Syllabus, 2015

H.S. (Vocational)

XI-XII

Agriculture

The West Bengal State Council of Technical and Vocational Education and Skill Development
Plot No. B/7, Action Area III, New Town, Rajarhat,
Kolkata - 700160

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Content

Nomenclature of different vocational groups under Agriculture disciplne :

SL No	Group Name	Gr. Code	Vocational subject combinations available in Class XII	Remarks
1	Fish Farming	AGFF	1. Pisciculture (PISC) 2. Polutry Farming (POFG) 3. Animal Health Care (ANHC)	*Papers mentioned in Sl. No. 1 of this combination must be chosen as VP1.* *VP2 can be seleted from Sl. No. 2 and Sl. No. 3 of this combination as per discretion of the Vocational Training Centre (VTC).*
2	Animal Husbandry	AGAH	1. Dairy Farming (DAFG) 2. Poultry Farming (POFG) 3. Goatery and Piggery (GOPG)	*Any Paper of this combination can be chosen as VP1 or VP2 as per discretion of the Vocational Training Centre (VTC)*
3	Cultivation of Fruits & Vegetable	AGCF	1. Processing and Preservation of Fruits & Vegetables (PPFV) 2. Production of Fruits (POFR) 3. Production of Vegetables (POVG)	*Papers mentioned in Sl. No. 1 of this combination must be chosen as VP1. VP2 can be selected from Sl. 2 & Sl. No. 3 of this combination as per discretion of the Vocational Training Centre (VTC)*
4	Horticulture	AGHC	1. Horticultural Nursery Management (HNMG) 2. Floriculture and Medicinal & Aromatic Plants (FMAP) 3. Production of Vegetables (POVG)	*Paper mentioned in Sl. No. 1 & Sl. No. 2 of this combination must be chosen as VP1 & VP2.*
5.	Crop management	AGCM	1. Crop Nutrient management (CNMG) 2. Seed Production (SEPR) 3. Plant Health Management (PHMG) 4. Operation & Maintenance of Farm Machineries (OMFM)	*VP1 & VP2 to be chosen from papers mentioned in Sl. No. 1, Sl. No. 2 & Sl. No. 3*
6.	Plant Management	AGPM	1. Plant Health Management (PHMG) 2. Floriculture and Medicinal & Aromatic Plants (FMAP) 3. Production of Field Crops (POFC)	*Any Paper of this combination can be chosen as VP1 or VP2 as per discretion of the Vocational Traning Centre (VTC).*

VP1 and VP2 are two compulsory papers, Optional paper may be VP3

For all students of a VTC, choice of VP1 and VP2 must be same. Choice of 7th subject of all students for a VTC must be either VP3 or AE3.

[VP = Vocational Paper, AE = Academic Elective]

CURRICULUM STRUCTURE FOR H.S. (VOCATIONAL) COURSES w.e.f. 2015-16 session

Discipline : Agriculture (AG)

I. Scheme of Studies

No. of periods per week*	Theory +Practical	40/42/43	No. of effective weeks per year	40
			No. of weeks for class	36
			No. of weeks for exam	4
Duration of period**	Theory	40 min		
	Practical	40 min		

* 8 periods per day (Monday to Friday) x 5 =40 periods + 4 periods in each Saturday.

** Effective class duration: Monday to Friday – 5 hours20min. per day, and Saturday - 2 hours 40 min.

II. Courses, Distribution Of Marks And Classes Class-XI

Group	Paper no.	Code	Subject	Distribution of Mark				Distribution of Classes/Week			Total yearly classes
				Theory	Practical	Project	Total	Theory	Practical/ Project	Total	
Language	1	BEN1/ HIN1/ NEP1/ URD1	First Language: Bengali/Hindi/Nepali/ Urdu	80		20	100	2	1	3	108
	2	ENG1	Second Language: English	80		20	100	2	1	3	108
Basic Vocational	3	BAAG	i) Basic Agriculture	50	50		100	3	4	7	252
	4	BAAH	ii) Basic Animal Husbandry	50	50		100	3	4	7	252
Academic elective	5	BIO1	Biology	70	30		100	4	2	6	216
	6	BSPC	Basic Science [Physics + Chemistry]	70 [35 + 35]	30 [15 + 15]		100 [50 + 50]	4 [2 + 2]	2@ [1 + 1]	6 [4 + 4]	216 [108 + 108]

Group	Paper no.	Code	Subject	Distribution of Mark				Distribution of Classes/Week			Total yearly classes
				Theory	Practical	Project	Total	Theory	Practical Project/ Tutorial	Total	
Common	7	EDCA	Entrepreneurship Development & Computer Application	50 [25 + 25]	25	25	100 [50 + 50]	4 [2 + 2]	4 [1 + 3]	8 [3 + 5]	288 [108 + 180]
								22	18	40	

Note:

A Candidate shall have to appear at all subjects in the Annual Examination of Class XI and have to pass at least 5 subjects to pass class XI as per below distribution:

- Both subjects of Language group (Paper1 & Paper2)
- Both Subjects of Vocational group (Paper3 & Paper4)
- Any one subject either from Academic Elective group or from Common group (i.e. any one paper from Paper5, Paper6 & Paper7). In case candidate passes in more than one subjects then the subject with highest marks will be considered for calculation of Grade.

