung' phone highlighting the unique features. (1×5=5)

(OR)

B) What is brochure? Prepare a brochure format for a 'National level workshop' highlighting the name of the host college, topic, date, entrance fees, facilities, chief guest, resource person, inauguration and valedictory function.

(OR)

C) Write the product manual on 'Refrigerator'.

VIII. A) Prepare your resume for the post of 'Sales Manager' in a reputed company. (1×5=5)

(OR)

B) What is Body language? What are the tips to improve the 'Body Language'?

(OR)

C) Describe the 'Indian Festivals' or 'a Football Match':

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III Semester B.Sc. (CBCS) Degree Examination, March/April - 2023

BASIC ENGLISH

(Repeaters) (AECC)

Time : 3 Hours **Maximum Marks : 80**

Text : The Blue Umbrella.

I. Answer the following questions in a word, a phrase or a sentence each. **(10×1=10)**

1. What was the name of white cow?
2. Where was Ram Bharosa's tea shop?
3. Why did Binya and Bijju visit Ram Bharosa's shop?
4. What happened when Binya dozed off in the shade of a Pine tree?
5. Who tried to steal the blue umbrella?
6. What was the real name of Bijju?
7. What was the daily duty of Binya?
8. Where did the action of the novel take place?
9. From whom did Binya get blue umbrella?
10. When were the rains coming to an end?

II. A. 1. Sketch the character of Bijju. **(1×10=10)**

(OR)

2. Discuss the significance of generosity and friendship in the novel 'The Blue Umbrella'.

B. 1. Sketch the character of Binya. **(1×10=10)**

(OR)

2. 'Sacrifice is key to happiness'. Discuss this statement with reference to the novel 'The Blue Umbrella'.

III. Write short notes on the following. (any **four**). **(4×5=20)**

1. Ram Bharosa.
2. Rustic life in the novel.
3. Significance of Kindness in the novel.
4. Rajaram.
5. Picnickers.
6. Title of the novel.

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IV. A) Substitute the following expressions with one word. (5×1=5)

1. Notice of person's death, especially in a newspaper.
2. One who is self centered.
3. Serving without pay.
4. That cannot be seen.
5. That cannot be heard.

B) Convert the following sentences as directed : (5×1=5)

1. Geeta wrote a poem (change into passive)
2. The mirror was broken by Mahesh. (Change into active)
3. Open the gate. (Change into passive)
4. Who sent this letter? (Change into passive)
5. My pocket has been picked. (Change into Active)

C) Draft a notice informing all your college students about 'Inaugural function of college Union' to be held on 22nd February, 2023. (1×5=5)

D) Write a paragraph on the following : (1×5=5)

1. Virtue has its own reward.

(OR)

2. Man does not live by bread alone.

E) Make the proofreading of the following passage : (1×5=5)

The land gift mission started in 1951. That spring, there was meeting of rural workers in Hyderabad Vinoba never uses money; so he decided to walk to this meeting although it was some 300 miles away from where he lived on the way, in every village through which he passed, he came face to face with the misery of the landless peasants. When he reached hyderabad he went straight to a village, and appealed to the landlords, If you have four sons and a fifth was born, he said, you would certainly give him a share of your land. Treat me as your fifth son and give me my share. The landlord's imagination was touched. Land was given, and the land gift mission was born. In his two months in Hyderabad, Vinoba received 12,000 acres of land in trust for the landles.

F) Write a review of any film you watched recently. (Provide details about the title of the film, starcast and production house, the plot, etc.) (1×5=5)

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III Semester B.Sc (NEP) Degree Examination, March/April - 2023

HINDI

1) एकांकी कलश

2) संचार माध्यम और हिन्दी

Paper - AECC

(Regular)

Time : 2 Hours **Maximum Marks : 60**

I. किन्हीं दस प्रश्नों के उत्तर लिखिए। **(10×1=10)**

1) 'एकांकी कलश' किताब के संपादक का नाम ------

a) डॉ राजेन्द्र पोवार b) डॉ मंजरी पाठक c) डॉ पूर्णिमा आर

2) 'रीढ़ की हड्डी' एकांकी के एकांकीकार का नाम -----

a) भुवनेश्वर b) भगवतीचरण वर्मा c) जगदीशचन्द्र माथुर

3) 'सुन्दर' यह पात्र किस एकांकी में चित्रित है ---

a) रीढ़ की हड्डी b) एक साम्यहीन साम्यवादी c) दो कलाकार

4) उपेन्द्रनाथ अश्क जीं का जन्म कब हुआ?

