घ) दिनांक–06.07.2022 से दिनांक–10.07.2022 के मध्य रात्रि तक ऑनलाईन आवेदन पत्र में की गई किसी भी अशुद्ध प्रवष्टि को संशोधित करने के लिए पुनः खोली जायेगी जिसके माध्यम से वैध अभ्यर्थी ऑनलाईन आवेदन पत्र की अशुद्धियाँ संशोधित कर सकेंगे। छूट सहित परीक्षा शुल्क भुगतान करने की स्थिति में शुद्धिकरण का दावा परीक्षा शुल्क भुगतान की राशि तक सीमित होगा।

14. परीक्षा शुल्क भुगतान करने की प्रक्रियाः–

परीक्षा शुल्क जमा करने के लिए Submit To Proceed Payment Click करें। एक नया पेज खुल जायेगा जिसमें Term & Condition को टिक (√) कर Proceed बटन दबाकर आगे बढ़ें। इसके बाद Select Payment category के सामने JMSCCE-2022 Select करें तथा अपना Registration Number डालकर अपना परीक्षा शुल्क का भुगतान करें।

15. **परीक्षा का स्वरूप :–** आयोग द्वारा ओ०एम०आर० आधारित परीक्षा ली जायेगी। परीक्षा यदि विभिन्न समूहो में लिया जाता है तो अभ्यर्थियों के प्राप्तांक का Normalisation किया जायेगा। Normalisation का सूत्र अलग से आयोग के वेबसाईट पर प्रकाशित है। अभ्यर्थियों की मेधा सूची उनके प्राप्तांक के Normalised अंक के आधार पर तैयार किया जायेगा तथा परीक्षाफल प्रकाशन के पश्चात उन्हें Normalised अंक ही दिया जायेगा।

परीक्षा का स्वरूप निम्न प्रकार होगा :–

परीक्षा का स्वरूप एवं पाठ्यक्रम :–परीक्षा एक चरण (मुख्य परीक्षा) में ली जायेगी।

परीक्षा में सभी प्रश्न वस्तुनिष्ठ एवं बहुविकल्पीय उत्तर युक्त होंगे। एक प्रश्न का पूर्ण अंक 3 (तीन) होगा। प्रत्येक सही उत्तर के लिए 3 (तीन) अंक दिये जायेंगे तथा प्रत्येक गलत उत्तर के लिए 1 (एक) अंक की कटौती की जायेगी।

भाषा विषयों को छोड़कर अन्य विषयों के प्रश्न हिन्दी एवं अंग्रेजी भाषा में होंगे।

16. मुख्य परीक्षा :–

मुख्य परीक्षा के लिए तीन पत्र होंगे। यह परीक्षा तीन पालियों में ली जायेगी। इसमें निम्न विषय रहेंगेः–

16.1 पत्र – 1 (भाषा ज्ञान) : कुल प्रश्न – 120, परीक्षा अवधि – 2 घंटा

(क)	हिन्दी भाषा ज्ञान	–	60 प्रश्न
(ख)	अंग्रेजी भाषा ज्ञान	–	60 प्रश्न

भाषा ज्ञान में प्राप्त अंक मात्र अर्हक (Qualifying) होगा, जिसमें उत्तीर्ण होने के लिए हिन्दी एवं अंग्रेजी भाषा ज्ञान में प्राप्त अंको को जोड़ कर 30% अंक प्राप्त करना निर्धारित रहेगा। इस पत्र में प्राप्त अंक मेधा निर्धारण के लिए नहीं जोड़ा जायेगा।

16.2 पत्र – 2

जनजातीय एवं क्षेत्रीय भाषा, कुल प्रश्न–100, परीक्षा अवधि– 2 घंटा

उर्दू/संथाली/बंगला/मुण्डारी (मुण्डा)/ हो/ खड़िया/ कुडूख(उरांव)/ कुरमाली/ खोरठा/ नागपुरी/पंचपरगनिया/उड़िया में से किसी एक भाषा की परीक्षा विकल्प के आधार पर अभ्यर्थी दे सकेंगे। इस परीक्षा में संबंधित भाषा के 100 बहुवैकल्पिक प्रश्न पूछे जायेंगे। उक्त पत्र के परीक्षा की अवधि 2 घंटा होगी।

चिन्हित क्षेत्रीय/जनजातीय भाषा में 30 प्रतिशत अंक प्राप्त करना अनिवार्य होगा।

16.3 पत्र– 3

तकनीकी/विशिष्ट विषय एवं सामान्य ज्ञान की परीक्षा

कुल प्रश्न–150, परीक्षा अवधि– 2 घंटा 30 मिनट

(क) तकनीकी/विशिष्ट विषय	–	100 प्रश्न
(ख) सामान्य अध्ययन	–	20 प्रश्न
(ग) सामान्य गणित	–	20 प्रश्न
(ख) सामान्य विज्ञान	–	10 प्रश्न

तकनीकी/विशिष्ट विषय में 30 प्रतिशत अंक प्राप्त करना अनिवार्य होगा।

टिप्पणीः– पत्र–1 (भाषा ज्ञान) की परीक्षा में न्यूनतम अर्हतांक 30% (तीस प्रतिशत) है। इससे कम अंक प्राप्त करने वाले अभ्यर्थी नियुक्ति के लिए चयन हेतु असफल/अयोग्य माने जायेंगे तथा ऐसे अभ्यर्थियों के पत्र–2 एवं पत्र–3 का मूल्यांकन नहीं किया जायेगा। इसी तरह चिन्हित क्षेत्रीय/जनजातीय भाषा प्रश्न पत्र–2 में 30 प्रतिशत से कम अंक प्राप्त करने वाले अभ्यर्थियों के प्रश्न पत्र–3 का मूल्यांकन नहीं किया जायेगा।

मुख्य परीक्षा का पाठ्यक्रम

पत्र – 1 (भाषा ज्ञान)

(क) हिन्दी भाषा ज्ञान :–

(i)	हिन्दी अनुच्छेद पर आधारित प्रश्न	–	30 प्रश्न
(ii)	हिन्दी व्याकरण पर आधारित प्रश्न	–	30 प्रश्न

इस विषय में हिन्दी अपठित अनुच्छेद (Unseen Passage) तथा हिन्दी व्याकरण पर आधारित प्रश्न रहेंगे।

(ख) अंग्रेजी भाषा ज्ञान :–

(i) अंग्रेजी अनुच्छेद पर आधारित प्रश्न – 30 प्रश्न

(ii) अंग्रेजी व्याकरण पर आधारित प्रश्न – 30 प्रश्न

इस विषय में अंग्रेजी अपठित अनुच्छेद (Unseen Passage) तथा अंग्रेजी व्याकरण पर आधारित प्रश्न रहेंगे।

पत्र – 2 (क्षेत्रीय भाषा)

उर्दू/संथाली/बंगला/मुण्डारी (मुण्डा)/ हो/ खड़िया/ कुडूख (उरांव)/ कुरमाली/ खोरठा/ नागपुरी/पंचपरगनिया/उड़िया में से किसी एक भाषा की परीक्षा विकल्प के आधार पर अभ्यर्थी दे सकेंगे। इस परीक्षा में संबंधित भाषा के 100 बहुवैकल्पिक प्रश्न पूछे जायेंगे। उक्त पत्र के परीक्षा की अवधि 2 घंटा होगी।

Urdu Language and Literature

1. **Urdu Literature Prose**

I. Kafan - Premchand
II. Naya Qanoon - Saadat Hassan Munto
III. Aakhri Harba - Elyas Ahmed Gaddi.

Poems

I. Muflisi - Nazeer Akbarabadi
II. Subh-e-Azadi - Faiz Ahmed Faiz
III. Waladat Nabvi - Hali.

Ashar

I. Aai Rashni-e-tabe jala kiyon Nahi deti - Siddque Mujeebi
II. Sabnam Bhigi Ghas per chalna kitna aachha lagta hai - Prakash Fikri
III. Tamannaon Main Uljhaya gaya Hoon - Shad Azimabadi.

2. Umraojan Ada - Mirza Hadi Ruswa.

3. **Grammar**

I. Gender
II. Opposite
III. Meaning
IV. Singular
V. Plural
VI. Similar.

कुरमाली

1. **व्याकरण** :– संज्ञा, सर्वनाम, वचन, लिंग, कारक, पुरूष, क्रिया, अव्यय, विशेषण, प्रत्यय, उपसर्ग, मुहावरे, लोकोक्तियाँ, पहेली (बुझौवल)।
2. कुरमाली लोकसाहित्य :–
   - क. लोक साहित्य की परिभाषा, कुरमाली लोककथा, वर्गीकरण, लोकनाट्या लोकगीत : डाँइडधरा, एढ़ेइया, बाँदना, करम, बिहा, डमकच।
   - ख. शिष्ट साहित्य : आधुनिक कविता की प्रवृतियाँ, कवित–रचना–विधान
   - ग. कहानी : कुरमाली केहनी जड़ती की सभी कहानियाँ।
   - घ. निबंध : महाकवि विनन्द सिंह, गौरांगिया, संतकवि सृष्टिधर, संतकवि महीपाल, डॉ नन्द किशोर सिंह

हो

1. **व्याकरण** :– संज्ञा, सर्वनाम, विशेषण, लिंग, पुरूष, विलोम शब्द, काल, मुहावरे, पहेली, कहावत आदि।
2. **साहित्य :–**
   - (क) हो लोक साहित्य :– अर्थ, परिभाषा, हो आदिवासी के उद्‌भव और विकास, गोत्र। लोकगीत–मागे, बा, हेरोः जोमनमा आदि।
   - (ख) हो शिष्ट साहित्य
   - (ग) नाटक– गिरूनगर– चोम्पानगर
   - (घ) उपन्यास– होकुड़ि
   - (ड.) निबंध :– मागे पोरोब, हेरो पोरोब, हेरमुट, बा पोरोब, जोनोम, दोस्तुर, आंदि दोस्तुर, गोनोःय दोस्तुर।
   - (च) कविता :– हर्ताहसा, जोनोम दिसुम, अले दिसुमरे, अबुअः नमा भारत, दुल सुनुम जुलोः दिसुम लागिड।

खोरठा

1. **गद्य भाग**
   - (क) छॉइहर (कहानी संग्रह) – लेखक – चितरंजन महतो चित्रा
   - (ख) सोंध माटी (कहानी संग्रह) – लेखक – डॉ0 विनोद कुमार
   - (ग) खोरठा निबन्ध – लेखक – डॉ0 बी0एन0 ओहदार
2. **पद्य भाग :–**
   - (क) दामुदेरक कोराञ् – लेखक – शिवनाथ प्रमाणिक
   - (ख) ऑखीक गीत – लेखक – श्री निवास पानुरी
   - (ग) खोरठा–कोठ पइदेक खेड़ी – लेखक – डॉ0 ए0के0झा
   - (घ) एक मउनी फूल – लेखक – संतोष महतो

3. **नाटक**

(क) डाह – सुकुमार

(ख) अजगर – लेखक – विश्वनाथ दसौधी राज

(ग) चाभी काठी – लेखक – श्री निवास पानुरी

(घ) उदवासल कर्ण – लेखक – श्री निवास पानुरी

4. **साहित्य की अन्य विद्याएँः–**

(क) संस्मरण

(ख) जीवनी

(ग) यात्रा वृवांत

(घ) शब्द चित्र

5. **व्याकरण :–**

खोरठा संज्ञा, सर्वनाम, लिंग, वचन, काल, कारक, समास, उपसर्ग

खड़िया

1. व्याकरण– संज्ञा, सर्वनाम, वचन, लिंग, पुरूष, क्रिया, काल, विशेषण, अव्यय, प्रत्यय, पहेलियॉ, मुहावरे, बुझावल, उल्टा शब्द आदि।

2. (क) खड़िया साहित्य – अर्थ, परिभाषा, भेद–उपभेद, खड़िया जाति का उद्‌भव और विकास, गोत्र विभाजन, गढ़ विभाजन।