@Physics and Chemistry practical may be taken alternate week keeping continuous 2 periods for each lab.

CLASS-XII

Group	Paper no.	Code	Subject	Distribution of Marks				Distribution of Classes/Week			Total yearly classes
				Theory	Practical	Project	Total	Theory	Practical Project/ Tutorial	Total	
Language	1	BEN2/ HIN2/ NEP2/ URD2	First Language: Bengali/Hindi/Nepali/Urdu	80		20	100	2	1	3	108
	2	ENG2	Second Language: English	80		20	100	2	3(1+ 2*)	5	180
Vocational			Two vocational subjects as prescribed under vocational course [to be selected from table under Sl no. IV]								
	3		i) Vocational Paper I**[VP1]**	50	40	10	100	3	4	7	252
	4		ii) Vocational Paper II**[VP2]**	50	40	10	100	3	4	7	252

Group	Paper no.	Code	Subject	Distribution of Marks				Distribution of Classes/Week			Total yearly classes
				Theory	Practical	Project	Total	Theory	Practical/ Project	Total	
Compulsory Academic	5	BIO2	Biology (AE1)	70	30	-	100	4	2	6	216
	6	PHYS /CHEM	One subject from Academic Electives [to be chosen from sl no. 2 or sl no 3 of list given in table under Sl.No.III i.e. either PHYSICS or CHEMISTRY] **[AE2]**	70	30	-	100	4	2	6	216
Optional Elective	7	CHEM /PHYS	One subject from Academic Electives [to be chosen from sl no. 2 or sl no 3 of list given in table under Sl.No.III i.e. either CHEMISTRY or PHYSICS]**[AE3]**	70	30	-	100	4	2	6	216
		or	OR								
		VP3	One vocational subject as prescribed under respective vocational group [to be selected from table under Sl no. IV] **[VP3]**	50	40	10	100	3	4	7	252
Common	8	ENST	Environmental Studies (**)	80	-	20	100	2	-	2	72
								24 /23	18 /20	42 /43	

(*) 2 Periods are kept to develop the communication skill in English.

(**) The theory subject "Environmental Studies" [ENST] is compulsory for all the candidates only to generate awareness among the students. Evaluation will be taken place at the end of the year, but the obtained marks will not be considered for calculation of final marks.

Note:

- Paper 7 is optional elective. A Candidate may or may not opt for it. Only if a Candidate opts for paper 7, marks scored will be displayed in final mark sheet.
- A Candidate shall have to appear at all subjects of Class XII and have to pass at least 5 subjects to pass class XII as per below distribution:

For student opting Paper 7	For student **NOT** opting Paper 7
- Both subjects of Language group Paper 1 & Paper2)	- Both subjects of Language group (Paper1 & Paper2)
- Both Subjects of Vocational group (Paper3 & Paper4)	- Both Subjects of Vocational group (Paper3 & Paper4)
- Any one paper from Paper5, Paper6 and Paper 7	- Any one paper from Paper5, Paper6.

- In case candidate pass in more than one subjects among Paper 5, 6, and 7 (if opted), paper with highest marks will be considered for calculation of Final grades. Final Grades will be calculated based on the marks attained only in Class XII.

III. AcademicElective Subject Package:

For Class XII

Sl No.	Subject Name	Subject code	Subject type
1.	Biology	BIO2	Compulsory Elective
2.	Physics	PHYS	Compulsory / Optional Elective
3.	Chemistry	CHEM	Compulsory / Optional Elective

IV. Different Vocational subject combinations available under Agriculture [AG]discipline for Class XI and Class XII

Sl No	Group code	Vocational subject for Class XI	Vocational Subjects combinations available in Class XII	Remarks
1	AGFF	1. Basic Agriculture [BAAG] 2. Basic Animal Husbandry [BAAH]	1. Pisciculture (PISC) 2. Poultry Farming (POFG) 3. Animal Health Care (ANHC)	*Papers mentioned in Sl. No. 1 of this combination must be chosen as VP1. VP2 can be selected from Sl. 2 & Sl. No 3 of this combination as per discretion of the Vocational Training Centre (VTC). For all students of a VTC, choice of VP2 must be same. Choice of 7th subject of all students for a VTC must be either VP3 or AE3.*