a) 1910 b) 1930 c) 1950

5) 'रेवा' किसकी पत्नी है?

a) बैरिस्टर की पत्नी b) रंजन की पत्नी c) हरि की पत्नी

6) भगवतीचरण वर्मा के किस उपन्यास पर फिल्म निर्माण हुआ है?

a) चित्रलेखा b) मरीचिका c) पतन

7) 'मार्तण्ड' किस एकांकी का पात्र है?

a) दो कलाकार b) समरेखा – विषमरेखा c) जान से प्यारे

8) ममता कालिया का जन्म कहाँ हुआ?

a) काशी b) आगरा c) वृन्दावन

9) अविनाश किसका मित्र है?

a) डॉ कौशिश का b) मि. सेठ का c) मि. कपूर का

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10) सर्वप्रथम मुद्रण का उद्भव किस देश में हुआ?

a) चीन b) भारत c) पाकिस्तान

11) संचार माध्यम कितने प्रकार के होते हैं?

a) दो b) तीन c) एक

12) प्रिंटिंग प्रेस का अविष्कार कब हुआ?

a) 1440 b) 1460 c) 1480

II. किन्हीं तीन की ससंदर्भ व्याख्या कीजिए। **(3×5=15)**

1) "घर जाकर जरा यह पता लगाइएगा कि आपके लाडलें बेटे की 'रीढ़ की हड्डी भी है या नहीं।"
2) "तुम बाल–बच्चों को लेकर यहीं रहो, 10 का महिना और दोनों की खुराक। और क्या!"
3) महिलाओं के अधिकारों का मुझसे बेहतर रक्षक आपको वर्तमान उमीदवारों में कहीं नजर न आएगा।
4) मैं तो केवल यह जानती हूँ कि मैंने विश्वासघात नहीं किया। केशव मेरा जीवन साथी है।
5) मैंने ऐसा फॉर्मूला ढूँढ निकाला है कि मैं आपके पूज्य पिताजी को जीवित कर सकता हूँ।

III. किन्हीं दो प्रश्नों का उत्तर लिखिए। **(2×10=20)**

1) 'रीढ़ की हड्डी' एकांकी का आशय स्पष्ट कीजिए?
2) 'अधिकार का रक्षक' एकांकी का सारांश लिखिए?
3) 'जान से प्यारे' एकांकी का उद्देश्य स्पष्ट कीजिए?
4) एकांकी के तत्वों के आधारपर 'समरेखा विषमरेखा' एकांकी की समीक्षा कीजिए?

IV. किसी एक प्रश्न का उत्तर लिखिए। **(1×10=10)**

1) संचार माध्यमों के विकास में इलेक्ट्रॉनिक माध्यमों का महत्त्व किस प्रकार है? इसे स्पष्ट कीजिए।
2) संचार माध्यम का उद्देश्य स्पष्ट कीजिए?

V. किसी एक पर टिप्पणी लिखिए। **(1×5=5)**

1) मुद्रित माध्यम
2) इंटरनेट

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III Semester B.Sc. (NEP) Degree Examination, March/April - 2023

CHEMISTRY

(Regular)

Time : 2 Hours **Maximum Marks : 60**

Instructions to Candidates : *1. All questions are compulsory.*
2. Draw neat diagrams and give equations wherever necessary.

1. Answer any **Six** questions: **(6×2=12)**

a) State Lambert's law.

b) When UV light is passed through the given solution the radiant power is reduced to 50% Calculate the absorbance.

c) What are limitations of VSEPR theory.

d) Write the structure of CdI_2.

e) What is SN^2 reaction? Give an example.

f) What is Diel - Alder's reaction? Give an example.

g) State any one form of second law of thermodynamics.

h) Write BET equation. Mention the terms involved in it.

2. Answer any **Three** questions. **(3×4=12)**

a) Derive the expression for Beer - Lambert's law.

b) Explain with neat labelled diagram the instrumentation of single beam spectrophotometer.

c) Discuss the determination Cu by colorimetric method.

d) Explain the effect of concentration and wavelength on scattering in nephelometry and Turbidometry.

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3. Answer any **Three** questions. **(3×4=12)**

   a) Calculate the limiting radius ratio for co-ordination No. 4 (Tetrahedral and Square planar).

   b) Write a note on Rutile structure.

   c) Explain following examples using VSEPR theory.

      i. BF_3.

      ii. BF_4^-.

   d) What are ionic compounds? Give examples of AX_2 type.