   लोकगीत– जाङ कोर, कमर बंदोई, कदलेटा, जनम पर'ब, मुरड', बिहा (केरसोङ)

   (ख) खड़िया शिष्ट साहित्य – गद्य–पद्य साहित्य।

   (ग) कहानी – लोककथा।

   (घ) निबंध – शहीद तेलेंगा खड़िया, गोपाल खड़िया, खड़िया महासभा, बंदोई, जाङ कोर, करम, जनम पर'ब'।

पंच परगनिया

1. व्याकरण – संज्ञा, सर्वनाम, विशेषण, क्रिया, वाक्य, काल समास, अव्यय, मुहावरा, पहेलि, बुझौवल आदि।
2. साहित्य – पंच परगनिया लोक साहित्य–अर्थ, परिभाषा, भाग, विभाग, पंच परगनिया भाषा साहित्य की विशेषतायें आदि।
3. लोकगीत – पुस लोक गीत, बिहा गीत, करम गीत, सँहरइ गीत, मंत्र गीत और बालगीत आदि।
4. मध्यकालीन कवियों की काव्य रचना – पाठयांश।
5. कहानी – पाठयांश से संबंधित कहानी।
6. निबंध– सामाजिक, राजनैतिक, आर्थिक, सांस्कृतिक भौगोलिक विषयों पर आधारित

संथाली

1. व्याकरण– संज्ञा, सर्वनाम, वचन, लिंग, पुरूष, क्रिया, काल, विशेषण, अव्यय, प्रत्यय, पहेलियाँ, मुहावरे, बुझोबोल

2. साहित्य–

   (क) संताली लोक साहित्य – अर्थ, परिभाषा, भाग– विभाग, संतालों का उद्‌भव और विकास, गोत्र विभाजन, गाढ़ विभाजन।

   लोक गीत– डाहार, बाहा, सोहराय, काराम दोङ, दाँसाय।

   (ख) संताली शिष्ट साहित्य – कविता, कुङकुरूबुद, साँवहेंत्, मारांड़ो, सेंगेल, बिरसा मुण्डा, तुपुनघाट, साना, राहला रिमिल।

   (ग) कहानी – माड़घाटी, तारा आञ्चार, आनखा लाहा, काथा रेनाङ गोनोङ।

   (घ) निबंध – सिदो कानहू हुल, बाबा तिलका माँझी हुल, डिबा किसुन हुल, बिरसा आन्दोलन।

उड़िया

1. **भाषा विभाग**

   भाषा

   उपभाषा

   भाषार उत्‌पति सिधांत

   भाषा परिबर्त्तनर कारण

   भाषा परिबर्त्तनर दिग

   ध्वनि परिबर्त्तनर कारण

   उड़िया भाषा उपरे अन्यान्य भाषार प्रभाव

2. **उड़िया साहित्यर इतिहास**

   आरम्भरु पंचसखा युग पर्यन्त

   लोकगीत

   लोक कहाणी

   लोक नाट्‌क

   लोक वाणी

   शरला दास पंचसखा युग (बलराम दास, जगन्नाथ दाश, अच्युतानन्द दास, जशोवंत दास, अनंत दास)

सहायक ग्रंथसूची

(क) भाषा विज्ञानर रूपरेख – डॉ0 वासुदेव साहु

(ख) उड़िया भाषार उनमेश ओ विकाश – डॉ0 वासुदेव साहु

(ग) भाषा शास्त्र परिचय – डॉ0 गोलक विहारी धल

(घ) ध्वनि विज्ञान – डॉ0 गोलक विहारी धल

3. **गल्प विभाग**

गल्प ओ एकांकिका – Edition 2000 (OBSE)

(क) रेवती – फकीर मोहन सेनापति

(ख) तुमे कि सते पथर हेल – गोदावरीश महापात्र

(ग) बउला – राज किशोर राय

(घ) आईवुढ़ी – वंसत कुमार सतपथि

(ङ) अशुभ पुत्रर काहाणी – अच्युतानंद पति

4. **एकांकिका विभाग**

गल्प ओ एकांकिका Edition 2000 (OBSE)

(क) दूर पाहाड़ – प्राणवन्धु कर

(ख) फल्गु – मनोरंजन दास

5. **व्याकरण विभाग**

विशेष्य, विशेषण, संधि, समास, वाक्य रूपान्तर, भ्रम संशोधन, समच्चारित शब्द, एकपदरे प्रकाश, कुदन्त तद्धित।

नागपुरी भाषा साहित्य पाठ्यक्रम

1. व्याकरण :– वर्ण, सज्ञा, सर्वनाम, लिंग, वचन, कारक, विशेषण, क्रिया विशेषण, अव्यय, समास, उपसर्ग प्रत्यय काल, क्रिया, वाक्य, उपसर्ग प्रत्यय, समास, अनेक शब्द के बदले एक शब्द, विलोम शब्द, समानार्थी शब्द, मुहावरे एवं कहावतें, वाक्य शुद्धि।

2. साहित्य :– (क) नागपुरी लोक साहित्य– लोक गीत, लोक कथा, पहेली, कहावत, मुहावरे

(ख) लोक गीत– डमकच, पावस, उदासी, फगुआ पंचरंगी, फगुआ पुछारी, झूमर, अंगनई, लहसुआ झुमआ, सोहराइ गीत।

(ग) नागपुरी लोक कथा–तिरियाँ चरित, वनाहरनी कर बेटा, सातभाई एक बहिन, छोटकी बोहोरिया, नवाँचाद आदर गोपीचांद।

(घ) नागपुरी शिष्ट साहित्य– वन केंवरा– भाग–एक–गद्य–पद्य संग्रह शकुंतला मिश्र एवं डॉ0 उमेश नन्द तिवारी

मुण्डारी

1. व्याकरण–संज्ञा, सर्वनाम, वचन, लिंग पुरूष, क्रिया, काल, विशेषण, अव्यय, प्रत्यय, पहेलियाँ, मुहावरे, बुझौवल।

2. साहित्य –

(क) मुण्डारी लोक साहित्य– अर्थ, परिभाषा, भाग–विभाग, मुण्डाओं का उद्‌भव और विकास, गोत्र विभाजन, गढ़ विभाजन।

लेकगीत– बा, करम, सोहराई, अड़ान्दि।

(ख) मुण्डारी शिष्ट साहित्य – कविता, बिरसा मुण्डा, प्रेम प्रसंग, प्रकृति गीत।

(ग) कहानी–करम कथा, सृष्टि कथा, जीव जन्तु की कथा, सियार और बुढ़ा की कथा।

(घ) निबन्ध– बिरसा मुण्डा के अलगुलान, गया मुण्डा, चोट्टि मुण्डा, माघे परब, माडा परब, सोहराई परब इत्यादि।

Bengali

1. Prose, Poetry, Drama

(A) Krishnakanter will - Bankim Chandra Chattopadhyay

(B) Pather Panchali - Bibhuti Bhushan Bandyopadhyay

(C) Chitra - Rabindranath Thakur (Selected)

(i) Sukh (ii) Urabashi (iii) 1400 sal (iv) Antarjami (v) Jibandebota

(D) Madhukari - Kalidas Roy (Selected)

(i) Mahakal (ii) Duiti Sattabani (iii) Mitrakkar (iv) Kalapahar

(v) Purano Kagajer Feriwala.

(E) Sajahan - Dwijendra Lal Roy

(F) Nananna - Bijon Bhattacharjee

(G) Sahityer Rup O Riti

(i) Mahakabya (ii) Gitikabya (iii) Tragedy (iv) Comdedy (v) Romanticism (vi) Classicism

Khudukh

1. व्याकरण– संज्ञा, सर्वनाम, विशेषण, वचन, पुरूष, विलोम शब्द, काल, मुहावरे, पहेली, कहावत आदि।

2. साहित्य– (क) कुडुख़ लोक साहित्य– अर्थ, परिभाषा, उद्‌भव और विकास, गोत्र।

लोक गीत – बेंजा, लूझकी, तोकना डंडी, खद्दी करम, असारी, बरोया धुड़िया।

(ख) कुडुख़ शिष्ट साहित्य– नाटक, उपन्यास, कहानी, शहीद, निबन्ध, कविता, यात्रा वृत्तांत, आलोचना का उद्‌भव और विकास एवं विशेषताएँ।

पत्र –3

(क) तकनीकी/विशिष्ट विषयों का पाठ्यक्रम विवरणिका की परिशिष्ट–XI में संलग्न है।

(ख) (i) सामान्य अध्ययनः–

इसमें प्रश्नों का उद्देश्य अभ्यर्थी की सामान्य जानकारी तथा समाज में उनके अनुप्रयोग के सम्बन्ध में उसकी योग्यता की जाँच करना होगा। वर्तमान घटनाओं और दिन–प्रतिदिन की घटनाओं के सूक्ष्म अवलोकन तथा उनके प्रति वैज्ञानिक दृष्टिकोण जैसे मामलों की जानकारी जिसे कि किसी भी शिक्षित व्यक्ति से अपेक्षा की जाती है। इसमें झारखण्ड, भारत और पड़ोसी देशों के संबंध में विशेष रूप से यथा संभव प्रश्न पूछे जा सकते हैं। सम–सामयिक विषय, वैज्ञानिक प्रगति, राष्ट्रीय/अंतर्राष्ट्रीय पुरस्कार, भारतीय भाषाएँ, पुस्तक, लिपि, राजधानी, मुद्रा, खेल–खिलाड़ी, महत्त्वपूर्ण घटनाएँ। भारत का इतिहास, संस्कृति, भूगोल, पर्यावरण, आर्थिक परिदृश्य, स्वतंत्रता आंदोलन, भारतीय कृषि तथा प्राकृतिक संसाधनों की प्रमुख विशेषताएँ एवं भारत का संविधान एवं राज्य व्यवस्था, देश की राजनीतिक प्रणाली, पंचायती राज, सामुदायिक विकास, पंचवर्षिय योजना।

झारखण्ड राज्य की भौगोलिक स्थिति एवं राजनीतिक स्थिति की सामान्य जानकारी।

(ii) सामान्य विज्ञानः–

सामान्य विज्ञान के प्रश्न में दिन–प्रतिदिन के अवलोकन एवं अनुभव पर आधारित विज्ञान की सामान्य समझ एवं परिबोध से संबंधित प्रश्न रहेंगे। जैसा कि एक सुशिक्षित व्यक्ति से जिसने किसी विज्ञान विषय का विशेष अध्ययन नहीं किया हो, अपेक्षित है।

(ii) सामान्य गणितः–

इस विषय में सामान्यतः अंक गणित, प्राथमिक बीजगणित ज्यामिति, सामान्य त्रिकोणमिति, क्षेत्रमिति से संबंधित प्रश्न रहेंगे। सामान्यतः इसमें मैट्रिक/10वीं कक्षा स्तर के प्रश्न रहेंगे।

17. मुख्य परीक्षा के आधार पर मेधा सूची का निर्माण :

(i) आयोग द्वारा आयोजित मुख्य परीक्षा के उपरांत विवरणिका की कंडिका–16.3 की टिप्पणी के अधीन प्रश्न पत्र–2– चिन्हित क्षेत्रीय/जनजातीय भाषा एवं पत्र–3 – तकनीकी/ विशिष्ट विषय में प्राप्त अंकों को जोड़कर समेकित अंकों के आधार पर सामान्य मेधा–सूची (Common Merit List) तैयार की जायेगी और मेधा (Merit) के आधार पर कोटिवार रिक्त पदों की संख्या के अनुसार अभ्यर्थियों का चयन किया जायेगा।

(ii) मेधा–सूची में एक से अधिक उम्मीदवारों के प्राप्तांक समान (Equal Marks) रहने पर मेधा का निर्धारण उम्मीदवारों की जन्म तिथि के आधार पर किया जायेगा तथा अभ्यर्थी, जिनकी उम्र ज्यादा होगी, उन्हे अपेक्षाकृत ऊपर स्थान मिलेगा। यदि एक से अधिक उम्मीदवारों के प्राप्तांक और जन्म तिथि समान पायी जाती है, तो ऐसी स्थिति में उनके स्नातक स्तर तकनीकी/विशिष्ट योग्यता परीक्षा में प्राप्त अकों के आधार पर वरीयता का निर्धारण किया जायेगा, अर्थात स्नातक स्तर तकनीकी/विशिष्ट योग्यता परीक्षा में अधिक अंक प्राप्त करने वाले उम्मीदवार को मेधाक्रम में ऊपर रखा जायेगा।