Sl No	Group code	Vocational subject for Class XI	Vocational Subjects combinations available in Class XII	Remarks
2	AGAH	1. Basic Agriculture [BAAG] 2. Basic Animal Husbandry[BAAH]	1. Dairy Farming (DAFG) 2. Poultry Farming (POFG) 3. Goatery and Piggery (GOPG)	*Any paper of this combination can be chosen as VP1 or VP2 as per discretion of the Vocational Training Centre (VTC). For all students of a VTC, choice of VP1 & VP2 must be same. Choice of 7th subject of all students for a VTC must be either VP3 or AE3.*
3	AGCF	1. Basic Agriculture [BAAG] 2. Basic Animal Husbandry [BAAH]	1. Processing and Preservation of Fruits & Vegetables (PPFV) 2. Production of Fruits (POFR) 3. Production of Vegetables (POVG)	*Papers mentioned in Sl. No. 1 of this combination must be chosen as VP1. VP2 can be selected from Sl. 2 & Sl. No 3 of this combination as per discretion of the Vocational Training Centre (VTC). For all students of a VTC, choice of VP2 must be same. Choice of 7th subject of all students for a VTC must be either VP3 or AE3.*
4	AGHC	1. Basic Agriculture [BAAG] 2. Basic Animal Husbandry [BAAH]	1. Horticultural Nursery Management (HNMG) 2. Floriculture and Medicinal & Aromatic Plants (FMAP) 3. Production of Vegetables (POVG)	*Papers mentioned in Sl. No. 1 & Sl. No. 2 of this combination must be chosen as VP1, VP2. Choice of 7th subject of all students for a VTC must be either VP3 or AE3.*
5	AGCM	1. Basic Agriculture [BAAG] 2. Basic Animal Husbandry [BAAH]	1. Crop Nutrient Management (CNMG) 2. Seed Production (SEPR) 3. Plant Health Management (PHMG) 4. Operation & Maintenance of Farm Machineries (OMFM)	*VP1 & VP2 to be chosen from paper mentioned in Sl. No. 1 & Sl. No. 2 & Sl No 3. Choice of 7th subject of all students for a VTC must be either VP3 or AE3*
6	AGPM	1. Basic Agriculture [BAAG] 2. Basic Animal Husbandry [BAAH]	1. Plant Health Management (PHMG) 2. Floriculture and Medicinal & Aromatic Plants (FMAP) 3. Production of Field Crops (POFC)	*Any paper of this combination can be chosen as VP1 or VP2 as per discretion of the Vocational Training Centre (VTC). For all students of a VTC, choice of VP1 & VP2 must be same. Choice of 7th subject of all students for a VTC must be either VP3 or AE3.*

Common Subject
Class XI & Class XII

Bengali (BEN 1 & BEN 2)

একাদশ ও দ্বাদশ শ্রেণি

Total no. of weeks for classes/ Year : 36		
Classes per week : 3	Th = 2	Project = 1
Total classes per year : 108	Th = 72	Project = 36
Total marks : 100	Th = 80	Project = 20

পূর্ণমান-১০০

গদ্য	-	১৫
কবিতা	-	১৫
নাটক	-	১০
ভাষা	-	২৫
নির্মিতি	-	১৫
প্রকল্প + প্রুফ	-	২০ (১৫ + ৫)
মোট	-	**১০০**

একাদশ শ্রেণি (BEN 1)

গদ্য - ৩০ (পিরিয়ড)

১. শরৎচন্দ্র চট্টোপাধ্যায় - ইন্দ্রনাথ ও শ্রীকান্ত (অংশবিশেষ)

২. রাণী চন্দ - পূর্ণকুম্ভ (অংশবিশেষ)

৩. তারাশংকর বন্দ্যোপাধ্যায় - কালাপাহাড়

৪. নারায়ণ গঙ্গোপাধ্যায় - হাড়

৫. সৈয়দ মুজতবা আলী - নোনামিঠা

কবিতা - ৩০ (পিরিয়ড)

১. মধুসূদন দত্ত - আত্মবিলাপ

২. রবীন্দ্রনাথ ঠাকুর - আগমন

৩. কাজী নজরুল ইসলাম - আমার কৈফিয়ৎ

৪. শক্তি চট্টোপাধ্যায় - যেতে পারি, কিন্তু কেন যাব?

৫. অন্নদাশংকর রায় - কাজ

নাটক — মেবার পতন — দ্বিজেন্দ্রলাল রায় (নির্বাচিত অংশ) ৮ (পিরিয়ড)

ভাষা/ব্যাকরণ — ২০ (পিরিয়ড)

- ভারতে প্রচলিত ভাষা পরিবার। বাংলাভাষার উৎপত্তি ও ক্রমবিকাশ। বাংলা লিপির উৎস ও ক্রমবিকাশ।
- ভাষাবৈচিত্র্য সম্বন্ধে ধারণা। বাংলাভাষার আঞ্চলিক রূপ, সমাজভাষা ও ব্যক্তিভাষার সাধারণ পরিচয়
- সাধুভাষা ও চলিত ভাষা

বানানবিধি

নির্মিতি - ১০ (পিরিয়ড)

প্রবন্ধ রচনা

প্রতিবেদন/পত্ররচনা

প্রকল্প - ১০ (পিরিয়ড)

প্রুফ

মোট পিরিয়ড ১০৮

দ্বাদশ শ্রেণি (BEN 2)