4. Answer any **Three** questions. **(3×4=12)**

   a) Discuss the mechanism of E-1 reaction with an example.

   b) Discuss the mechanism of addition of HBr to Propene.

   c) What are Saytzeff and Hoffmann's eliminations? Explain with examples.

   d) What is ozonolysis? Discuss the mechanism of ozonolysis of Ethene.

5. Answer any **Three** questions. **(3×4=12)**

   a) What is Joule - Thomson effect? Show that enthalpy of the system remains constant in this process.

   b) Derive Gibbs - Helmholtz equation.

   c) Derive Langmuir - adsorption isotherm.

   d) Derive Michaelis - Menten equation.

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III Semester B.Sc. Degree Examination, April - 2023

CHEMISTRY

(CBCS Scheme Repeater)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1. All questions are compulsory.
2. Draw neat diagrams and give equations wherever necessary.

I. Answer any **ten** questions. **(10×2=20)**

1. Write any two differences between Ideal and Non ideal solutions.
2. What is the effect of temperature on the viscosity of liquid.
3. What are Azeotropes?
4. What is EMF?
5. Write Nernst equation.
6. What is eutectic point?
7. How is ethylene glycol obtained from ethene?
8. Mention the composition and use of dynamite.
9. Write the principle of infrared spectroscopy.
10. Define parent peak and base peak.
11. Write nitration of naphthalene.
12. State Huckel's rule.

II. Answer any **three** questions. **(3×5=15)**

a. What is critical solution temperature? Explain the mutual solubility of Nicotine water system with a diagram.

b. Explain the determination of surface tension of liquid by drop number method.

c. Explain the process of steam distillation.

d. State Nernst distribution law. Mention its limitations.

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III. Answer any **three** questions. (3×5=15)

a. Write a note on calomel electrode.

b. Explain the determination of P^H of solution using quin hydrone electrode.

c. The EMF of cell $cd|cdcl_2.2½H_2O\|Agcl_{(s)}|Ag$ is found to be 0.6753 V at 25°C and 0.6915V at 0°C calculate ΔG and ΔH at 25°C.

d. Explain the phase diagram of water system.

IV. Answer any **three** questions. (3×5=15)

a. Discuss the orientation of substitution in Toluene.

b. Explain the mechanism of Fries rearrangement (Inter molecular).

c. Explain the mechanism of lederer - Manasse reaction in acidic medium.

d. Give an account of acidic character of phenol.

V. Answer any **three** questions. (3×5=15)

a. Explain Mclafferty rearrangement with respect to butyraldehyde.

b. Explain the mechanism of sulphonation of Benzene.

c. Discuss the mechanism of Friedel - Craft's acylation reaction.

d. Write stretching frequencies of following compounds.

i. Alkanes.

ii. Alkene.

iii. Alkynes.

iv. Aldehydes.

v. Ketones.

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III Semester B.Sc.6. (NEP) Degree Examination, April - 2023

PHYSICS

Wave motion and Optics

(Regular)

Time : 2 Hours **Maximum Marks : 60**

Instructions to Candidates :

1. *Calculator is allowed to solve the problems.*
2. *Write intermediate steps.*

1. Answer any SIX questions. **(6×2=12)**

a) What are different types of wave motion?

b) Write two uses of lissajous figures.

c) What is resonance?

d) Define reverberation and Time of Reverberation.

e) What are conditions for constructive and destructive interference of light in young's double slits experiment?

f) Define wavefront. Mention its types.

g) Write any two comparisions between zone plate and convex lens.

h) What are positive and negative plates with respect to polarization of light?

2. Answer the questions 'a and b' OR 'c and d'.

a) Derive expression for intensity of progressive wave. **(8)**

b) The wavelength of a note on sound of frequency 512Hz at 27°C is 0.65 m. Find the ratio of two specific heats of air. Given its density to be 1.293 kg/m^3. **(4)**

(OR)

c) Derive expression for resultant displacement of a particles due to superposition of two colinear oscillations having equal frequencies. **(8)**

d) A progressive wave travels from medium 1 to medium 2. It's wavelength in two media are 0.2 m and 0.3m respectively. If the velocity of wave in medium 1 is 130 m/s, What is the velocity of wave in medium 2? Also calculate the frequency of the wave. **(4)**

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3. Answer the questions 'a and b' OR 'c and d'.

a) Derive an expression for velocity of wave along a stretched string interms of tension T and mass per unit length m. **(8)**

b) The resonating volume in Helmholtz resonator is 120 CC for tuning fork of frequency 480 Hz. Calculate the frequency of tuning fork if the resonating volume is 105 CC. **(4)**

