



INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Mid-Spring Semester Examination 2022-23

Date of Examination: 23.02.2023 Session: (FN/AN) AN Duration: 2 hrs. Full Marks: 60

Subject No.: KS 20203 Subject: Paninian Grammar from Computational Perspective

Department/Center/School: Centre of Excellence for Indian Knowledge System

Specific charts, graph paper, log book etc., required: NIL

Special Instructions (if any): Nil

Q. I. Answer any 5 of the following questions in one or two sentences

(5x1 = 5)

1. What is 'inflection'?
- ✓ 2. Who has the ultimate authority to decide whether a particular usage is साधु (sādhū) or not? ✓
- ✓ 3. What is the name of the book written by पतञ्जलि (Patañjali)? ✓
- ✓ 4. What is 'धातु (dhātu)'? ✓
5. In which form did बृहस्पति (Bṛhaspati) teach व्याकरण (vyākaraṇa) to इन्द्र (Indra)?
- ✓ 6. List the 4 ways in which विद्या (vidyā) is utilized according to पतञ्जलि (Patañjali)? ✓
- ✓ 7. Name the book that discusses genders of words. ✓

Q. II. Answer any 4 of the following in 80-100 words

(4x5 = 20)

- ✓ 1. Write about the history of संस्कृत व्याकरण (saṃskṛta vyākaraṇa) enlisting the names of some important works and their authors.
2. Explain the meaning of the word 'शब्द (śabda)' in संस्कृत व्याकरण (saṃskṛta vyākaraṇa). ✗
- ✓ 3. Explain how there is multiplicity of words in संस्कृत (Saṃskṛta).
- ✓ 4. Explain with example the algebraic nature of rules in the अष्टाध्यायी (Aṣṭādhyāyī).
- ✓ 5. Explain how पाणिनि's grammar is a sort of transformational generative grammar.
6. Explain what is संस्कृत (saṃskṛta) and the role of व्याकरण (vyākaraṇa) in establishing the संस्कृत. ✗

Q. III. Explain any 5 of the following terms in 35-50 words

(5x3 = 15)

- ✓ 1. सूत्र (sūtra) 2. वैखरी (yaikharī) ✓ 3. प्रातिपदिक (prātipadika) ✓ 4. प्रत्यय (pratyaya)
- ✓ 5. वार्तिक (vārttika) ✓ 6. प्रतिपदपाठ (pratipadapāṭha) 7. वाक्य (vākya)

Q. IV. State whether the following statements are true or false with reason

(3x2 = 6)

- ✓ 1. गणपाठ (Gaṇapāṭha) is an exhaustive collection of all nominal bases. ✓
- ✓ 2. पाणिनि (Pāṇini) was the first grammarian of Sanskrit. ✗
- ✓ 3. The word पङ्कज (Paṅkaja) is a योगरूढ (Yogarūḍha) word. ✓

Q. V. Give one word for any 4 of the following

(4x1 = 4)

1. A concise commentary of a सूत्र (sūtra) meant for teaching its meaning to new students –
- ✓ 2. A language that is described in detail by rules of व्याकरण (Vyākaraṇa) – लघु
- ✓ 3. A default rule – उत्पत्तिः
4. A detailed commentary covering all aspects of a सूत्र (sūtra) along with a discussion on all the वाक्तिक s (Vārttikas) connected to it, but not meant for novices –
- ✓ 5. Those who focus only on the language to be described while framing its rules are called –
- ✓ 6. The opinion that, 'it is possible to show a derivational process for all the words' is called –

Q. VI. Answer in detail (any one)

(1x10 = 10)

1. Explain the arguments put forth by grammarians in favour of शब्द-नित्यत्व (śabda-nityatva) as we see as your views about the same.
2. Write about the foundational books of Pāṇiniyan Grammatical System.

शुभमस्तु

Course: Paninian Grammar from Computational Perspective (KS 20203)

Duration: 1 hour

Answer any 5 the following questions in 50 – 100 words (10 marks)

Q1. What is सूत्र?

Q2. How are words derived in पाणिनि's व्याकरण?

Q3. Write about the tradition of संस्कृत व्याकरण.

Q4. What is the need for creating व्याकरण?

Q5. What is व्याकरण?