গদ্য ঃ ৩০ পিরিয়ড

১) বঙ্কিমচন্দ্র চট্টোপাধ্যায় - সুবর্ণগোলক

২) রবীন্দ্রনাথ ঠাকুর - কঙ্কাল

৩) বিভূতিভূষণ বন্দ্যোপাধ্যায় - অভিনন্দন-সভা

৪) আশাপূর্ণা দেবী - ঈর্ষা

৫) মতি নন্দী - অবিনাশের সাড়ে আটচল্লিশ

কবিতা ঃ ৩০ পিরিয়ড

১) রবীন্দ্রনাথ ঠাকুর — প্রার্থনা

২) কাজী নজরুল ইসলাম - আমি গাই তারি গান

৩) জীবনানন্দ দাশ - সেই দিন এই মাঠ

৪) সুভাষ মুখোপাধ্যায় - ভুলে যাব না

৫) নীরেন্দ্রনাথ চক্রবর্তী - কলকাতার যীশু

নাটক ঃ ৮ পিরিয়ড

রথের রশি - রবীন্দ্রনাথ ঠাকুর

ভাষা/ব্যাকরণ ঃ ২০ পিরিয়ড

১) ধ্বনি - বাগযন্ত্র। বাংলাভাষার ধ্বনি ও বৈচিত্র্য। ধ্বনি পরিবর্তন।

২) বাংলাভাষার শব্দ তৈরির কৌশল। শব্দ ও অর্থ।

৩) বাক্যের আসত্তি, যোগ্যতা, আকাঙ্খা। বাংলা বাক্যের গঠন ও গঠনগত ভাগ। অর্থগত ভাগ।

৪) প্রবাদ প্রবচন।

৫) বিরামচিহ্ন।

নির্মিতি ১০ পিরিয়ড

প্রবন্ধ রচনা (১০ নম্বর)

ভাবসম্প্রসারণ/ভাবার্থ/তথ্যপঞ্জি অনুযায়ী (অনুচ্ছেদ রচনা/প্রবন্ধ রচনা) / মতের পক্ষে বা বিপক্ষে (প্রবন্ধ রচনা)

অনুচ্ছেদ রচনা — (০৫ নম্বর)

প্রকল্প - ১০ পিরিয়ড

প্রুফ

প্রকল্পের বিষয়

১ অনুবাদ (ইংরাজী বা হিন্দি ভাষা থেকে বাংলা)

২. সমীক্ষা (Survey Report)

৩. স্বরচিত গল্প রচনা

৪. চরিত্র নির্মাণ (গল্প বা উপন্যাস থেকে যেমন ফেলুদা, ঘনাদা, ব্যোমকেশ)

৫. সাক্ষাৎকার গ্রহণ

৬. সাহিত্যিকদের জীবন, কর্ম ও অবদান

একাদশ এবং দ্বাদশের জন্য যে কোনো একটি করে মোট দুটি প্রকল্প নির্বাচন করবে।

মোট পিরিয়ড - ১০৮

	MCQ	VSA	ET	TOTAL
গদ্য	3 × 1 = 3	2 × 1 = 2	2 × 5 = 10	15
কবিতা	3 × 1 = 3	2 × 1 = 2	2 × 5 = 10	15
নাটক	3 × 1 = 3	2 × 1 = 2	1 × 5 = 5	10
ভাষা	10 × 1 = 10	10 × 1 = 10	1 × 5 = 5	25
নির্মিতি			10 + 5	15
প্রকল্প + প্রুফ			15 + 5	20
	19	16		100

MCQ : Multiple Choice Questions

VSA : Very Short Answer Type Questions

ET : Essay Type Questions

HINDI (HIN 1 and HIN 2)
एकादश तथा द्वादश श्रेणी

Total no. of weeks for classes/ Year : 36		
Classes per week : 3	Th = 2	Project = 1
Total classes per year : 108	Th = 72	Project = 36
Total marks : 100	Th = 80	Project = 20

पूर्णमान–१००

गद्य	**15**
काव्य	**15**
नाटक	**10**
भाषा	**25**
रचना	**15**
परियोजना	**20 (15+ 5)**
कुल	**100**

एकादश श्रेणी (HIN1)

काव्य —— (30 पीरियड)

सूरदास के पद

भारतेन्दु हरिश्चन्द्र

मैथिलीशरण गुप्त – चारू चन्द्र की चंचल किरणें

बच्चन – अग्नि पथ! अग्नि पथ! अग्नि पथ!

नागार्जुन – अकाल और उसके बाद

गद्य —— (30 पीरियड)

महावीर प्रसाद द्विवेदी – साहित्य

चन्द्रधर शर्मा गुलेरी – उसने कहा था

अज्ञेय – बहता पानी निर्मला

हरिशंकर परसाई – विकलांग श्रद्धा का दौर

नासिरा शर्मा – सबीना के चालीस चोर

एकांकी —— (8 पीरियड)

उपेन्द्रनाथ अश्क – अधिकार का रक्षक

भाषा / व्याकरण —— (20 पीरियड)

हिन्दी भाषा की उत्पत्ति और विकास

देवनागरी लिपि

हिन्दी की उपभाषाएँ

संज्ञा और उसके भेद

सर्वनाम और उसके भेद

विशेषण और उसके भेद

क्रिया और उसके मुख्य भेद

वाच्य परिवर्तन

वाक्य परिवर्तन

प्रत्यय और उपसर्ग

विराम चिन्ह

परिभाषा– प्रशासनिक, कारीगरी (कृषि, वाणिज्य)

रचना विधि —— (10 पीरियड)

निबन्ध

प्रतिवेदन / पत्र

परिभाषिक शब्दावली

परियोजना (Project) (10 पीरियड)

द्वादश श्रेणी (HIN2)

काव्य —— (30 पीरियड)

तुलसीदास के पद

जयशंकर प्रसाद – अरी बरुणा की शांत कछार

दिनकर – समर शेष है

अज्ञेय – मैंने देखा, एक बूंद

सर्वेश्वर दयाल सक्सेना – प्रार्थना

गद्य —— (30 पीरियड)