(OR)

c) Derive Sabine's reverberation time formula. **(8)**

d) Calculate the intensity of sound wave if its intensity level is 110 decibel. (given that $I_o = 10^{-12}$ w/m^2]. **(4)**

4 Answer the questions 'a and b' OR 'c and d'.

a) How do you determine wavelength of light by using Fresnel biprism. **(8)**

b) The wavelength of light source is 6000 A°, what is distance between third and fifth dark fringes in an interference pattern formed by this source of light. Given that, the distance between screen and plane of slit is 1.2 m and slit width 0.1mm. **(4)**

(OR)

c) Give the theory of Newton's rings. **(8)**

d) Newton's rings are observed in reflected light of $\lambda = 5.9 \times 10^{-5} cm$. The diameter of the 10th dark ring is 0.5cm. Find the radius of curvature of the lens. **(4)**

5. Answer the questions 'a and b' OR 'c and d'.

a) Explain fraunhofer diffraction through a single slit. Draw the intensity distribution curve. **(8)**

b) What is the radius of the first half period zone in a zone plate behaving like a convex lens of local length 60 cm. For light of wavelength 6000 A°? **(4)**

(OR)

c) Explain the production of circular and elliptical polarized light. **(8)**

d) A 200 mm long tube containing 48cm^3 of sugar solution produces an optical rotation of 11°, when placed in a polarimeter/saccharimeter. If the specific rotation of the sugar solution is 66°. Calculate the quantity of sugar contained in the tube in the form of solution. **(4)**

44125/C0350

Reg. No. | | | | | | | | |

III Semester B.Sc.5 (CBCS) Degree Examination, April - 2023

PHYSICS

Kinetic Theory, Thermodynamics, Sound and Waves

(Repeater)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1. *Calculators can be used to calculate problems.*
2. *Write intermediate steps during problem solving.*

I. Answer any **Ten** of the following. **(10×2=20)**

1. a) Write an expression for mean velocity of gas molecule.
   b) Define thermal conductivity.
   c) Give the statement of Stefan's law of radiation.
   d) Define the concept of entropy.
   e) What is surface tension?
   f) What is viscous force?
   g) Mention characteristics of an exhaust pump.
   h) Define speed of an exhaust pump.
   i) What are beats in sound waves?
   j) What are forced vibrations?
   k) Define one decibel.
   l) What is reverberation?

II. Answer any **One** question of the following question.

2. a) Derive clausius expression of mean free path. **(10)**
   b) Calculate mean free path of a gas molecule whose radius is 2×10^{-10} m and the number of molecules per unit volume is 1.5×10^{25}. **(5)**

(OR)

3. a) Derive Plank's law of radiation. **(10)**
   b) Calculate the amount of energy emitted by a black body at temperature 200 k

   Given $\sigma = 5.67\times10^{-8}$ SI units. **(5)**

[P.T.O.

III. Answer any **One** of the following question.

4. a) Derive Maxwell's thermodynamic relations. **(10)**

   b) Find the increase in entropy when 1.68 kg of ice at 273°K melting into water at the same temperature. Given latent heat of fusion of ice = 335×10^3J/kg. **(5)**

(OR)

5. a) Derive an expression for efficiency of Diesel engine. **(10)**

   b) Calculate the efficiency of Otto engine if its adiabatic expansion ratio is 5 (γ=1.4). **(5)**

IV. Answer any **One** of the following question.

6. a) Describe an experiment to determine surface tension of a liquid by Jaeger's method. **(10)**

   b) Calculate excess pressure inside a soap bubble of radius 2×10^{-3}m if surface tension of soap solution is 20×10^{-3}N/m. **(5)**

(OR)

7. a) Write a note on exhaust pump. **(10)**

   b) Write a short note on ionization guage. **(5)**

V. Answer any **One** of the following question.

8. a) Discuss the composition of two equal and different frequency. **(10)**

   b) A particle is executing SHM of amplitude 0.03m and frequency 2 Hz. Calculate its velocity at the mean position. **(5)**

(OR)

9. a) Give the theory of Helmholtz resonator. **(10)**

   b) In Helmholtz resonator experiment, the volume of air is 8×10^{-5} m^3 for a tuning fork of frequency 512 Hz. Calculate the resonating volume of air for the tuning fork of frequency 256 Hz. **(5)**

44139/C5090

Reg. No. | | | | | | | | |

III Semester B.Sc.5 (CBCS) Degree Examination, March/April - 2023

PHYSICS

Weather Forecasting (SEC)

(Repeater)

Time : 2 Hours **Maximum Marks : 40**

PART - A

I. Answer any **Five** questions. **(5×2=10)**

1. a. What is green house effect?
   b. What is radiation?
   c. What is weather forecasting?
   d. What is acid rain?
   e. What are aerosols?
   f. What is cyclone?