परिशिष्ट–(XI)

तकनीकी/विशिष्ट विषयों का पाठ्यक्रम

अर्थशास्त्र (ECONOMICS)

1. अर्थव्यवस्था का ढाँचा, राष्ट्रीय आय का लेखीकरण।
2. आर्थिक विकल्प (Economical Choice) – उपभोक्ता व्यवहार – उत्पादक व्यवहार और बाजार के रूप।
3. निवेश सम्बन्धी निर्णय तथा आय और रोजगार का निर्धारण–आय, वितरण और वृद्धि के समृद्ध आर्थिक प्रतिरूप।
4. बैंक व्यवस्था–योजनाबद्ध–विकासशील अर्थव्यवस्था के केन्द्रीय बैंक व्यवस्था के उद्देश्य और साधन तथा साख सम्बन्धी नीतियाँ। झारखण्ड के वाणिज्य बैंकों के क्रियाकलाप।
5. करों के प्रकार और अर्थव्यवस्था के बजटीय और राजकोषीय नीति के उद्देश्य और साधन।
6. अंतर्राष्ट्रीय व्यापार प्रशुल्क पद्धति, विनिमय दर, अदायगी शोध, अतंर्राष्ट्रीय मुद्रा व बैंक संस्थान।
7. भारतीय अर्थव्यवस्था, भारतीय अर्थ नीति के निदेशक सिद्धांत, योजनाबद्ध वृद्धि और वितरण न्याय–गरीबी का उन्मूलन। भारतीय अर्थव्यवस्था का संस्थागत ढाँचा–संघीय शासन संरचना–कृषि औद्योगिक क्षेत्र, सार्वजनिक और निजी क्षेत्र, राष्ट्रीय आय, उसका क्षेत्रीय और क्षेत्रीय वितरण कहाँ–कहाँ और कितनी।
8. कृषि उत्पादन–कृषि नीति–भूमि सुधार–प्रौधोगिकीय परिवर्त्तन–औद्योगिक क्षेत्र से सह–सम्बन्ध।
9. औद्योगिक उत्पादन–औद्योगिक नीति। सार्वजनिक और निजी क्षेत्र क्षेत्रीय वितरण–एकाधिकार प्रथा का नियंत्रण और एकाधिकार।
10. कृषि उत्पादों और औद्योगिक उत्पादों के मूल्य निर्धारण सम्बन्धी नीतियाँ अधिप्राप्ति और सार्वजनिक वितरण।
11. बजट की प्रवृत्तियाँ और राजकोषीय वितरण।
12. मुद्रा और साख प्रवृत्तियाँ और नीति–बैंक व्यवस्था और वित्तीय संस्थाएँ।
13. वदेशी व्यापार और अदायगी कोष।
14. भारतीय योजना–उद्देश्य, व्यूह, रचना अनुभव और समस्याएँ।
15. झारखण्ड की अर्थ व्यवस्था :– कृषि एवं उद्योग के सापेक्षिक स्थान, आर्थिक विकास के मार्ग की रूकावटें, गरीबी एवं बेरोजगारी, भूमि सुधार की प्रगति।

MATHEMATICS

1. **Linear Algebra**: Vector space, Linear dependence and independence, Subspace, bases, dimension, Finite dimensional vector spaces.
Matrices: Cayley- Hamilton theorem, eigenvalues and Eigen vectors, matrix of transformation, row and colum reduction, echelon form, rank, equivalence, congruence and similarity. Reduction to canonical forms. Orthogonal and unitary reduction of quadratic and hermitian forms, positive definite quadratic forms.

2. **Calculus** : Real numbers, bounded sets, open and closed sets, real, sequences, limits, continuity, differenticibility, mean value theorems, Taylor's theorem with remainders, indeterminate form, maxima and minima, asymptotes, functions of several variables, continuity, differentiability, partial deriavatives, maxima and minima, Lagranges methods of multipliers, jacobian, Raimann's definition of definite integrals. Indefinite integrals, infinite & improper integrals, beta & beta gamma functions, double and tripe integrals (evaluation techniques only), areas, surface and volumes, centre of gravity.

3. **Analytic geometry**: Cartesian and polar co-ordinates in two and three dimensions, second degree equations in two and three dimensions, reduction to canonical forms, straight lines, shortest distance between two skew lines plane, sphere, cone, cylinder, paraboloid, ellipsoid, hyperboloid of one and two sheets and their properties.

4. **Ordinary differential equations**: Formulation of differential equation, order and degree, equations of first order and first degree, integrating factors, equations of first order but not of first degree, calariaut's equation, singular solution.

Higher order linear equations with constant coefficients, complementary functions and particular integrals, general solution, Euler-Cauchy equation.

Second order linear equations with variable coefficients, determination of complete solution when one solution is known, method of variation of parameters.

5. **Dynamics, Statics and Hydrostatics**: Degree of freedom and constraints, rectilinear motion, simple harmonic motion, motion in a plane projectile, constrained motion, work and energy, conservation of energy, motion under impulsive forces, kepler's law, orbit under central forces, motion of varying mass, motion under resistance.

Equilibrium of a system of particles, work and potential energy, friction, common catenary, principle of virtual work, stability of equilibrium, equilibrium of forces in three dimensions.

Pressure of heavy fluids, equilibrium of fluids under a given system of forces, Bernoulli's equation, center of pressure, thrust on curved surfaces, equilibrium of floating bodies, stability of equilibrium, metacenter, pressure of gases.

6. **Vector analysis**: Scalar and vector fields, triple products, differentiation of vector function of scalar variable, gradient, divergence and curl in Cartesian, cylindrical and spherical co-ordinates and their physical interpretation. Higher order derivatives, vector identities and vector equations.

Application to geometry: Curves in spaces, curvature and torsion, Serret-Frenet formulae Gauss and Stoke's theorem, Green's identities.

7. **Algebra**: Groups, Sub groups, normal subgroups, homomorphism of groups, quotient groups basic isomorphism theorem, Sylow's theorem, permutation groups, Cayley theorem. Rings and ideals, principal ideal Domains, Unique Factorisation Domains and Euclidean Domains, and Euclidean Domains, field extensions, finite fields.

8. **Complex Analysis**: Analytic function, Cauchy-Riemann equations, Cauchy's theorem Cauchy's integral formula, power series, taylor's series, Laurent's series, Singularities, Cauchy Rasidue theorem, Contour integration, Conformal mapping, Bilinear transformation.

9. **Operations Research**: Linear programming problems, basic solution, basic feasible solution and optimal solution. Graphical method and simplex method of solution, Duality, Transportation and assignment problems.

   Analysis of steady state and transient solution for queueing system with poisson arrivals and exponential service time.

   Deterministic replacement models, sequencing problem with two machines and n jobs, 3 machines and n jobs (special case).

10. **Mathematical Modeling**

   (a) Difference and differential equation growth models: Single species population models, Population growth an age structure model. The spread of technological innovation.

   (b) Higher order linear models - A Model for the detection of diabetes.

   (c) Nonlinear population growth models: prey- predator models, Epidemic growth models.

   (d) An Application in environment: Urban wastes water management planning models.

   (e) Models from political science: Proportional representation (cumulative and comparison voting) models.

11. **Partial differential equations**: Curves and surfaces in three dimensions, formulation of partial differential equations, solutions of equations, solutions of equation of type dx/P=dy/Q=dz/R; orthogonal trajectories, pfaffian differential equations, partial differential equations of the first order, solution by Cauchy's method of characteristics, charpit's method of solution, linear partial differential equations of the second order with constant coefficients, equations of vibrating string, heat equation, Laplace equations.

12. **Probability**: Notion of probability: Random experiment, Sample space, axioms of probability, Elementary properties of probability, equally likely outcome problems.

   Random variables: Concept, cumulative distribution function, discrete and continuous random variables, expectations, mean, variance, moment generating function.

   Discrete distribution: Binomial, geometric, poisson.

   Continuous distribution: Uniform, Exonential, Normal, Conditional probability, and conditional expectation, Bayes theorem, independence, computing expectation by conditioning.

   Bivariate random variables: Joint distribution, Joint and Conditional distributions.

   Functions of random variables: Sum of random variables, the law of large number and central limit theorem, approximation of distributions.

13. **Mechanics and fluid dynamics**: Generalised co- ordinates, holonomic and non- holonomic systems D'Alembert's principle and Langrage's equation, Hamilton equations, moment of inertia, motion of rigid bodies in two dimensions.

    Equation of continuity, Euler's equations of motion for inviscid flow, stream-lines, path of a particle, potential flow. Two dimensional and axisymytric motion, sources and sinks, votex motion, flow past a cylinder and a sphere, method of images, Navier- Stocke's equation, for a viscous fluid.

14. **Discrete Mathematics**: Introduction to graph theory: graphs and degree sum theorem, connected graph, bi-partite graphs, trees, Eulerian and Hammiltonian graph, plane graph and Euler's theorem, planar graphs, 5-color theorem, marriage theorem.

15. **Logic** : Logical connectives negation, quantifiers, compound statement, Truth table, Tautologies, Boolean algebra- Lattices, geometrical lattices and algebraic structures, duality, distributive and complemented lattices, boolean lattices and boolean algebras, boolean functions and expressions, design and implementation of digital networks, switching circuits.

COMMERCE

1. Accounting, Auditing and taxation

a) **Accounting as a financial information system**- Impact of behavioral sciences-Methods of accounting of changing price levels with particulars reference to current Purchasing Power (CPP) accounting Advanced problems of company accounts- Amalgamation absorption and reconstruction of companies- Accounting of holding companies-Valuation of shares and goodwill. Controllership functions-property control legal and management.

b) **Important provisions of the Income Tax Act. 1961**- Definition – charge of Income tax – Exemptions Depreciation and Investment allowance-Simple problems of computation of income under the various heads and determination of assessable income – Income tax authorities.

c) **Nature and functions of Cost Accounting** – Cost classification – Techniques of segregating semi-variable costs into fixed and variable components – Job costing – FIFO and weighted average methods or calculating equivalent units of production – Reconciliation of cost and financial accounts – Marginal Costing – Cost-volume- profit relationship; Algebraic formulae and graphical representation-Shut-down point-Techniques of cost control and cost reduction-Budgetary control-flexible Budget – Standard costing and variance analysis responsibility accounting-Bases of charging overheads and their inherent fallacy costing for pricing decisions .

d) **Significance of the attest function**- Programming the audit-works-Valuation and verification of assets, fixed, wasting and current assets – Verification of liabilities – Audit of limited companies – appointment status, power, duties and liabilities of the auditor – Auditor's report-Audit of share capital and transfer of shares – Special point in the audit of banking and insurance companies.

2. BUSINESS FINANCE AND FINANCIAL INSTITUTIONS.

a) Concept and scope of Financial Management: Financial goals of corporations – Capital budgeting; Rules of the thumb and Discounted cash flow approaches – Incorporating uncertainty in investment decisions – Designing an optimal capital structure – Weighted average cost of capital and the controversy surrounding the Modigliani and miller model, sources – of raising short-term, intermediate and long-term finance – Role of public and convertible debentures – Norms and guidelines regarding debt-equity rations, - Determinants of an optimal dividend policy-optimizing models of James E.walter and John Lintner-Forms of dividend payment – Structure of working capital and the variable affecting the level of difference of components – Cash flow approach of forecasting working capital needs – Profiles of working capital in Indian industries – Credit management and credit policy – Consideration to tax in relation to financial planning and cash flow statements.

b) **Organisation and deficiencies of Indian money Market structure of assets and liabilities of commercial banks** – Achievements and failures of nationalisation – Regional rural banks – Recommendations of the Tandon (P.L.) study group on following of bank credit, 1976 and their revision by the chore (K.B.), committee, 1979 – An assessment of the monetary and credit policies of the Reserve bank of India – Constituents of the Indian Capital Market – Functions and working of All India term Financial institutions (IDBI, IFCI, ICICI, and IRCI) – Investment policies of the Life Insurance corporation of India and the Unit Trust of India – Present state of stock exchanges and their regulation.

c) **Provision of the Negotiable Instruments Act, 1881.**

d) **Crossings and endorsements with particular reference to statutory protection to the paying and collecting bankers** – Salient Provision of the Banking Regulation Act, 1949 with regard to chartering, supervision and regulation of banks.