हजारीप्रसाद द्विवेदी – शिरीष के फूल

प्रेमचन्द – मंत्र

कृष्णा सोवती – सिक्का बदल गया

राहुल सांकृत्यायन – किन्नर देश की ओर

रवीन्द्रनाथ टैगोर – छुट्टी

नाटक —— (8 पीरियड)

भुवनेश्वर – ताँबे के कीड़े

व्याकरण —— (20 पीरियड)

सन्धि, समास, प्रत्यय, उपसर्ग, वाक्य परिवर्तन, वाक्य विश्लेषण

निबन्ध रचना —— (10 पीरियड)

रिपोर्ट

भाव विस्तार

भाषण – पक्ष / विपक्ष

प्रूफ

परियोजना (Project) (10 पीरियड)

अनुवाद – (अंग्रेजी या बांग्ला से हिन्दी में)

समीक्षा (Survey Report)

स्व रचित कहानी

कहानी का नाटक में परिवर्तन

साक्षात्कार

प्रमुख साहित्यकारों की जीवनी

	MCQ	VSA	ET	TOTAL
गद्य	3×1=3	2×1=2	2×5=10	15
पद्य	3×1=3	2×1=2	2×5=10	15
नाटक	3×1=3	2×1=2	1×5=5	10
भाषा	10×1=10	10×1=10	1×5=5	25
रचना			10 + 5	15
परियोजना + प्रूफ			15 + 5	20
	19	16		100

MCQ : Multiple Choice Questions

VSA : Very Short Answer Type Questions

ET : Essay Type Questions

नेपाली *(NEP 1 and NEP 2)*

(एघारौँ र बाह्रौँ श्रेणी)

Total no. of weeks for classes/ Year : 36		
Classes per week : 3	Th = 2	Project = 1
Total classes per year : 108	Th = 72	Project = 36
Total marks : 100	Th = 80	Project = 20

पूर्णमान–१००

गद्य	–	१५
पद्य	–	१५
नाटक	–	१०
भाषा	–	२५
रचना	–	१५
परियोजना	–	२०
पूर्णाङ्क	–	१००

एघारौँ श्रेणी (NEP1)

पद्य (३० पिरियड)

१. लक्ष्मीप्रसाद देवकोटा – जिन्दगीको मौसम
२. बालकृष्ण सम – स्वर्ग आफै बन्छ
३. धरणीधर कोइराला – साहित्य सुधा
४. रवीन्द्रनाथ ठाकुर – प्रार्थना (जहाँ मन निर्भय छ)
अनु. बालकृष्ण सम

गद्य (३० पिरियड)

१. गुरुप्रसाद मैनाली – कर्तव्य
२. रूपनारायण सिंह – बितेका कुरा

३. हरिप्रसाद 'गोर्खा' राई – गोर्खाको मोडेल

४. राजनारायण प्रधान – गान्धी

नाटक (८ पिरियड)

मनबहादुर मुखिया – 'चिडियाखाना' एकाङ्की मात्र (अँध्यारामा बाँच्नेहरू)

– बाट

भाषा/व्याकरण (२० पिरियड)

१. भाषा – परिभाषा, भाषा र व्याकरणको सम्बन्ध, नेपाली भाषाको परिचय।

२. लिङ्ग – परिभाषा, प्रकार, पुलिङ्गबाट स्त्रीलिङ्ग बनाउने विधि।

३. वचन – परिभाषा, प्रकार, एकवचनबाट बहुवचन बनाउने विधि।

४. विराम चिन्ह – पूर्णविराम, अर्धविराम, प्रश्नसूचक चिन्ह, विस्मयादिबोधक चिन्ह।

रचना (१० पिरियड)

- प्रबन्ध रचना
- प्रतिवेदन / पत्ररचना

परियोजना (प्रोजेक्ट) (१० पिरियड)

(तलका मध्ये कुनै एउटा विषयमा मात्र)

१. एच. आई. भी. एड्स रोग सङ्क्रमण र यसको रोकथामका उपायहरू (एक हजारदेखि पन्ध्र सय शब्दभित्र)

२. दार्जिलिङ पहाडी क्षेत्रमा खानेपानीको समस्या र यसको समाधानका प्रयास, कारबाही र नयाँ उपायहरू (एक हजारदेखि पन्ध्र सय शब्दभित्र)।

३. आफूले गरेको कुनै एउटा रोमाञ्चक यात्राको विवरण (पन्ध्र सय शब्दभित्र)।

४. आफू सहभागी रहेको कुनै एउटा जिल्ला स्तरीय सामाजिक, सांस्कृतिक वा साहित्यिक कार्यक्रमको विवरण (पन्ध्र सय शब्दभित्र)।

५. दार्जिलिङ पहाडी क्षेत्रको पर्यटन व्यवस्था र व्यवसायको स्थिति तथा यसको सुधारको सम्भावना पन्ध्र सय शब्दभित्र)।

बाह्रौँ श्रेणी (NEP2)

पद्य (३० पिरियड)

१. लक्ष्मीप्रसाद देवकोटा – यात्री

२. गोपाल प्रसाद रिमाल – एक दिन एक चोटी आउँछ

३. भूपि शेरचन – शहीदहरूको सम्झनामा

४. नरबहादूर दाहाल – पतझड़

गद्य (३० पिरियड)