PART - B

II. Answer question no. **2** or question no. **3**.

2. a. What is air temperature? Give the types. **(5)**
   b. What is humidity? Explain role of humidity in the atmosphere. **(10)**

(OR)

3. a. Write a note on pressure measuring instruments. **(5)**
   b. Explain the types of variation of atmospheric pressure. **(10)**

III. Answer questions no. **4** or question no. **5**.

4. a. Write a note on Green house gases. **(5)**
   b. Describe the classification of climates. **(10)**

(OR)

5. a. Write a note on process of heat transmission. **(5)**
   b. What are the types of weather forecasting methods? Explain. **(10)**

47130

Reg. No. | | | | | | | | |

III Semester B.Sc. 6. (NEP) Degree Examination, March/April - 2023

MATHEMATICS

Paper : Ordinary Differential Equations and Real Analysis - I

(Regular w.e.f. 2022-23)

Time : 3 Hours **Maximum Marks : 60**

Instructions to Candidates : *1. Answer any six questions from question number 1.*
2. Answer any three questions from question number 2,3,4, and 5.

1. Answer any **Six** of the following : **(6×2=12)**

a. Solve $p^2-7p+12=0$.

b. Find the general solution of $(y-px)(p-1)=p$.

c. Solve $\left(D^2+25\right)y=0$.

d. Find the complementary function of $\left(D^2-2D+1\right)y=\cos 3x$.

e. Prove that every convergent sequence is bounded.

f. State Cauchy's second theorem on limits.

g. Show that the series $1^2+2^2+3^2+.....+n^2$ diverges to $+\infty$.

h. Define absolute and conditionaly convergent of a series.

2. Answer any **Three** of the following. **(3×4=12)**

a. State and prove necessary condition for a differential equation $Mdx+Ndy=0$ to be exact.

b. Solve $y=2px+p^4x^2$.

c. Solve $x^2ydx-(x^3+y^3)dy=0$.

[P.T.O.

d. Reduce the equation $y^2(y-px)=x^4p^2$ into clairaut's form by using the substitutions $x=\frac{1}{4}$ and $y=\frac{1}{2}$ and solve.

3. Answer any **Three** of the following. **(3×4=12)**

a. With usual notations prove that $\frac{1}{f(D^2)}\sin ax=\frac{1}{f(-a^2)}\sin ax$, provided $f(-a^2)\neq 0$.

b. Solve $\frac{d^2y}{dx^2}-4\frac{dy}{dx}+2y=x^2$.

c. Solve $\frac{dx}{dt}=x+y;\frac{dy}{dt}=4x-2y$.

d. Derive the condition for the integrability of the equation $Pdx+Qdy+Rdz=0$, where P,Q,R are functions of x,y,z.

4 Answer any **Three** of the following. **(3×4=12)**

a. If a sequence $<x_n>$ is monotonically increasing and bounded above. Then prove that it is convergent and coverges to least upper bound.

b. If $\lim_{n\to\infty}<x_n>=l$ and $\lim_{n\to\infty}<y_n>=m$. Prove that $\lim_{n\to\infty}<x_n+y_n>=l+m$.

c. State and prove Cauchy's first theorem on limits.

d. Show that $\lim_{n\to\infty}\left(\frac{2}{1}.\frac{3}{2}.\frac{4}{3}.....\frac{n}{n-1}\right)^{1/n}=1$.

5. Answer any **Three** of the following. **(3×4=12)**

a. Prove tat P-series $\sum\frac{1}{n^p}$ converges if P>1 and diverges if $P\leq 1$.

b. Test the convergence of $\sum\sqrt{\frac{n}{n^2+1}}.x^n$.

c. State and prove Leibnitz's theorem on Alternating series.

d. Test the convergence of $\sum\frac{1}{n^2+1}$.

42333/C330

Reg. No. | | | | | | | | |

III Semester B.Sc. 4 Degree Examination, March/April - 2023

MATHEMATICS(OPTIONAL)

Mathematical Logic and Real Analysis

Paper : I

(Repeater)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1. Question paper has three parts namely A, B and C
2. Answer **all** questions.