3. **Organization Theory and Industrial Relations.**

a) ORGANISATION THEORY:

i) **Nature and concept of organization**: Organization goals Primary and secondary goals Single and Multiple goals, ends – means chain-Displacement, succession, expansion and multiplication of goals – Formal organization: Type, Structure-Line and Staff, functional matrix, and project – Informal organization – functions and limitations.

ii) **Evolution of organisation theory**: (classical, Neo-classical and system approach – Bureaucracy Nature and basis of power, sources of power, power structure and politics-Organisation behaviour as a dynamic system: technical social and power systems interrelations and interactions – Perception-Status system: Theoretical and empirical foundations of Maslow, Megergore, Horzberg, Likert, Vroom, porter and Lawler, Odam and Human Models of motivation. Morale and productivity- Leadership; Theories and styles-Management of Conflicts in organization – Transactional Analysis – Significance of culture to organisatons. Limits of rationality simon- March approach. Organisation change, adaptation, growth and development-Organisation control and effectiveness.

4. INDUSTRIAL RELATIONS:

Nature and scope of industrial relations, Industrial labour in India and its commitment – Theories of unionism- Trade union movement in India – Growth and structure-Role of outside leadership-Workers education and other problems-Collective bargaining-approaches conditions, limitation and its effectiveness in Indian conditions-Workers participation in management: philosophy, rational, present day state of affairs and its future prospects.

Prevention and settlement of industrial disputes in India: preventive measures, settlement machinery and other measures in practice- industrial relations in public enterprises- Absenteeism and labour turn-over International Labour Organisation and India-Role of personnel department in the organization- Executive development, personnel policies, personnel audit and personnel research.

STATISTICS

i. **Probability** – Sample space and events, probability measures and probability space, Statistical independence, Random variable as a measurable function, Discrete and continuous random variables, Probability density and distribution functions, marginal and conditional distributions functions of random variables and their distributions, expectation and movements, conditional expectation, correlation co-efficient; convergence in probability in LP almost everywhere; Markov, Chebychev and Kalmogrov inequalities, Borel – Cantellilemma, Weak and strong law of large numbers probability generating and characteristic functions. Uniqueness and continuity theorems. Determination of distribution by moments Linderberg-Levy Central limit theorem. Standard discrete and continuous probability distributions, their interrelations including limiting cases.

ii. **Statistical Inference** - Properties of estimates, consistency, unbiasedness, efficiency, sufficiency and completeness Cromer-Rao bond, Minimum variance unbiased estimation, Rao Blockwell and Lehmann Sheffe's theorem methods of estimation by moments maximum likelihood, minimum Chi-square. Properties of maximum likelihood estimators confidence intervals for parameters of standards distributions.

Simple and composite hypotheses, statistical tests and critical region, two kinds of error, power function unbiased tests, most powerful and uniformly most powerful tests Neyman person Lemma, Optimal tests for simple hypotheses concerning one parameter, monotone likelihood ratio property and its use in constructing UMP test, likelihood ratio criterion and its asymptotic distribution, Chi-square and Kolmogoro tests for goodness of fit. Run test for randomness. Sign test for Location, Wilcoxon-Mann-whitney test and Kologor-Simirnov test for the two sample problem. Distribution-free confidence intervals for quantities and confidence bands for distribution functions. Notions of a sequential test, Walds, SPRT, its CC and ASN function.

iii. **linear Inference and Multivariate Analysis -** Theory of least squares and Analysis of variance, Gausse Markoff theory, normal equations, least square estimates and their precision. Tests of significance and intervals estimates based on least square theory in one way, two way and three way classified data. Regression Analysis, linear regression, estimates and tests about correlation and regression coefficient curve linear regression and orthogonal polynomials, test for linearity of regression Multivariate normal distribution, multiple regression, multiple and partial correlation. Mahalanobis D^2 and Hotelling T^2 – Statistics and their applications (derivations of distribution of D^2 and T^2 excluded) Fisher's discriminant analysis.

iv. **Sampling Theory and Design of Experiments -** Nature and scope of sampling, simple random sampling, sampling from finite populations with and without replacement, estimation of the standard errors sampling with equal probabilities and PPS sampling. Stratified random and systematic sampling, two stage and multi-stage sampling, multiphase and cluster sampling schemes.

Estimation of population total and mean, use of biased and unbiased estimates auxillary variables, double sampling standard errors of estimates cost and variance functions ratic and regression estimates and their relative efficiency. Planning and organization of sample surveys with special reference to recent large scale surveys conducted in India.

Principles of experimental designs, CRD, RBD, LSD, missing plot technique factorial experiments 2^{nd} and 3^{rd} design general theory of total and partial confounding and fractional replication. Analysis of split plot, BIB and simple lattice designs.

v. **Engineering Statistics** - Concepts of quality and meaning of control, Different types of control charts like X-R Charts, P charts np charts and cumulative sum control charts.

Sampling inspection Vs 100 percent inspection. Single, double multiple and sequential sampling plans for attributes inspection, OC ASN and ATI curves. Concept of producer's risk and consumer's risk. AQI., AOQL, LTPD etc. Variable sampling plants.

Definition of Reliability, maintainability and availability Life distribution failure rate and bath-tub, failure curve exponential and Weibull models, Reliability of series and parallel systems and other simple configurations. Different types of redundancy like hot and cold and use of redundancy in reliability improvement problems in life testing, Censored and truncated experiments for exponential model.

vi. **Operational Research**- Scope and definition of Or different types of models, their construction and obtaining solution.

Homogenous discrete time Markov chains, transition probability matrix, classification of states and ergodic theorems. Homogenous continuous time Markov chains. Elements of queuing theory, M/M/1 and M/M/K queues, the problem of machine interference and GI/M/I and B/GI queues.

Concept of scientific inventory management and analytical structure of inventory problems simple models with deterministic and stochastic demand with and without lead time. Storage models with particular reference to dam type.

The Structure and formation of a linear programming problem. The simplex procedure two phase methods and charnes-M Method with artificial variables. The quality theory of linear programming and its economic interpretation. Sensitivity analysis.

vii. **Transportation and Assignment Problems** - Replacement of items that fail and those that deteriorate, group and individual replacement policies.

Introduction to computers and elements of Fortran IV Programming Formats for input and output statements, specification and logical statements and subroutines. Application to some simple statistical problems.

viii. **Quantitative Economics –** Concept of time-series, additive and multiplicative modols, resolution into four components, determination of trend by free-hand drawing. Moving averages and fitting of mathematical curves, seasonal indices and estimate of the variance of the random components.

Definition, construction, interpretation and limitation of index numbers, Lespeyre parsche Ecgewoth-marshall and Fisher index numbers their comparitions tests for index numbers and construction of cost of living index.

Theory and analysis of consumer demand – Specification and estimation of demand functions. Demand elasticities. Theory of production, supply functions and elasticities, input demand functions. Estimation of parameters in single equation model – classical least square generalized least squares beteroscedasticity, serial correlation multicollinearity, errors in variables model, simultaneous equation models-Identification. Rank and order conditions. Indirect least squares and two stage least squares, short-term economic forecasting.

ix. Demography and psychometry - Sources of demographic data: Census registration : NSS and other demographic surveys. Limitation and uses of demographic data.

Vital rates and rations : Definition construction and uses.

Life tables – complete and absidged : construction of life tables from vital statistics and census returns uses of life tables.

Logistic and other population growth curves.

Measure of fertility. Gross and net reproduction rates.

Stable population theory. Uses of stable and quasi-stable population techniques in estimation of demographic parameters.

Morbidity and its measurement Standard Classification by cause of death. Health surveys and use of hospital statistics.

Educational and psychological statistics methods of Standardization of scales and tests. IQ tests. reliability of tests and T and Z scores.

Horticulture

Definition division horticulture, scope, importance problems Horticulture, Classification of vegetable omamentals: Types vegetable gardens, propagation techniques, layout orchard: Principles preservation of fruits vegetables Protected cultivation; Value addition marketing produce. Techniques raising nursery, Basie physiology of ripening in fruits vegetables and products: Type of fruits vegetable products control fungal bacterial diseases, nutritive value of fruits vegetables and their human nutrition, important physiological disorders.

Production Technology of Crops: Area production different fruit crops Climatic zones horticultural crops; Training pruning of fruit trees. Unfruitfulness and remedies, fruit drops and remedies, Propagation important fruits, methods irrigation in crops; Manuring in crops. Package practices cultivation of fruits- mango, banana, citru, guava, grape pineapple, papaya apple, pear, peach and plum; Cultivation plantation crops like coconut, cashew, nut, coffee, tea and are canut.

Area production different vegetables, raising seedlings, cultural practices of vegetable crops, production technology tomato, chillies, brinjal, cucurbits (pumpkin bottle gourd, bittergourd, ashgourd, muskmelon and watermelon. cucumber and parwal) cole crops (cauliflower, cabbage and knoll Khol) onion and garlic, beans, cowpea common bean, french bean and peas root crops (radish, tapioca, sweet potato, turnip, carrot and potato) leafy vegetables (fenugreek coriander and spinach) importance floriculture cultivation, ornamental gardens, types and styles of ornamental gardens seasonal flowers pot plants etc. Major Floriculture Crops grown in India for commercial purposes like rose, carnation, chrysanthemum marigold. tuberose, gladiolus, orchids and jasmine production technology spices like black pepper, coriander, turmeric, ginger, cardamom cumin fenugreek.

Production technology of aromatic crops- lemon grass, citronella, palma rosa, vetiver, geranium, dawana; Medicinal plants- rauvoitia, ocimum, aloevera, guggul, stevia, safed musli, brahmi, tulsi, mint kalmegh, jatropha and discoria. Nursery raising techniques for medicinal and aromatic plants Establishment and maintenance of lawns, trees, shrubs, creepers, hedges and annuals: Type of gardens, methods of crop improvement; Male sterility and incompatibility. Pure line and pedigree selection, backeross. mass selection. heterosis: Plant nutrients, deficiency symptoms of nutrients, manures and fertilizers: Systems of irrigation Management of important pests and diseases of fruits and vegetables.

Agricultural Science (कृषि विज्ञान)

Ecology and its relevance to man natural resources, their sustainable management and conservation; Physical and social environment as factors of crop distribution and production: Agro acology: Cropping patterns as indicators a environments. Environmental pollution and associated hazards to crops, animal and humans: Climate change international conventions and global initiatives Green house effect and global warming Advance tools for ecosystem analysis, Remote sensing (RS) and Geographic Information System (GIS)

Cropping patterns in different agro climatic zones of the country Impact of high-yielding and short-duration Varielles on shifts in cropping patterns Concepts of various cropping and farming systems Organic and precision farming Package of practices for production of important cereals, pulses. oil seeds, fibers, sugar, commercial and fodder crops.

Important features and scope of various types of forestry plantations such as social forestry, agro-forestry, and natural forests. Propagation of forest plants Forest products Agro forestry and value addition Conservation of forest flora and fauna

Weeds, their characteristics, dissemination and association with various crops, their multiplications: cultural, biological and chemical control of weeds

Soil physical chemical and biological properties Processes and factors of soil formation. Soils of India Mineral and organic constituents of soils and their role in maintaining soil productivity Essential plant nutrients and other beneficial elements in soils and plants. Principles soil fertility, soil testing and fertilizer recommendations, integrated nutrient management: Bio fertilizers Loses of nitrogen in soil, nitrogen-use efficiency in submerged rice soils, nitrogen fixation in soils Efficient phosphorus and potassium use Problem soils and their reclamation. Soil-factors affecting greenhouse gas emission.