१. रामकृष्ण शर्मा – प्यारो सपना

२. लैनसिंह बाङ्देल – मूर्तिकारको धोको

३. शिवकुमार राई – माछाको मोल

४. इन्द्रबहादुर राई – रातभरि हुरी चल्यो

नाटक (८ पिरयिड)

मनबहादुर मुखिया – 'अँध्यारामा बाँच्नेहरू' एकाङ्की मात्र **(अँध्यारामा बाँच्नेहरूबाट)**

भाषा – व्याकरण (२० पिरयिड)

- तत्सम, तद्भव र आगन्तुक शब्द।
- नेपाली उखान, तुक्का र वाग्धारा।
- पर्यायवाची, विपरीतार्थक र सार शब्द।
- नेपाली वर्तनी प्रयोग विधि (हिज्जे)।

रचना (१० पिरियड)

- भावविस्तार वा सारांश लेखन
- विज्ञापन लेखन
- प्रबन्ध रचना
- अङ्ग्रेजीबाट नेपाली अथवा नेपालीबाट अङ्ग्रेजीमा अनुवाद

परियोजना (प्रोजेक्ट) (१० पिरियड)

(तलकामध्ये कुनै एउटा विषयमा मात्र)

- नशालु पदार्थ सेवनले युवावर्गमा पारेको नकारात्मक प्रभाव (एक हजारदेखि पन्ध्र सय शब्दभित्र)।
- कुनै दुईजना प्रसिद्ध नेपाली साहित्यकारहरूको साहित्यिक परिचय र तिनले पुप्याएको योगदानको मूल्याङ्कन (एक हजारदेखि पन्ध्र सय शब्दभित्र)।
- विश्वधरोहर घोषित दार्जिलिङ हिमालयन रेलको इतिहास र वर्तमान समयमा यसको अवस्था (एक हजारदेखि पन्ध्र सय शब्दभित्र)।
- दार्जिलिङ पहाड़ी क्षेत्रमा भल–पैह्रो, बाटाघाटा र पुल – साँघुहरूको दूरावस्थाले जनजीवनमा ल्याएको सङ्कट निवारण गर्ने उपायहरू (एक हजारदेखि पन्ध्र सय शब्दभित्र)।
- चामे ('परालको आगो'), गौथली ('परालको आगो'), रने ('माछाको मोल'), मोटा राई ('भ्रमर') कालेकी आमा ('रातभरि हुरी चल्यो') – को चरित्र चित्रण (एक हजारदेखि पन्ध्र सय शब्दभित्र)।

	MCQ	VSA	ET	TOTAL
गद्य	3×1=3	2×1=2	2×5=10	15
पद्य	3×1=3	2×1=2	2×5=10	15
नाटक	3×1=3	2×1=2	1×5=5	10
भाषा	10×1=10	10×1=10	1×5=5	25
रचना			10 + 5	15
परियोजना			15 + 5	20
	19	16		100

MCQ : Multiple Choice Questions

VSA : Very Short Answer Type Questions

ET : Essay Type Questions

सन्दर्भ

१. प. ब. उच्च माध्यमिक शिक्षा परिषद् – **नेपाली 'ए' (एघारौ र बाह्रौ श्रेणीका निम्ति)**

२. प. ब. उच्च माध्यमिक शिक्षा परिषद् – **नेपाली 'बी' (एघारौ र बाह्रौ श्रेणीका निम्ति)**

३. प. ब. माध्यमिक शिक्षा परिषद् – **नेपाली 'बी' (नवौ र दसौ श्रेणीका निम्ति)**

४. घनश्याम नेपाल र पुष्कर पराजुली – **माध्यमिक नेपाली व्याकरण र रचना**

५. घनश्याम नेपाल र कविता लामा – **उच्च माध्यमिक नेपाली व्याकरण र रचना**

६. मनबहादुर मुखिया – **अँध्यारामा बाँच्नेहरू** (एकाङ्की सङ्ग्रह)

७. **जेम्स कार्थक** – नेपाली साहित्यका केही प्रतिभाहरू

Urdu (URD 1 & URD 2)

Class XI & XII

Total of weeks for classes/year: 36		
Classes per week: 3	Th=2	Project =1
Total classes per year:108	Th=72	Project = 36
Total marks: 100	Th= 80	Project = 20

Full Marks - 100

Prose:	15 Marks
Poetry:	15 Marks
Drama :	10 Marks
Language :	25 Marks
Composition:	15 Marks
Project+Proof:	20 Marks (15+5)
Total :	100

Class – XI (URD 1)

Poetry (30 Periods)

1. Faqiron ki sada (Nazm) – Nazir Akbarabadi
2. Mad-o-Jazar-e-Islam (Nazm) – Knwja Altaf Hussain Hali
3. Patta Patta, Boota Boota (Ghazal) - Mir Taqi Mir
4. Phir Mujhe Deeda-e-tar.. (Ghazal) - Mirza Ghalib
5. jab Daagh-e-Bekasi... (Mirthia)- Mir Anis

Prose (30 Periods)

1. Quissa Khwaja Sag-parast ka- (From "Bagh-o-Bhahar")-Mir Amman
2. Mir Mehdi Majrooh ke naam (Letter) - Mirza Ghalib
3. Ummeed ki Khushi- (Essay) - Sir Syed
4. Hasan Nizami ki hasti...(From Aap Beeti) - Khwaja Hasan Nizami
5. "Kal raat paani barsa..." (Letter) Faiz Ahmad Faiz

Drama: Said-e-Hawas by Agha Hashr (First Act-two scenes) (8 Periods)

Language/Grammar (20 Periods)

- Families of Indian Language
- Origin & Development of Urdu Language in India.
- Dialects of Western Hindi
- Daccani and Gujri urdu. Language of Sufi Saints.
- Characteridtics of Urdu Language in Northern & Southern India.
- Development of Urdu Language in Bengal
- Contributions of Fort William College, Calcutta. Beginning of Simple Urdu, Style of prose writing in Bahar-o-Bahar by Mir Amman & Letters of Mirza Ghalib.