Part - A

Answer any **ten** of the following **(10×2=20)**

1. a) Write the converse and Inverse of the implication. "If y is a real then it is rational or irrational".

b) Prove that $\sim(p \to q) \equiv p \wedge \sim q$

c) Give counter example to disprove the statement. "The product of any two odd integers is perfect square".

d) If $u = x + y$ and $v = xy$ then find $\frac{\partial(u,v)}{\partial(x,y)}$

e) State Taylor's theorem for functions of two variables.

f) Show that $x^2 + y^2 + x + y + xy$ has a minimum value at $\left(\frac{-1}{3}, \frac{-1}{3}\right)$

g) State the necessary conditions for extreme values.

h) Define convergent sequence and give an example.

i) If the sequence $\{a_n\}$ converges to 'l', then the sequence $\{|a_n|\}$ converges to $|l|$.

j) Show that the sequence $\{x_n\} = \left\{\frac{1}{n}\right\}$ is bounded $\forall n \in N$.

[P.T.O.

k) Define 'limit superior' and 'limit inferior' of sequence.

l) Find the limit of the sequence $\frac{(n+1)^{n+1}}{n^n}$.

Part - B

Answer any **four** of the following. **(4×5=20)**

2. Prove that $[(p \to r) \vee (q \to r)] \leftrightarrow [(p \wedge q) \to r]$ is a tautology.

3. State and prove Lagrange's mean value theorem for function of two variables.

4. Find the extreme values of $y^2 + 4xy + 3x^2 + x^3$.

5. If $\lim_{n\to\infty}\{a_n\} = l$ and $\lim_{n\to\infty}\{b_n\} = m$ then prove that $\lim_{n\to\infty}\{a_n.b_n\} = lm$

6. Prove that the sequence $\{u_n\}$ defined by $u_1 = \sqrt{7}, u_{n+1} = \sqrt{7+u_n}$ converges to positive root of the equation $x^2 - x - 7 = 0$

7. State and prove Cauchy's first theorem on limits.

Part - C

Answer any **four** of the following **(4×10=40)**

8. a) Define 'universal' and 'existential' quantifiers. Also explain these with suitable examples.

   b) Prove by indirect proof: if 'm' is an odd integer, then m+7 is even.

9. a) If u, v are functions of x,y and x,y are functions of r, θ. Then show that $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(r,\theta)} = \frac{\partial(u,v)}{\partial(r,\theta)}$.

   b) If $u = x + y + z, v = x^2 + y^2 + z^2$ and $w = xy + yz + zx$ then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$

10. a) Explain Lagrange's method of undetermined multipliers to find the extreme values of the function $u = f(x,y,z)$ where x,y,z are connected by the relations $\phi(x,y,z)=0$ and $\psi(x,y,z)=0$

b) Find the stationary value of $x^2y^3z^4$ subjected to the condition $x+y+z=5$

11. a) Prove that every monotonic decreasing sequence which is bounded below converges to its infimum.

b) Show that the sequence $\{x_n\}$ defined by $x_n = 1+\frac{1}{1!}+\frac{1}{2!}+.....+\frac{1}{n!}$ is convergent and $2 \le \lim_{n\to\infty} x_n \le 3$.

12. a) State and prove Cauchy's general principle of convergence for sequence.

b) Prove that $\lim_{n\to\infty} \frac{(n!)^{1/n}}{n} = \frac{1}{e}$.

42334/C340

Reg. No.

III Semester B.Sc. 4 Degree Examination, April - 2023

MATHEMATICS

Graph Theory Integral Calculus and Differential Equations

Paper No: II

(Repeater)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1. Question paper Contains three parts namely A, B and C
2. Answer all questions.

PART - A

I. Answer any **TEN of the following** **(10×2=20)**

1. a) In a graph G, prove that $(ab)^{-1} = b^{-1}a^{-1}, \forall a,b \in G$.

   b) Prove that identity element in a group G is unique.

   c) Write the permulation $f = \begin{pmatrix} 1234567 \\ 5463127 \end{pmatrix}$ as a product of disjoint cycles.

   d) If $G = \{1,-1,i,-i\}$ be a group under multiplication then prove that G is cyclic.

   e) Define left and right cosets of H in G.

   f) Find the length of the curve $y = \log \sin x$ from $x = 0$ to $x = \frac{\pi}{3}$

   g) Find the volume of solid generated by $y^2 = 4ax$ about x-axis from vertex to focus.

   h) Solve the equation $(1+2y)dx + 2xdy = 0$.

   i) Solve $(x^2 + y^2)dx - 2xydy = 0$

   j) Find the integrating factor of $xdy - ydx = (1-x^2)dx$.

   k) Solve $p^2 - 5p + 6 = 0$

   l) Find the general solution of $y^2 + p^2x^2 - 2pxy - 1 - p^2 = 0$.