Q6. What is the meaning शब्द in संस्कृत व्याकरण?

Q7. Who are लक्ष्यैकचक्षुष्कs?

Q8. Give one Sanskrit word for the following concepts —

- a. The language that is described लक्ष्यम्
- b. The rules that describe the language लक्ष्यम्
- c. Default rules लक्ष्यम्
- d. Exceptional rules
- e. Verbal root धातु

Q9. What are the contents of सूत्रपाठ?

Q10. What is प्रकृति and प्रत्यय?

Centre of Excellence for Indian Knowledge System, IIT Kharagpur
Class Test

Course: Paninian Grammar from Computational Perspective (KS 20203)

Duration: 30 minutes

Answer any 5 of the following questions in 50 – 100 words (10 marks)

SET G

1. ✓ 'All other types of सूत्रs are meant to facilitate the विधिसूत्रs (Vidhisūtras)' Explain.
2. What is नियमसूत्र (Niyamasūtra)? Explain with an example.
3. ✓ What kind of सूत्रs has पाणिनि (Pāṇini) used to avoid repetition of certain processes that are identical to those related to once that have been already taught in other contexts? Explain with an example.
4. ✓ Which is the सूत्र-type that indicates the beginning of a new topic in the अष्टाध्यायी (Aṣṭādhyāyī)? Name and explain it with a few examples.
5. ✓ Explain the difference between 'meta-rules' and 'meta-language'.
6. What is प्रत्याहार? How is it prepared? And how is it used in पाणिनि's grammar?
7. ✓ How has पाणिनि used अनुबन्ध technique in his work.

सूत्र
नियम
विधि
प्रत्याहार
अनुबन्ध



INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

End-Spring Semester Examination 2022-23

Date of Examination: 26.04.2023

Session: (FN/AN) AN

Duration: 3 hrs.

Full Marks: 100

Subject No.: KS 20203

Subject: Paninian Grammar from Computational Perspective

Department/Center/School: Centre of Excellence for Indian Knowledge System

Specific charts, graph paper, log book etc., required: No

Special Instructions (if any): Nil

Handwritten signature

Q.I. Answer any two of the following questions in 250-300 words

(20)

Q1. Explain the Paninian approach of analysing the information coded in Sanskrit.

Q2. Explain 6 types of सूत्र (sūtras) found in the अष्टाध्यायी (Aṣṭādhyāyī) with examples.

Q3. What is meant by 'Metalanguage'? Explain various techniques used by Panini for build up his Metalanguage.

Q.II. Answer any Five of the following questions in 100-150 words

(35)

Q1. Describe the recent efforts in computational processing of Sanskrit Language.

Q2. What is IKS? Write your thoughts about relevance of IKS today.

Q3. What is meant by 'Natural Language' and what are the challenges involved in Natural Language Processing.

Q4. Explain how the concepts of 'Data Separation' and 'Data Encapsulation' are embedded in Panini's व्याकरण (vyākaraṇa).

Q5. Explain the salient features of the arrangement of various वर्ण (varṇas) in the वर्णमाला (varṇamālā).

Q6. Explain with an example the role of अनुबन्ध (anubandhas) in the derivational process.

Q7. Explain the relevance of शिवसूत्र (Śivasūtras) in Paninian grammatical system and discuss the significance of the unique arrangement of sounds found in the शिवसूत्र (Śivasūtras).

Q.III. Fill the blanks with appropriate words given in the brackets.

(08)

[सनादि (sanādi) suffix, तद्धित (taddhita) suffix, तिङ् (tiṅ) suffix, सुप् (sup) suffix, समास (samāsa), स्त्री (strī) suffix, सनादि (sanādi) suffix, कृत् (kṛt) suffix]

- | | |
|-------------------------------------|---|
| 1. धातु (dhātu) + _____ | = New धातु (dhātu) |
| 2. प्रातिपदिक (prātipadika) + _____ | = New धातु (dhātu) |
| 3. प्रातिपदिक (prātipadika) + _____ | = Feminine प्रातिपदिक (prātipadika) |
| 4. प्रातिपदिक (prātipadika) + _____ | = New प्रातिपदिक (prātipadika) |
| 5. धातु (dhātu) + _____ | = प्रातिपदिक (prātipadika) |
| 6. धातु (dhātu) + _____ | = Verb ready to be used in Sanskrit |
| 7. प्रातिपदिक (prātipadika) + _____ | = Non-verb ready to be used in Sanskrit |
| 8. Non-verb + _____ | = Non-verb |