Composition

Easy Writing

Report/Letter Writing (10 Period)

Project

Proof (10 Period)

Class – XII (URD2)

Poetry (30 Periods)

1. Dar Madh Bahadur Shah Zafar (Qasida) - Sk. Ibrahim Zauq
2. Masti mein Farogh-e-Rukh-e-janan (Ghazal) - Asghar Gondvi
3. Isaan aur Bazm-e-Qudrat (Poem) - Sir Md. Iqbal
4. Fakhta ki Awaz-(Poem)-Josh Malihabadi
5. Dard Ayega Dabey Paaon (Poem) - Faiz Ahmad Faiz

Prose (30 Periods)

1. Bahadur Shah aur Phool walon ki sair- Farhatullah Baig
2. "Guzashta saal jab hum... (From Ghubar-e-Khatir) Maulana Azad
3. Insan kisi haal mein (From" Nairang-e-Khayal") Md. Hussain Azad

4. Md. Ali jauhar (From Ganj-hai Giran-maya)- Rashid A. Siddiqui
5. Addu-(Short Story)- Jeelani Bano

Drama

Drama "Kheti" By: Prof. Md. Mujeeb (First Two Acts) (8 Periods)

Language/Grammar (20 Periods)

- Different parts of Urdu Grammar-Ilm-e-Hijja, Ilm-e-Huroof, Ilm-e-Nahv, Ilm-e-Bayan, Ilm-e-Urooz.
- Types of Huroof-Mufrid & Murakkab.
- Synonym & Antonym
- *I'raab* (sings)

  zabar,zer,paish,jazam,mudd,tashdeed, tanveen,hamza,mauqoof.
- Different types of Gender, number, Tense in Urdu.
- Phrases & Proverbs.
- Construction of Sentences in urdu

Composition (10 Periods)

- Eassy Writting (10 Marks)
- Expression of Thoughts/Summary/Substance/Expand the idea
- Paragraph Writing (5 Marks)

Project

Proof (10 Periods)

Topic of Project

1. Translation (From English to Urdu)
2. Survey Report
3. Self-composed Story
4. Characterization (From Story or Novel like Asghari Akbari from "Miratul-Uroos", Mirza Zahirdar Baig from "Taubatun Nasooh")

   For Class XI & XII one each topic will be selected. In total two topics will be selected.
5. Taking Interview
6. Writer's life, work & achievement.

	MCQ	VSA	ET	TOTAL
Prose	3×1=3	2×1=2	2×5=10	15
Verse	3×1=3	2×1=2	2×5=10	15
Drama	3×1=3	2×1=2	1×5=5	10
Language	10×1=10	10×1=10	1×5=5	25
Composition			10+5	15
Project+Proof			15+5	20
	19	**16**		**100**

MCQ : Multiple Choice Questions

VSA : Very Short Answer Type Questions

ET : Essay Type Questions

References:

1. Urdu Selection of Prose & Verse, 2013. Published by W.B. Council of Higher Secondary Education
2. Maquddama-e-Tarikh-e-Zaban-e-Urdu. By: Msood Hussain Khan
3. Drama "Said-e-Hawas". By Agha Hashr
4. Drama Kheti. By: Prof. Md. Mujeeb
5. Bengal mein Urdu. By: Wafa Rashidi
6. Mashraqi Bengal mein Urdu. By: Iqbal Azim

English (ENG1)

Class XI

1.	Total Classes Per Week: 3	Theoretical: 2	Project/Tutorial:1
2.	Total Classes Per Year:108	Theoretical: 72	Project/Tutorial:36
3.	Total Marks: 100	Theoretical: 80	Project:20

I. Topics

Theoretical And Project Work

(80 Marks + 20 Marks)

1. Prose: 20 Marks
2. Poetry: 20 Marks
3. Drama (One-act Play): 10 Marks
4. Rapid Reader (Comprehension): 10 Marks
5. Textual Grammar: 10 Marks
6. ESP (Personal Letter Writing/Official Letter Writing/Paragraph Writing): 10 Marks
7. Project Work : 20 Marks

Total: 100 Marks

II. Detailed Content And Period Allocation

A. Theoretical:

1. Prose 15 Periods

i. "Lalajee" By Jim Corbett
ii. "Cinderella" - Traditional
iii. "The School That I Would Like" By William

2. Poetry

i. "The Solitary Reaper" by William Wordsworth 9 Periods
ii. "In Time of 'The Breaking of Nations'" by Thomas Hardy
iii. "The Owl" by Edward Thomas