P.T.O.

PART - B

Answer any **Four** of the following **(4×5=20)**

2. Prove that every permutation on a finite set A can be expressed as a product of disjoint cycles.

3. Prove that every subgroup of a cyclic group is cyclic.

4. Find the volume of solid obtained by revolving an arc of cycloid $x=a(\theta+\sin\theta)$ and $y=a(1+\cos\theta)$.

5. Solve. $(2x-3y+4)dx+(3x-2y+1)dy=0$

6. Solve. $\frac{dy}{dx}=\frac{x+2y+1}{2x+4y+3}$

7. Solve : $y-2px+yp^2=0$

PART - C

Answer any **Four** of the following. **(4×10=40)**

8. a) In a group G, prove that a subset H of a group G is a subgroup of G iff $ab^{-1}\in G, \forall a,b\in G$.

   b) Prove hat $G=\{1,5,7,11\}$ is an abelian group.

9. a) State and prove Lagrange's Theorem for group

   b) Let H be a subgroup of G, then prove that two right cosets of H in G are identical or disjoint.

10. a) Derive the formula for surface area of solid generated by revolving the curve $y=f(x)$ about x-axis from $x=a$ to $x=b$

    b) Find the arc length of astroid $x=a\cos^3 t$ and $y=b\sin^3 t$.

11. a) Define exact differential equation. State and prove the necessary condition for the equation $Mdx + Ndy = 0$ to be exact.

b) Solve the equation: $\left(x^2 + y^2 + x\right)dx + xydy = 0$

12. a) Solve : $p^2 + 2xp + 1 = 0$

b) Find the general solution and singular solution of the equation $p = \sin\left(y - px\right)$

44123/C0330

Reg. No. | | | | | | | | | |

III Semester B.Sc.5 Degree Examination, March/April - 2022

MATHEMATICS

Algebra - II, Real Analysis and Differential Equations

(Repeater)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates : *1. Question paper contains 3 - parts namely A,B,C.*
*2. Answer **All** questions.*

PART - A

Answer any **Ten** of the following. **(10×2=20)**

1. a. If $u = x+y$, $u = xy$ then find $\frac{\partial(u,v)}{\partial(x,y)}$.

b. Expand $\sin(x+y)$ by maclaurin's series upto 3rd degree terms.

c. Define convergent sequence and give an example.

d. Verify the sequence $\langle x_n \rangle$, where $x_n = \frac{2n+7}{3n+8}$ is monotonically increasing or decreasing.

e. Define Oscillatory sequence and give an example.

f. State Cauchy's 2nd theorem on limits.

g. Prove that every Cauchy sequence is bounded.

h. If G is a group, $(ab)^2 = a^2b^2 \ \forall a,b \in G$, then show that G is abelian.

i. Define add and even permutations.

j. Solve : $(e^y + 1)\cos x\,dx + e^y \sin x dy = 0$.

k. Solve : $y^2 + p^2 = a^2$.

l. Solve : $p^2 - 5p - 6 = 0$.

PART - B

Answer any **Four** of the following. **(4×5=20)**

2. If u,v are function of x,y then prove that $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(u,v)} = 1$.

P.T.O.

3. Find the extreme values of $y^2+4xy+3x^2+x^3$.

4. Show that the sequence $\langle a_n \rangle$ defined by $a_1=\sqrt{2}$ and $a_{n+1}=\sqrt{2a_n}$ converges to 2.

5. State and prove Cauchy's 1st theorem on limits.

6. Prove that every subgroup of a cyclic group is cyclic.

7. Solve : $P^2+2XP+1=0$.

PART - C

Answer any **Four** of the following. **(4×10=40)**

8. a. Expand $e^x \sin y$ in Maclaurin's series.

   b. Show that $x^2+y^2+x+y+xy$ has a minimum value at $\left(-\frac{1}{3},-\frac{1}{3}\right)$ and the minimum value is $-\frac{1}{3}$.

9. a. Prove that every convergent sequence has a unique limit.

   b. Prove that the sequence $\langle a_n \rangle$, where $a_n=\frac{1}{n+1}+\frac{1}{n+2}+\ldots+\frac{1}{2n}$ is convergent and its limit lies between $\frac{1}{2}$ and 1.