Soil conversation, integrated watershed: management Soil erosion and its management Dry land agriculture and its problems Technology for stabilizing agricultural production in rain fed areas.

Water-use efficiency in relation to crop production, criteria for scheduling Irrigations, ways and means of reducing run-off losses of irrigation, water, Rainwater harvesting, Drip and sprinkler irrigation. Drainage of waterlogged soils, quality of irrigation water, effect of industrial effluents on soil and water pollution. Irrigation projects in India.

Farm management- scope: importance and characteristics, farm planning. Optimum resource use and budgeting. Economics of different types of farming systems. Marketing management strategies for development, market intelligence. Price fluctuations, and their cost; roll of co-operatives in agricultural economy; types and systems of farming and factors affecting them. Agriculture prize policy. Crop Insurance.

Agricultural extension- its importance and role, methods of evaluating of extension programmes, socio ecocomic survey and status of large, small marginal Farmers & landless agricultural labourers. Training programmes for extension workers. Role of Krishi Vigyan Kendras (KVKs) in dissemination of agricultural technologies. Non Government Organizations (NGO) and self help group approach for rural development.

Cell structure, function and cell cycle. Synthesis structure and function of genetic material. Laws of heredity. Chromosoma aberrations, linkage and cross-over, and their significance in recombination breeding. Polyplus, euploids and aneuploids. Mutations- and their role in crop improvement. Heritability, asterility and incompatibility, classification, and their application in crop improvement. Cytoplasmic inheritance, sex-linked, sex influenced and sex limited characters.

History of plant breeding Mode of reproduction, selfing and crossing techniques. Origin: evolution and domestication of crop plants, center of origin, law of Homologous series, crop genetic resources-conservation and utilization. Application of principle of plant breeding. improvement of crop plants. Molecular markers and their application in plant improvement. Pure-life selection: pedigree, mass and recurrent selections, combining ability, its significance in plant breeding. Heterosis and its exploitation. Somatic hybridization Breeding for disease and pest resistance. Role of inter-specific and inter-generic hybridization. Role of genetic engineering and biotechnology in crop improvement. Genetically modified crop plants.

Seed production and processing technologies. Seed certification, seed testing and storage. DNA finger printing and seed registration. Role of public and private sectors in seed production and marketing. Intellectual Property Rights (IPR) issues, WTO issues and its impact on agriculture

Principles of Plant Physiologies with reference to plant nutrition, absorption, translocation and metabolism of nutrients. Soil-water-plant relationship.

Enzymes and plant pigments; photosynthesis- modern concept and factors affecting the process, aerobic and anaerobic respiration; C3, C4 and CAM mechanisms. Carbohydrate, protein and fat metabolism. Growth and development; photoperiodism and vernalization. Plant growth substances and their role in crop production. Physiology of seed development and germination; dormancy. Stress physiology drought, salt and water stress.

Major fruits, plantation crops, vegetables, spices and flower crops. Package of practices of major, horticultural crops. Protected cultivation and high-tech Horticulture Post-hervest technology and value addition of fruits and vegetables. Landscaping and commercial floriculture. Medicinal and aromatic plants. Role of fruits and vegetables in human nutrition.

Diagnosis of pests and diseases of field crops, vegetables, orchard and plantation crops and their economic importance. Classification of pests and diseases and their management. Integrated pest and disease management. Storage pests and their management. Biological control of pests and diseases. Epidemiology and forecasting of major crop pests and diseases. Plant quarantine measures Pesticides-their formulation and modes of action.

Food production and consumption trends in India. Food security and growing population vision-2025, Reasons for grain surplus. National and internationals food policies. Production procurement distribution constraints. Availability of food grain; per capita expenditure on food. Trends in poverty. Public Distribution System and below Poverty Line population, Targeted Public Distribution System (PDS), policy implementation in contest to globalization, Processing constraints. Relation of food production to National Dietary Guidelines and food consumption Pattern. Food- based dietary approaches to eliminate hunger. Nutrient deficiency Micronutrient deficients. Protein energy mal nutrition or Protein Calorie Malnutrition (PEM or PCM), Micro nutrient deficiency and HRD in context of work capacity of women and children. Food grain productivity and food security.

SANITARY AND FOOD INSPECTOR

BASIC NUTRION & FOOD CHEMISTRY

UNIT-I

1. Introduction to nutrition –functions of foods, definition of nutrition, nutrients, adequate optimum and good nutrition, malnutrition. Food as a source of nutrients.
2. Inter relationship between nutrition and health, visible symptoms of good health.
3. Food guide-basic five food groups and usage of food guide.
4. Use of food in body-digestion, absorption, transport, utilization of nutrientsin the body.

UNIT-II

1. Water as a nutrient, function, sources, requirement, structure, water balance – effect of deficiency.
2. Introduction to chemistry of water and ice.
3. Moisture in food: Hydrogen bonding, bound water, free water, water activity and food stability.
4. Energy – Unit of energy, food as a source of energy, value of food, the body's need for energy, B.M.R activities. Utilization of food for energy requirements
5. Acid – base balance.

UNIT-III

1. Carbohydrates –composition, classification, sources, functions, structure,physical & chemical properties.
2. Other sweetening agents, functions of sugar in food (Browning reaction),changes during cooking and processing.
3. Lipids – composition, nomenclature, saturated, unsaturated fatty acids,classification, food sources, functions of fats.
4. Physical and chemical properties, emulsions, chemistry & technology of fat and oil processing. Role of food lipids in flavor.
5. Proteins- composition, classification sources, functions, denaturation, and protein deficiency, determination of protein quality.
6. Amino acids- classification, Physio-chemical properties, modification of food protein through processing and storage.

UNIT-IV

1. Mineral functions, sources, Bio-availability, and deficiency of following minerals-calcium, Iron, Iodine, Fluorine, Sodium, potassium.
2. Vitamins – Classification, units of measurement, sources, functions and deficiency diseases caused by following vitamins:
   Fats soluble vitamins – Vitamin A, D, E and K Water soluble vitamins – Vitamin C and B- complex
3. Vitamins and minerals structure general causes of loss in food. Fortifications, Enrichment and Restoration.

UNIT-V

1. Enzymes, Nomenclature, specificity, catalytic regulations, kinetics factors influencing enzyme activity, controlling enzyme action. Enzyme added to food during processing, modification of food by endogenous enzyme. Enzyme inhibitors in food.
2. Pigments indigenous to food, structure, chemical and physical properties. Effect of processing and storage.
3. Flavors – Vegetables, fruit and spice flavors, fermented food, Meat and seafood.

BASIC NUTRION & FOOD CHEMISTRY

1. Experiments on properties of monosaccharids- Glucose, Fructose andGalatose.
2. Experiments on properties of Disaccharides – maltose, lactose and sucrose.
3. Experiments on properties of of Polysaccharides- starch.
4. Estimation of glucose in a given sample.
5. Experiments on properties of amino-acids.
6. Experiments on properties of proteins.
7. Experiments on properties of fats.
8. Saponification number of lipids.

FOOD MICROBIOLOGY, SANITATION AND HYGIENE

UNIT-I

1. Introduction to microbiology and its relevance to everyday life- General morphology of micro-organisms- General characteristics of bacteria, fungi, virus, protozoa, algae.
2. The relationship of micro-organism to sanitation. Role of microbiology- Environment effects of microbial growth.
3. Effects of micro-organisms on food degradation and food bore illness- Bacteria, Virus, Molds, Yeasts and parasites.

UNIT-II

1. Control of macro- organisms growth curve- effect of environmental factors on growth of micro- organisms- pH, water activity, oxygen availability, temperature & others.
2. Microbial intoxications and infections- sources of contamination of food toxic production and physiological action. Sources of infection of foods by pathogenic organisms, symptoms and method of control
3. Beneficial effect of micro- organisms.
4. Relevance of microbiological standards for food safety.

UNIT-III

1. Microbiology of different foods - Spoilage and contamination-Sources, types, effects on the following:

a) Cereals & Cereals products.
b) Sugar & Sugar products.
c) Vegetables & Fruits.
d) Meat & Meat products.
e) Fish & other sea foods.
f) Eggs & Poultry,
g) Milk & Milk products.
h) Canned and other processed foods.

2. Other food hazards- chemicals, antibiotics, hormones, metals contamination-poisonous foods.
3. Food contamination-sources and transmission by water, air, sewage and soil as reservoirs of infection and mode of spread.
4. Other agents of contamination:
   Human, domestic animals, vermins, birds.

UNIT-IV

1. Needed environment microbiology- water, air, soil & sewage.
2. Importance of personal hygiene of food handlers - clothes, illness. Education of food handler in handling and serving food.
3. Safety in food procurement, storage, handling and preparation-control of spoilage - safety of left over foods.
4. Cleaning and sanitization. Products and methods - use of detergents and chemicals, tests for sanitizer's strength.

UNIT-V

1. Kitchen Sanitation:
   - Kitchen design-equipment and systems.
   - Structure and layout of food premises maintaining clean environment.
   - Selecting and Installing cleaning equipment.
2. Waste product handling: Planning for waste disposal. Solid waste andliquid waste.
3. Control of infestation:
   Rodent Control - Rats, Mice-Rodent, proofing, destruction, Vector Control. Uses of pesticides.
4. Food Sanitation, Control and Inspection programmes for healthpersonnel.

POST HARVEST TECHNOLOGY

UNIT I

1. Physical Principles underlying food processing and preservation including thermal processing, ionizing, radiations, refrigeration, freezing,dehydration.
2. Physical and Chemical changes in food that affect texture, flavor, odour, stability and nutritive value during processing and storage.
3. Basic processing technology of cereals and legumes, losses during storage,handling and processing.
4. Basic processing technology of oilseeds.

UNIT II

1. Basic processing technology of fruits and vegetables.
2. Basic processing technology of milk and milk products.
3. Basic processing technology of Meat, Fish, Poultry and eggs.
4. Fermentation Technology, Enrichment and fortification technology. High protein technology (Single Cell Protein)

UNIT III

1. Quality control in food industry-Methods of evaluation and quality control of various aspects in quality of raw material, manufacturing processes and testing of finished goods.
2. Waste disposal and sanitation
3. Extruded foods
4. Food Irradiation

UNIT IV

1. Additives and Preservatives used in processing and Formulation,
2. Food Adulteration
3. Chemical and physical properties of foods.
4. Transportation, Types/Mode, optimization of transportation taking into account type of product, distance, storage, facilities etc.

UNIT V

1. Market and consumer Research, Needs and types of foods - consumption trends, Psychological, Anthropological and Sociological dimensions of food consumption.
2. Food situation in India and outside. Trapping the unconventional post- harvest losses and prospects for food processing for export.
3. Traditional foods-status and need for revival in the context of non- traditional foods, urbanization and other factors.
4. Product development - Primary processing, secondary processing, types of products, e.g. quick cooking, Fast foods, fabricated foods, Convenience foods.

SENSORY EVALUATION AND FOOD PACKAGING

UNIT I

1. Sensory assessment of food quality
   Appearance of food visual perception, colour, Odour and smell, Flavour,Texture, Threshold test, Difference Test**,** Ranking Test, Scoring Test & Hedonic Scale

UNIT II

1. Consideration for testing sensory evaluation Testing area, Testing setup, Lighting setup, Testing schedule
2. Preparation of Samples Coding and order of presentation, Types of panels-trained and consumer panelsc semi-trained

UNIT III

1. Importance of packaging.
2. Evaluation of food package
3. Packaging: Criteria, appearance, protection, function, cost, material and forms of packaging

UNIT IV

1. Different food packaging materials.

a. Basics
b. laminates

2. Packaging methods and performances
3. Food packaging interactions.

a. Global
b. Specific migration

UNIT V

1. Food Packaging Law
2. Packaging evaluation

a. Package life theory
b. testing packaging materials.