Handwritten notes:
सनादि - धातु, स्त्री, समास
तद्धित - धातु, स्त्री, समास
तिङ् - धातु, स्त्री, समास
सुप् - धातु, स्त्री, समास
कृत् - धातु, स्त्री, समास

Q.IV. शब्द (Śabda) that is actually spoken is real. प्रकृति (prakṛtis), प्रत्यय (pratyayas) and transformation-rules leading to the derivation of words are fictitious. Only condition while deciding प्रकृति (prakṛtis), प्रत्यय (pratyayas) and rules is that they should be 'minimal' as they lead us to साधु (sadhu) usages. Following is small

present → ति, यति
future → इति
past → अति
order → अति

पठ, ति, यति. अति + अ
Rule → ① add ति in present, ति
② अति to be added 3 add in imperative case.
③ add अति, ति in past.

corpus of words provided to you. Make a minimal database of प्रकृति (indicating their meanings also), decide upon the minimal प्रत्यय (indicating their meanings) and prepare a minimal rule-set in such a way that all the words can be derived. Techniques like अनुबन्ध (anubandha) and अनुवृत्ति (anuvṛtti) may also be used while writing the rules. (10)

No.	Word	Meaning	No.	Word	Meaning
1	पठति (paṭhati)	Reads (present tense)	5	पठतु (paṭhatu)	(He must) Read
2	पाठयति (pāṭhayati)	Makes (someone) read (teaches)	6	पाठयतु (pāṭhayatu)	(He must) Teach
3	पठिष्यति (paṭhiṣyati)	Will read	7	अपठत् (apaṭhat)	Read (Past tense)
4	पाठयिष्यति (pāṭhayiṣyati)	Will teach	8	अपाठयत् (apāṭhayat)	Taught

Q.V. Observe the following set of rules and answer the questions given below –

No.	सूत्र (sūtras)	Meaning
1	उपदेशे अच् अनुनासिकः इत् (upadeśe ac anunāsikaḥ it)	The nasalised vowels are इत् in उपदेश or original enunciation.
2	हल् अन्त्यम् (hal antyam)	In उपदेश, the final consonant is इत्
3	न विभक्तौ तु-स्-माः (na vibhaktau tu-s-māḥ)	The final dental consonants and the final स् and म् are not इत्, in affixes called विभक्ति
4	आदिः त्रि-टु-डवः (ādiḥ tri-tu-ḍavaḥ)	त्रि, टु and डु occurring at the beginning of an उपदेश are called 'इत्'.
5	षः प्रत्ययस्य (ṣaḥ pratyayasya)	The letter ष at the beginning of a प्रत्यय is called 'इत्'
6	चु-टू (cu-tū)	The letters - च, छ, ज, झ, ञ, ट, ठ, ड, ढ, ण - at the beginning of a प्रत्यय are called इत्
7	लशकु अतद्धिते (laśaku ataddhite)	The initial ल् and श् and the gutturals of all affixes, except, तद्धित are called इत्
8	तस्य लोपः (tasya lopah)	Of this, (namely of that which has been called इत्), there is elision

1. Write the form of the following प्रत्यय (pratyayas) after the removal of their इत् (it) sounds. Also indicate the सूत्र (sūtras) by which some part of them is removed or not removed
 (i) घञ् (ghañ) (ii) तुमुन् (tumu-n) (iii) क्त्वा (ktvā) (iv) जस् (jas) (This is a विभक्ति suffix) (v) तल् (tal)
 (This is a तद्धित suffix) (10)
2. By using the principle of अकाङ्क्षा (akāṅkṣā) re-write all the above सूत्र (sūtras) along with all their अनुवृत्ति (10)

Q.VI. (A) Write about the most significant insights that you have gained from the course on Panini's Grammar and the possible areas where they can be applied....OR... (10)

(B) Express your opinion about the following statement by Leonard Bloomfield, "Panini's grammar is one of the greatest monuments of human intelligence..."

शुभमस्तु