10. a. Prove that a sequence is convergent iff it is a Cauchy sequence.

    b. Show that by applying Cauchy's convergence criterion that the sequence $\langle a_n \rangle$, where $a_n=1+\frac{1}{3}+\frac{1}{5}+\ldots+\frac{1}{2n-1}$ is not convergent.

11. a. State and prove Lagrange's theorem for finite groups.

    b. Prove that any two right cosets of H in G, are either identical or mutually disjoint.

12. a. Solve $\left(a^2-2xy-y^2\right)dx-(x+y)^2dy=0$.

    b. Find the general and singular solution of the differential equation $y=px+\sin^{-1}p$.

42333/C330

Reg. No. | | | | | | | | |

III Semester B.Sc. 4 Degree Examination, March/April - 2023

MATHEMATICS(OPTIONAL)

Mathematical Logic and Real Analysis

Paper : I

(Repeater)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

1. Question paper has three parts namely A, B and C
2. Answer **all** questions.

Part - A

Answer any **ten** of the following **(10×2=20)**

1. a) Write the converse and Inverse of the implication. "If y is a real then it is rational or irrational".

b) Prove that $\sim(p \to q) \equiv p \wedge \sim q$

c) Give counter example to disprove the statement. "The product of any two odd integers is perfect square".

d) If $u = x + y$ and $v = xy$ then find $\frac{\partial(u,v)}{\partial(x,y)}$

e) State Taylor's theorem for functions of two variables.

f) Show that $x^2 + y^2 + x + y + xy$ has a minimum value at $\left(\frac{-1}{3}, \frac{-1}{3}\right)$

g) State the necessary conditions for extreme values.

h) Define convergent sequence and give an example.

i) If the sequence $\{a_n\}$ converges to 'l', then the sequence $\{|a_n|\}$ converges to $|l|$.

j) Show that the sequence $\{x_n\} = \left\{\frac{1}{n}\right\}$ is bounded $\forall n \in N$.

[P.T.O.

k) Define 'limit superior' and 'limit inferior' of sequence.

l) Find the limit of the sequence $\frac{(n+1)^{n+1}}{n^n}$.

Part - B

Answer any **four** of the following. **(4×5=20)**

2. Prove that $[(p \to r) \vee (q \to r)] \leftrightarrow [(p \wedge q) \to r]$ is a tautology.

3. State and prove Lagrange's mean value theorem for function of two variables.

4. Find the extreme values of $y^2 + 4xy + 3x^2 + x^3$.

5. If $\lim_{n\to\infty}\{a_n\} = l$ and $\lim_{n\to\infty}\{b_n\} = m$ then prove that $\lim_{n\to\infty}\{a_n.b_n\} = lm$

6. Prove that the sequence $\{u_n\}$ defined by $u_1 = \sqrt{7}, u_{n+1} = \sqrt{7+u_n}$ converges to positive root of the equation $x^2 - x - 7 = 0$

7. State and prove Cauchy's first theorem on limits.

Part - C

Answer any **four** of the following **(4×10=40)**

8. a) Define 'universal' and 'existential' quantifiers. Also explain these with suitable examples.

   b) Prove by indirect proof: if 'm' is an odd integer, then m+7 is even.

9. a) If u, v are functions of x,y and x,y are functions of r, θ. Then show that $\frac{\partial(u,v)}{\partial(x,y)} \cdot \frac{\partial(x,y)}{\partial(r,\theta)} = \frac{\partial(u,v)}{\partial(r,\theta)}$.

   b) If $u = x+y+z, v = x^2+y^2+z^2$ and $w = xy+yz+zx$ then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$

10. a) Explain Lagrange's method of undetermined multipliers to find the extreme values of the function $u = f(x,y,z)$ where x,y,z are connected by the relations $\phi(x,y,z)=0$ and $\psi(x,y,z)=0$

b) Find the stationary value of $x^2y^3z^4$ subjected to the condition $x+y+z=5$

11. a) Prove that every monotonic decreasing sequence which is bounded below converges to its infimum.

b) Show that the sequence $\{x_n\}$ defined by $x_n = 1+\frac{1}{1!}+\frac{1}{2!}+.....+\frac{1}{n!}$ is convergent and $2 \le \lim_{n\to\infty} x_n \le 3$.

12. a) State and prove Cauchy's general principle of convergence for sequence.

b) Prove that $\lim_{n\to\infty} \frac{(n!)^{1/n}}{n} = \frac{1}{e}$.