3. Shelf Life estimation methods

FOOD ADULTERATION & FOOD TOXICOLOGY

UNIT-I

1. Food Laws

a. Voluntary
b. Mandatory-National & international

2. Role of voluntary agencies and legal aspects of consumer protection

UNIT –II

1. General Composition and quality criteria for the following:

a. Milk and Milk products.
b. Oil and Fats
c. Spices and condiments
d. Food Grains
e. Flours
f. Canned Foods
g. Fruit and Vegetables products
h. Meat and poultry
i. Sugar and Preserves.
j. Beverages Alcoholic and Non Alcoholic.

UNIT-III

1. Importance of toxicology
2. Naturally occurring toxins in various foods
3. Residual Chemical utilized in food production and processing:

a. Pesticides
b. Heay metals, Hormones

UNIT-IV

1. Substances intentionally added to foods

a. Antioxidants
b. Colour
c. Stabilizers

2. Microbial and Parasitic

a. Food Poisoning and food infections or Food borne illness
b. Mycotoxins – aflatoxin
c. Bacterial toxinUNIT-V

1. Physical treatment of food and health hazards.
2. Carcinogens
3. Genetically engineered Food and their safety.

FOOD ANALYSIS & FOOD MANUFACTURE

UNIT-I

1. Composition and factors affecting food composition.
2. Sampling techniques.
3. Preparation of sample.
4. General physical methods of analysis of foods.

a. Lactrometric determination
b. Refractrometry
c. Polarimatory & Polarography
d. Food Rheologye.
e. Viscosity
f. Surface tension
g. Freezing point

UNIT-II

1. General Chemical methods of analysis in Food

a. Proximate principles
b. Moisture in spices
c. Specific gravity
d. Ash and types
e. Total protein ,non-protein nitrogen and specific protein in foods.
f. Total fat and different types of lipids.
g. Total Carbohydrates, starch, mono and disaccharides.
h. Crude fibre and dietary fibre.
i. Macro nutrients: Sodium, K, Mg, I, Fe
j. Vitamins A, D, E
k. Trace Elements - Cu, Zn, As

UNIT-III

1. Spectrophotometer - Estimation of phosphorous and ascorbic acid.
2. Radioactive tracer techniques, radioactive counters- liquid scintillation and Geiger Muller counter.
3. Fluorimeter – Estimation of Thiamin and Riboflavin.

UNIT-IV

1. Principles and techniques of separation methods - chromatography (TLC, GLC.) electrophoresis (paper, moving boundary and gel).
2. Atomic Absorption - Estimation of Iron and calcium/any trace element.
3. Measurement of enzyme activity and its principles, any one enzyme (amylase) to be estimated.

UNIT-V

1. Entrepreneurship, Plant location, Investment, Financing in Project.
2. Food laws Equipment and Space.
3. Costing of product.
4. Advertising asnd marketing.

Veterinary Science & Animal husbandry

1. Animal Nutrition:

1.1 Partitioning of food energy within the animal. Direct and indirect calorimetry, Carbo-nitrogen balance and comparative slaughter methods. Systems for expressing energy value of foods in ruminants, pigs and poultry. Energy requirements for maintenance, growth, pregnancy, lactation, egg, wool, and meat production.

1.2 Latest advances in protein nutrition. Energy protein interrelationships. Evaluation of protein quality. Use of NPN compounds in ruminant diets. Protein requirement for maintenence, growth, pregnancy, Lactation, egg, wool and meat production.

1.3 Major and trace minerals- Their sources, physiological functions and deficiency symptoms. Toxic minerals. Minral interactions. Role of fat-soluble and water- soluble vitamins in the body, their sources and deficiency symptoms.

1.4 Feed additives - methane inhibitors, probiotics, enzymes, antibiotics, hormones, oligosaccharides, antioxidants, emulsifiers, mould inhibitors, buffers etc. Use and abuse of growth promoters like hormones and antibiotics - latest concepts.

1.5 Conservation of fodders. Storage of feeds and feed ingredients. Recent advances in feed technology and feed processing. Anti-nutritional and toxic factors present in livestock feeds. Feed analysis and quality control. Digestibility trials- direct, indirect and indicator methods. Predicting feed intake in grazing animals.

1.6 Advances in ruminant nutrition. Nutrient requirements. Balanced rations. Feeding of calves, pregnant, work animals and breeding bulls. Strategies for feeding milch animals during different stages of lactation cycle. Effect of feeding on milk composition. Feeding of goats for meat and milk production. Feeding of sheep for meat and wool production.

1.7 Swine Nutrition. Nutrient requirements. Creep, starter, grower and finisher rations. Feeding of pigs for lean meat production. Low cost rations for swine.

1.8 Poultry nutrition. Special features of poultry nutrition. Nutrient requirements for meat and egg production. Formulation of rations for different classes of layers and broilers.

2. Animal Physiology

2.1 Physiology of blood and its circulation, respiration; excretion. Endocrine glands in health and disease.

2.2 Blood constituents - Properties and functions-blood cell formation Haemoglobin synthesis and chemistry plasma proteins production, classification and properties, coagulation of blood; Haemorrhagic disorders-anticoagulants-blood groups-Blood volume Plasma expanders-Buffer systems in blood. Biochemical tests and their significance in disease diagnosis,

2.3 Circulation - Physiology of heart, cardiac cycle, heart sounds, heart beat, electrocardiograms. Work and efficiency of heart-effect of ions on heart function metabolism of cardiac muscle, nervous and chemical regulation of heart, effect of temperature and stress on heart, blood pressure and hypertension, osmotic regulation, arterial pulse, vasomotor regulation of circulation, shock. Coronary and pulmonary circulation, Blood-Brain barrier- Cerebrospinal fluid- circulation in birds.

2.4 Respiration - Mechanism of respiration, Transport and exchange of gases-neural control of respiration-chemoreceptors-hypoxia-respiration in birds.

2.5 Excretion-Structure and function of kidney-formation of urine-methods of studying renal function renal regulation of acid-base balance: physiological constituents of urine-renal failure-passive venous congestion-Urinary secretion in chicken-Sweat glands and their function. Bio-chemical test for urinary dysfunction.

2.6 Endocrine glands - Functional disorders their symptoms and diagnosis. Synthesis of hormones, mechanism and control of secretion-hormonal receptors classification and function.

2.7 Growth and Animal Production Prenatal and postnatal growth, maturation, growth curves, measures of growth, factors affecting growth, conformation, body composition, meat quality.

2.8 Physiology of Milk Production, Reproduction and Digestion- Current status of hormonal control of mammary development, milk secretion and milk ejection, Male and Female reproductive organs, their components and functions. Digestive organs and their functions,

2.9 Environmental Physiology Physiological relations and the regulation; mechanisms of adaptation, environmental factors and regulatory mechanisms involved in animal behaviour, climatology - various parameters and their importance. Animal ecology. Physiology of behaviour. Effect of stress on health and production.

3. Animal Reproduction:

Semen quality- Preservation and Artificial Insemination- Components of semen, composition of spermatozoa, chemical and physical properties of ejaculated semen, factors affecting semen in vivo and in vitro. Factors affecting semen production and quality, preservation,

composition of diluents, sperm concentration, transport of diluted semen. Deep freezing techniques in cows, sheep, goats, swine and poultry. Detection of oestrus and time of insemination for better conception. Anoestrus and repeat breeding.

4. Livestock Production and Management:

4.1 Commercial Dairy Farming Comparison of dairy farming in India with advanced countries. Dairying under mixed farming and as specialized farming, economic dairy farming. Starting of a dairy farm, Capital and land requirement, organization of the dairy farm. Opportunities in dairy farming, factors determining the efficiency of dairy animal. Herd recording, budgeting, cost of milk production, pricing policy; Personnel Management. Developing Practical and Economic rations for dairy cattle; supply of greens throughout the year, feed and fodder requirements of Dairy Farm. Feeding regimes for young stock and bulls, heifers and breeding animals; new trends in feeding young and adult stock; Feeding records.

4.2 Commercial meat, egg and wool production- Development of practical and economic rations for sheep, goats, pigs, rabbits and poultry. Supply of greens, fodder, feeding regimes for young and mature stock. New trends in enhancing production and management. Capital and land requirements and socio economic concept.

4.3 Feeding and management of animals under drought, flood and other natural calamities

5. Genetics and Animal Breeding:

History of animal genetics. Mitosis and Melosis: Mendelian inheritance; deviations to Mendelian genetics; Expression of genes; Linkage and crossing over, Sex determination, sex influenced and sex limited characters; Blood groups and polymorphism; Chromosome aberrations; Cytoplasmic inheritance. Gene and its structure; DNA as a genetic material; Genetic code and protein synthesis; Recombinant DNA technology. Mutations, types of mutations, methods for detecting mutations and mutation rate. Trans-genesis.

5.1 Population Genetics applied to Animal Breeding- Quantitative Vs. qualitative traits; Hardy Weinberg Law; Population Vs. individual; Gene and genotypic frequency; Forces changing gene frequency: Random drift and small populations; Theory of path coefficient, Inbreeding, methods of estimating inbreeding coefficient, systems of inbreeding, Effective population size; Breeding value, estimation of breeding value, dominance and epistatic deviation;

Partitioning of variation; Genotype X environment correlation and genotype X environment interaction; role of multiple measurements; Resemblance between relatives.

5.2 Breeding Systems-Breeds of livest-sock and Poultry, Heritability, repeatability and genetic and phenotypic correlations, their methods of estimation and precision of estimates; Aids to selection and their relative merits; Individual, pedigree, family and within family selection; Progeny testing: Methods of selection; Construction of selection indices and their uses; Comparative evaluation of genetic gains through various selection methods; Indirect selection and correlated response; Inbreeding, out breeding, upgrading, cross-breeding and synthesis of breeds; Crossing of inbred lines for commercial production; Selection for general and specific combining ability; Breeding for threshold characters. Sire index.

6. Extension:

Basic philosophy, objectives, concept and principles of extension. Different Methods adopted to educate farmers under rural conditions. Generation of technology, its transfer and feedback. Problems and constraints in transfer of technology. Animal husbandry programmes for rural development.

7. Anatomy, Pharmacology and Hygiene:

7.1 Histology and Histological Techniques: Paraffin embedding technique of tissue processing and H.E. staining - Freezing microtomy- Microscopy Bright field microscope and electron microscope. Cytology-structure of cell, organells and inclusions; cell division-cell types-Tissues and their classification embryonic and adult tissues-Comparative histology of organs-Vascular. Nervous, digestive, respiratory, musculo-skeletal and urogenital systems-Endocrine glands -Integuments-sense organs.

7.2 Embryology - Embryology of vertebrates with special reference to aves and domestic mammals gametogenesis-fertilization-germ layers- foetal membranes and placentation-types of placenta in domestic mammals-Teratology-twins and twinning- organogenesis -germ layer derivatives endodermal, mesodermal and ectodermal derivates.

7.3 Bovine Anatomy- Regional Anatomy: Paranasal sinuses of OX- surface anatomy of salivary glands. Regional anatomy of infra orbital, maxillary, mandibuloalveolar, mental and cornual nerve block. Regional anatomy of paravertebral nerves, pudendal nerve, median ulnar and radial nerves-tibial, fibular and digital nerves-Cranial nerves-structures involved in epidural anaesthesia-superficial lymph nodes surface anatomy of visceral organs of thoracic,

abdominal and pelvic cavities-comparative features of locomotor apparatus and their application in the biomechanics mammalian body.

7.4 Anatomy of Fowl- Musculo-skeletal system-functional anatomy in relation to respiration and flying, digestion and egg production.

7.5 Pharmacology and therapeutic drugs - Cellular level of pharmacodynamics and pharmacokinetics. Drugs acting on fluids and electrolyte balance. Drugs acting on Autonomic nervous system. Modern concepts of anaesthesia and dissociative anaesthetics. Autacoids. Antimicrobials and principles of chemotherapy in microbial infections. Use of hormones in therapeutics- chemotherapy of parasitic infections. Drug and economic concerns in the Edible tissues of animals chemotherapy of Neoplastic diseases. Toxicity due to insecticides, plants, metals, non-metals, zootoxins and mycotoxins.

7.6 Veterinary Hygiene with reference to water, air and habitation Assessment of pollution of water, air and soil- Importance of climate in animal health- effect of environment on animal function and performance-relationship between industrialization and animal agriculture-animal housing requirements for specific categories of domestic animals viz. pregnant cows and sows, milking cows, broiler birdsstress, strain and productivity in relation to animal habitation.

8. Animal Diseases:

8.1 Etiology, epidemiology pathogenesis, infectious diseases of cattle, sheep and g mptoms, postmortem lesions, diagnosis, and control of horses, pigs and poultry.

8.2 Etiology, epidemiology, symptoms diagnosis, treatment of production diseases of cattle, horse, pig and poultry.

8.3 Deficiency diseases domestic animals and birds.

8.4 Diagnosis and treatment of non-specific conditions like impaction, Bloat, Diarrhoea, Indigestion, dehydration, stroke, poisoning.

8.5. Diagnosis and treatment of neurological disorders.

8.6 Principles and methods of immunization of animals against specific diseasesherd immunity-disease free zones-zero disease concept-chemoprophylaxis.

8.7 Anaesthesia- local, regional and general-preanesthetic medication. Symptoms and surgical interference in fractures and dislocation. Hernia, choking abomasal displacement-Caesarian operations. Rumenotomy-Castrations.

8.8 Disease investigation techniques.- Materials for laboratory investigation Establishment of Animal Health Centers Disease free zone.

9. Veterinary Public Health:

9.1 Zoonoses. - Classification, definition, role of animals and birds in prevalence and transmission of zoonotic diseasesoccupational zoonotic diseases.

9.2 Epidemiology- Principle, definition of epidemiological terms, application of epidemiological measures in the study of diseases and disease control. Epidemiological features of air, water and food bome infections. OIE regulations, WTO, sanitary and phytosanitary measures.

9.3 Veterinary Jurisprudence- Rules and Regulations for improvement of animal quality and prevention of animal diseases. State and central rules for prevention of animal and animal product borne diseases SPCA-Veterolegal casesCertificates -Materials and Methods of collection of samples for veterolegal investigation.

10. Milk and Milk Products Technology:

10.1 Market Milk: Quality, testing and grading of raw milk. Processing, packaging, storing, distribution, marketing, defects and their control. Preparation of the following milks: Pasteurized, standardized, toned, double toned, sterilized, homogenized, reconstituted, recombined and flavoured milks. Preparation of cultured milks, cultures and their management, yoghurt, Dahi, Lassi and Srikhand. Preparation of flavoured and sterilized milks. Legal standard Sanitation requirement for clean and safe milk and for the milk plant equipment. www.careprindia.com

10.2 Milk Products Technology: Selection of raw materials, processing, storing, distributing and marketing milk products such as Cream, Butter, Ghee, Khoa, Channa, Cheese, condensed, evaporated, dried milk and baby food, Ice cream and Kuifi, by-products, whey products, butter milk, lactose and casein. Testing, grading, judging milk products- BIS and Agmark specifications, legal standards, quality control and nutritive properties. Packaging, processing and operational control. Costing of dairy products

10. Meat Hygiene and Technology:

10.1 Meat Hygiene.

10.1.1 Ante mortem care and management of food animals, stunning, slaughter and dressing operations; abattoir requirements and designs; Meat inspection procedures and judgment of carcass meat cuts grading of carcass meat cuts- duties and functions of Veterinarians in wholesome meat production.

10.1.2 Hygenic methods of handling production of meat- Spoilage of meat and control measures- Post slaughter physicochemical changes in meat and factors that influence them- Quality improvement methods-Adulteration of meat and detection - Regulatory provisions in Meat trade and Industry.

10.2 Meat Technology.

10.2.1 Physical and chemical characteristics of meat-Meat emulsions- Methods of preservation of meat Curing, canning, irradiation, packaging of meat and meat products, processing and formulations.

5.3 By-products- Slaughter house byproducts and their utilization- Edible and inedible by products Social and economic implications of proper utilization of slaughter house by-products- Organ products for food and pharmaceuticals.

5.4 Poultry Products Technology Chemical composition and nutritive value of poultry meat, pre slaughter care and management. Slaughtering techniques, inspection, preservation of poultry meat and products. Legal and BIS standards. Structure, composition and nutritive value of eggs. Microbial spoilage. Preservation and maintenance. Marketing of poultry meat, eggs and products. Value added meat products.

5.5 Rabbit/Fur Animal farming - Rabbit meat production. Disposal and utilization of fur and wool and recycling of waste by products. Grading of wool.

FORESTRY

1. Silviculture -General:

Ecological and physiological factors influencing vegetation, natural and artificial regeneration of forests; methods of propagation, grafting techniques; site factors, nursery and planting techniques nursery beds, poly bags and maintenance, water budgeting, grading and hardening of seedlings; special approaches; establishment and tending.

2. Silviculture-systems:

Clear felling, uniform shelter wood selection, coppice and conversion systems. Management of silviculture systems of temperate, subtropical, humid tropical, dry tropical and coastal tropical forests with special reference to plantation silviculture, choice of species, establishment and management of standards, enrichment methods, technical constraints, intensive mechanized methods, aerial seeding thinning.

3. Silviculture - Mangrove and Cold desert:

Mangrove: habitat and characteristics, mangrove, plantation-establishment and rehabilitation of degraded mangrove formations; silvicultural systems for mange protection of habitats against natural disasters.

Cold desert: Characteristics, identification and management of species.

4. Silviculture of trees:

Traditional and recent advances in tropical silvicultural research and practices. Silviculture of some of the economically important species in India such as Acacia catechu, Acacia nilotica, Acacia auriculiformis, Albizzia lebbeck, Albizzia procera, Anthocephalus Cadamba, Anogeissus latifolia, Azadirachta indica, Bamboo spp, Butea monosperma, Cassia siamea, Casuarina equisetifolia, Cedrus deodara, Chukrasia tabularis, Dalbergia sisoo, Dipterocarpus spp., Emblica officindils, Eucalyptus spp. Gmelina Arborea, Hardwickia binata, Largerstroemia Lanceolata, Pinus roxburghi, Populus spp. Pterocarpus marsupium, Protopis juliflora, Santalum album, Semecarpus anacardium,. Shorea robusta, Salmalia malabaricum, Tectona grandis, Terminalis tomemtosa, Tamarindus indica.

5. Agroforestry, Social Forestry, Joint Forest Management and Tribology:

Agroforestry: scope and necessity; role in the life of people and domestic animals and in integrated land use, planning especially related to (i) soil and water conservation; (ii) water recharge; (iii) nutrient availability to crops; (iv) nature and eco-system preservation including ecological blances through pest predator relationships and (v) providing opportunities for enhancing bio-diversity, medicinal and other flora and fauna. Agro forestry systems under different agro-ecological zones; selection of species and role of multipurpose trees and NTFPs, techniques, food, fodder and fuel security. Research and Extension needs.

Social/Urban Forestry: objectives, scope and necessity; peoples participation. JFM - principles, objectives, methodology, scope, benefits and role of NGOs.

Tribology: tribal scene in India; tribes, concept of races, principles of social grouping, stages of tribal economy, education, cultural tradition, customs, ethos and participation in forestry programmes.

6. Forest Soils, Soil Conservation and Watershed management:

Forests Soils: classification, factors affecting soil formation; physical, chemical and biological properties.

Soil conservation: definition, causes for erosion; types - wind and water erosion; conservation and management of eroded soils/areas, wind breaks, shelter belts; sand dunes; reclamation of saline and alkaline soils, water logged and other waste lands. Role of forests in conserving soils. Maintenance and build up of soil organic matter, provision of loppings for green leaf manuring: forest leaf litter and composting: Role of microorganisms in ameliorating soils; N and C cycles, VAM Watershed Management: concepts of watershed; role of mini-forests and forest trees in overall resource management, forest hydrology, watershed development in respect of torrent control, river channel stabilization, avalanche and landslide controls, rehabilitation of degraded areas; hilly and mountain areas; watershed management and environmental functions of forests; water-harvesting and conservation; ground water recharge and watershed management: role of integrating forest trees, horticultural crops, field crops, grass and fodders.

7. Environmental Conservation and Biodiversity:

Environment: components and importance, principles of conservation, impact of deforestation; forest fires and various human activities like mining, construction and developmental projects, population growth on environment.

Pollution: types, global warming, green house effects, ozone layer depletion, acid rain, impact and control measures, environmental monitoring: concept of sustainable development. Role of trees and forests in environmental conservation, control and prevention of air, water and noise pollution. Environmental policy and legislation in India. Environmental Impact Assessment. Economics assessment of watershed development vis-a-vis ecological and environmental protection.

8. Tree Improvement and Seed Technology:

General concept of tree improvement, methods and techniques, variation and its use, provenance, seed source, exotics; quantitative aspects of forest tree improvement, seed production and seed orchards, progeny tests, use of tree improvement in natural forest and stand improvement, genetic testing programming, selection and breeding for resistance to diseases, insects, and adverse environment; the genetic base, forest genetic resources and gene conservation in situ and ex-situ. Cost benefit ratio, economic evaluation.

9. Forest Management and Management Systems:

Objective and principles; techniques; stand structure and dynamics, sustained yield relation; rotation, normal forest, growing stock; regulation of yield; management of forest plantations, commercial forests, forest cover monitoring. Approaches viz., (i) site-specific planning, (11) strategic planning, (III) Approval, sanction and expenditure, (iv) Monitoring (v) Reporting and governance. Details of steps involved such as formation of Village Forest Committees, Joint Forest Participatory Management.

10. Forest Working Plan:

Forest planning, evaluation and monitoring tools and approaches for integrated planning; multipurpose development of forest resources and forest industries development; working plans and

working schemes, their role in nature conservation, bio-diversity and other dimensions, preparation and control. Divisional Working Plans, Annual Plan of Operations.

11. Forest Measuring and Remote Sensing:

Methods of measuring - diameter, girth, height and volume of trees; form-factor volume estimation of stand, current annual increment; mean annual increment. Sampling methods and sample plots. Yield calculation; yield and stand tables, forest cover monitoring through remote sensing; Geographic Information Systems for management and modeling.

12. Surveying and Forest Engineering:

Forest surveying- different methods of surveying, maps a reading. Basic principles of forest engineering. Building materials and construction. Roads and Bridges; General principles, objects, types, simple design and construction of timber bridge.

13. Forest Ecology and Ethno botany:

Forest ecology-Biotic and aboinic components, forest eco-systems; forest community concepts; vegetation concepts, ecological succession and climax, primary productivity, nutrient cycling and water relations; physiology in stress environments (drought, water logging salinity and alkalinity). Forest types in India, identification of species, composition and associations; dendrology, taxonomic classification, principles and establishment of herbaria and arboreta. Conservation of forest ecosystems. Clone parks Role of Ethnobotany in Indian Systems of Medicine; Ayurveda and Unani - Introduction, nomenclature, habitat, distribution and botanical features of medicinal and aromatic plants. Factors affecting action and toxicity of drug plants and their chemical constituents.

14. Forest Resources and Utilization:

Environmentally sound forest harvesting practices; logging and extraction techniques and principles, transportation system, storage and sale; Non-Timber Forest Products (NTFPs) definition and scope; gums, resins, oleoresins, fibers, oil seeds nuts, rubber, canes, bamboos, medicinal plants, charcoal, lac and shellac, Katha and Bidi leaves, collection; processing and disposal. Need and importance seasoning and preservation; general principles of seasoning, air and kiln seasoning, solar dehumidification, steam heated and electrical kilns. Composite wood; adhesives manufacture, properties, uses, plywood manufacture-properties, uses, fibre boards-manufacture properties, uses; particle boards manufacture; properties uses. Present status of composite wood industry in India in future expansion plans. Pulp-paper and rayon; present position of supply of raw material to industry, wood substitution, utilization of plantation wood; problems and possibilities. Anatomical structure of wood, defects and abnormalities of wood, timber identification-general principles.

15. Forest Protection & Wildlife Biology:

Injuries to forest - abiotic and biotic, destructive agencies, insect-pests and disease, effects of air pollution on forests and forest die back. Susceptibility of forests to damage, nature of damage, cause, prevention, protective measures and benefits due to chemical and biological control. General forest protection against fire, equipment and methods, controlled use of fire, economic and environmental costs; timber salvage operations after natural disasters. Role of afforestation and forest regeneration int absorption of CO2. Rotational and controlled grazing, different methods of control against grazing and browsing animals; effect of wild animals on forest regeneration, human impacts; encroachement, poaching, grazing, live fencing, theft, shifting cultivation and control.

16. Forest Economics and Legislation:

Forest economics: fundamental principles, cost-benefit analyses; estimation of demand and supply, analysis of trends in the national and international market and changes in production and consumption patterns; assessment and projection of market structures; role of private sector and co-operatives; role of corporate financing. Socio-economic analyses of forest productivity and attitudes; valuation of forest goods and service.

Legislation: history of forest development; Indian Forest Policy of 1894, 1952 and 1990. National Forest Policy, 1988 of People's involvement, Joint Forest Management, Involvement of women; Forestry Policies and issues related to land use timber and non-timber products, sustainable forest management; industrialisation policies, institutional and structural changes. Decentralization and Forestry Public Administration. Forest laws, necessity; general principles, Indian Forest Act 1927; Forest Conservation Act, 1980; Wildlife Protection Act 1972 and their amendments; Application of Indian Penal Code to Forestry: Scope and objectives of Forest Inventory.

SANITARY SUPERVISOR

A. FOOD & NUTRITION

1. Introduction to Nutrition, Health & Disease.

Classification and function of food-

- Body building
- Energy yielding
- Protective food

2. **Nutrient:** Carbohydrates, Proteins, fats, Vitamins, & Minerals, function, source and diatic requirement of each. Nutritive value of different locally available foodstuffs. Cereals, Pulse, Vegetables, Milk, Eggs, Meat & Fish. Condiments, Spices, Fats & Nuts, Sugar, Fruits, Beverages.

3**. Balanced Diet:** Definition, factors to be considered on planning meals. Nutritional requirements of special groups. Prescription of diet Menu for Hypertensive persons, Nephritis patients, Diabetic patients, Heart patients.

Malnutrition: Causes of Malnutrition, Precaution for malnutrition.

4. Preparation & Preservation of food. General principles of refrigeration of food. Preservation of food- household method. Inspection of cooked food/food ingredients household & commercial.

5. Cultural factors on Nutrition.

6. Introduction to Nutrition and its importance.

7. Dietary survey.

B. ENVIRONMENTAL SANITATION AND SANITARY ENGINEERING

1. WATER:

Sources of water, various uses of water and its need. Physical, chemical and biological standard for potable water. Sources and nature of pollution of water. Process of purification of water in large scale and small scale. Process of disinfections of water in large and small scale, provisions for sanitary wells and tube wells, plumbing system and its maintenance. Water supply and storage system at the community and domestic level.

2. AIR:

Composition of air, sources of air pollution and nature of pollutants, estimation of level of pollutants. Process air purification and disinfections. Green house effect, types of ventilation, thermal comfort, air temperature, humidity, radiation, evaporation and their measurements.

3. SOLID WASTE DISPOSAL:

Classification of solid waste in the community. Polluting affects of different types of solid waste, system of collection of solid waste from the houses and street, sanitary transportation of solid waste, sanitary process of disposal of solid waste such as composting, sanitary land filling, incineration

4. LIQUID WASTE DISPOSAL:

Classification of liquid waste, Physical, Chemical and bacteriological quality of different types of liquid waste. Health hazard related to accumulation of liquid waste or in sanitary drainage system. Construction and maintenance of sanitary sewerage system. Use of different types of traps, pollution of water sources from sewerage and its disinfection.

5. NIGHT SOIL DISPOSAL:

Prevalent practices of defecation and its effect on community health, different types of latrines in use. Principles of construction of sanitary latrines and their use, especially berg hole, dug well, RCA and septic tank latrine. Common causes of non-use of latrines and process of disinfections of the latrines. Sanitation of the trenching ground and its maintenance. Effect of sewage on the eco-system especially in the aquatic life process. Methods and process of treatment of sewage and various types of treatment plants. Methods of disinfections of sewage. Sanitary practices of sewage farming.

6. BURIAL AND CREMATION GROUND AND MASS CASUALTY DISPOSAL :

Traditional practices of disposal of dead bodies of various sects.

Health hazards associated with the Un-sanitary disposal of dead bodies.

Enforcement of legal provisions for disposal of dead bodies and maintenance of their records.

7. SOIL SANITATION :

Types of soil, water retention properties of different types of soil, natural drainage of soil, sources of pollution of soil, health hazards associated with soil pollution, prevention of soil pollution and treatment of soil.

Study on insecticides, pesticides and disinfections.

Sterilisation & disinfections of different articles.

Various spraying equipments.

Uses of rodenticides & larvaecidals.

8. HOUSING:

Requisites of satisfactory and safe housing, sanitary standards for construction of houses and provision of utility services. Assessment of overcrowding.

9. SANITATION MEASURES IN FAIRS, FESTIVALS AND NATRUALCALAMITIES-MASS CASUALTY DISPOSAL :

Sanitary problems associated with human gatherings and temporary settlements. Sanitary problems associated with natural calamities, common health problems in unsanitary state of fair, festival, human gathering, planning and anticipatory extra sanitary measures in fairs, festivals and temporary settlements and natural calamities.

Alternate emergency sanitary provisions to prevent sanitation crisis for food, housing, water supply, lighting, disposal of community waste and prevention of outbreak of epidemics.

Incorporation of Municipal Rules and Regulation in Sanitation.

C. COMMUNICABLE AND NON- COMMUNICABLE DISEASES (PREVENTION AND CONTROL) :

1. COMMUNICABLE DISEASES:

Introduction, Terminology. Modes of disease transmission, general measures for prevention & control of communicable diseases. Role of Health Worker.

2. IMMUNITY & IMMUNIZATION :

Purpose, types & effects. National Immunization schedule for prevention of major communicable diseases BCG, DTP, Polio, Measles & Typhoid Vaccines

3. DISINFECTION & STERILIZATION:

Effective disinfection by liquid chemical agents like Halogen, Potassium per magnate solution etc. Solid chemical agent - Bleaching powder, Lime etc.

4. NON-COMMUNICABLE DISEASES:

Diagnosis & prevention.

5. PERSONAL HYGIENE:

Factors influencing health & hygiene. Health habits & practice. Maintenance of normal circulation, respiration, digestion etc. Skin care cleanliness. Dental care. Care of hands, hand washing. Exercises-importance. Food values. Nutrition.

D. HEALTH AND DEATH STATISTICS:

HEALTH STATISTICS

Basic knowledge of statistics, mean, medium, mode, standard deviations. Sampling procedure Tabulation of Data Histogram, Ogive, Pie Chart, Bar chart.

DEMOGRAPHY AND HEALTH SURVEY

a. Registration of birth, death and mortality.

b. Immunization process

PUBLIC HEALTH ACTS:

Indian Epidemic Diseases Act.

Purification of Air and Water Pollution Acts.

Prevention of Food Adulteration act. Birth and Death Registration Act.

NTP Act.

Suppression of Immoral Traffic Act(SITA).

Municipal and local body Acts related to housing, sanitation etc.

Factory Act and Employer's State Insurance Act.

Operational aspects of National Health Programs

a. Family Welfare Program

b. Maternity & Child Health Services

c. National Malaria Eradication Program.

d. National Filaria Control Program

e. National Leprosy Program

f. Diarrheal Disease Control program

g. STD Central Program

h. Goiter Control Program

i. Blindness Control Program

j. Universal Immunization Program

BEHAVIORAL SCIENCE

Factors influencing human behavior.

Change of behavioral pattern in different age groups.

Interpersonal relations and defense mechanism.

Learning and motivation process in behavior.

Special groups & family structure.

Social Process and control.

Law

Constitutional and Administrative Law

- Constitution and Constitutionalism: The distinctive features of the Constitution.
- Fundamental rights - Public interest litigation; Legal Aid; Legal services authority.
- Relationship between fundamental rights, directive principles and fundamental duties.
- Constitutional position of the President and relation with the Council of Ministers.
- Governor and his powers.
- Supreme Court and High Courts: (a) Appointments and transfer. (b) Powers, functions and jurisdiction.
- Centre, States and local bodies: (a) Distribution of legislative powers between the Union and the States. (b) Local bodies, (c) Administrative relationship among Union, State and Local Bodies. (d) Eminent domain - State property - common property-community property.
- Legislative powers, privileges and immunities.
- Services under the Union and the States: (a) Recruitment and conditions of services; Constitutional safeguards; Administrative tribunals. (b) Union Public Service Commission and State Public Service Commissions - Power and functions (c) Election Commission - Power and functions.
- Emergency provisions.
- Amendment of the Constitution.
- Principles of natural justice - Emerging trends and judicial approach.
- Delegated legislation and its constitutionality.
- Separation of powers and constitutional governance.
- Judicial review of administrative action.
- Ombudsman: Lokayukta, Lokpal etc.

International Law

- Nature and definition of international law.
- Relationship between international law and municipal law.
- State recognition and state succession.
- Law of the sea: Inland waters, territorial sea, contiguous zone, continental shelf, exclusive economic zone, high seas.
- Individuals: Nationality, statelessness; Human rights and procedures available for their enforcement.
- Territorial jurisdiction of States, extradition and asylum.
- Treaties: Formation, application, termination and reservation.
- United Nations: Its principal organs, powers, functions and reform.
- Peaceful settlement of disputes - different modes.
- Lawful recourse to force: aggression, self-defence, intervention.
- Fundamental principles of international humanitarian law - International conventions and contemporary developments.
- Legality of the use of nuclear weapons; ban on testing of nuclear weapons; Nuclear – non proliferation treaty, CTBT

- International terrorism, state sponsored terrorism, hijacking, international criminal court
- New International economic order and monetary law: WTO, TRIPS, GATT, IMF, World Bank
- Protection and improvement of the human environment: International efforts.

Law of Crimes

- General principles of criminal liability: Mens res and actus reus, mens rea in statutory offences.
- Kinds of punishment and emerging trends as to abolition of capital punishment.
- Preparation and criminal attempt.
- General exceptions.
- Joint and constructive liability.
- Abetment.
- Criminal conspiracy.
- Offences against the State.
- Offences against public tranquility.
- Offences against human body.
- Offences against property.
- Offences against women.
- Defamation.
- Prevention of Corruption Act, 1988.
- Protection of civil rights Act 1955 and subsequent legislative developments. 16 Plea bargaining,

Law of Torts

- Nature and definition.
- Liability based upon fault and strict liability; Absolute liability.
- Vicarious liability including State liability
- General defences.
- Joint tort feasors.
- Remedies.
- Negligence.
- Defamation.
- Nuisance.
- Conspiracy.
- False imprisonment.
- Malicious prosecution.
- Consumer Protection Act,1986

Law of Contracts and Mercantile Law

- Nature and formation of contract/Econtract.
- Factors vitiating free consent.
- Void, voidable, illegal and unenforceable agreements.
- Performance and discharge of contracts.

- Quasi- Contracts.
- Consequences of breach of contract.
- Contract of indemnity, guarantee and insurance.
- Contract of agency.
- Sale of goods and hire purchase.
- Formation and dissolution of partnership.
- Negotiable Instruments Act, 1881.
- Arbitration and Conciliation Act, 1996.
- Standard form contracts.

Contemporary Legal Developments

- Public Interest Litigation.
- Intellectual property rights - Concept, types/prospects.
- Information Technology Law including Cyber Laws - Concept, purpose/prospects.
- Competition Law- Concept, purpose/ prospects.
- Alternate Dispute Resolution - Concept, types/prospects.
- Major statutes concerning environmental law.
- Right to Information Act.
- Trial by media.