3. Drama (One-Act Play) 10 Periods

"The Death-trap" By H. H. Munro (Saki)

4. Rapid Reader 12 Periods

"My Boyhood Days" By Rabindranath Tagore

5. Textual Grammar 16 Periods

i. Narration Change
ii. Voice Change
iii. Transformation of Sentences
iv. Joining / Splitting
v. Filling in the blanks with correct forms of given verbs

6. English For Special Purpose (ESP) 10 Periods

i. Personal Letter Writing (Within 120 Words)
ii. Official Letter Writing (Within 120 Words)
iii. Paragraph Writing (Within 120 Words)

B. Project/Turorial:

1. Project Work

i. Interview of a teacher / a member of the staff of the school / a member of the family / imaginary interview of a famous person, whether past or present
ii. Picture description 10 Periods

iii. Autobiography of a non-living object, e.g. a pen / a coin / a book etc.

Note: *For Project Work In Class XI, one out of the three above.*

2. Tutorial 26 Periods

On theoretical work, specially Textual Grammar and ESP

III. Question Pattern And Marks Allotment

A. Theoretical: 80 Marks

1. Prose: 20 Marks

MCQ (4 Alternatives)	Word limit not applicable (4 out of 4)	1 × 4 = 4 Marks
SAQ (6 Out of 10)	In a single sentence	1 × 6 = 6 Marks
DAQ	In about 75 words (2 out of 3)	5 × 2 = 10 Marks

2. Poetry: 20 Marks

MCQ (4 Alternatives)	Word limit not applicable (4 out of 4)	1 × 4 = 4 Marks
SAQ	In a single sentence (6 out of 10)	1 × 6 = 6 Marks
DAQ	In about 75 words (2 out of 3)	5 × 2 = 10 Marks

3. Drama: 10 Marks

MCQ (4 Alternatives)	Word limit not applicable (3 out of 3)	1×3 = 3 Marks
SAQ	In a single sentence (2 out of 4)	1×2 = 2 Marks
DAQ	In about 75 words (1 out of 3)	5×1 = 5 Marks

MCQ : Multiple Choice Questions

VSA : Very Short Answer Type Questions

ET : Essay Type Questions

4. Rapid Reader: 10 Marks (Only Comprehension Passage)

Rearrange	5 Marks
True/False	1 × 3 = 3 Marks
Table completion	1 × 2 = 2 Marks

5. Textual Grammar: 10 Marks

Narration change	1 Mark
Voice change	1 Mark
Transformation of sentences	1 × 3 = 3 Marks
Joining / Splitting	1 × 2 = 2 Marks
Filling in the blanks with correct forms of given verbs	1 × 3 = 3 Marks

6. ESP: 10 Marks

Personal letter writing (within 120 words)	10 Marks
Official letter writing (within 120 words)	10 Marks
Paragraph writing (within 120 words)	10 Marks

All three to be set as questions. Any one to be attempted

B. Project Work: 20 Marks

i. Interview of a teacher / a member of the staff of the school / a member of the family / imaginary interview of a famous person, whether past or present

ii. Picture description

iii. Autobiography of a non-living object, e.g. a pen / a coin / a book etc.

Note: For Project Work in Class XI, one out of the three above.

Word Limit For Project Work: 800 - 1000 Words.

English (ENG2)

Class XII

1. Total Classes Per Week: 5	**Theoretical: 2**	**Project/Tutorial: 3(1+2*)** ***2 periods for developing communicative skills in English***
2. Total Classes Per Year:180	**Theoretical: 72**	**Project/Tutorial: 36** **Developing communicative skills in English : 72**
3. Total Marks: 100	**Theoretical: 80**	**Project:20**

I. Topics

Theoretical and Project work

(80 marks + 20 marks)

1. Prose: 20 Marks
2. Poetry: 20 Marks
3. Textual Grammar: 10 Marks
4. ESP (Personal Letter Writing/Official Letter Writing, CV (Curriculum Vitae) Writting/ Report Writting, but no newspaper report): 10 Marks
5. Unseen Comprehension: 15 Marks
6. Project Work (Internal): 20 Marks

TOTAL: 100 MARKS

B. Developing Communicative Skills in English

(No marks allotted)

Beside being an independent area for developing communicative skills, this is also an area for preparqation for Project Work and for developing skills in writing ESP items.

1. To develop listening and speaking skills.

(i) **Listening Skill –** Teachers will read out a passage to the students three times — first time for listening, second time for writing down and third time for verifying, after which teacher will assess the listening skill of the students by examining the scripts of the students. The passages are to be selected by the teacher from school textbooks of a comparable level, or newspapers, magazines, journals etc., so as to be

accessible by the students within their vocabulary capacity. The scripts of the students should be carefully preserved by the institutions.

(ii) **Speaking Skill –** Teachers will ask the students to read out a passage, and the teachers will assess the speaking skill of the students. The passages are to be selected by the teacher from school textbooks of a comparablr level, or newspaper, magazines, journals etc., so as to be accessible by the students within their vocabulary capacity. Passages given to the students for reading out should be carefully preserved by the institutions.

Note: ***Students shall be tested on listening and speaking skills - the two components of the Project Work of 20 marks.*** (Refer to B. Project Work under III. Question Pattern and Marks Allotment)

2. To Practise the items in English for Special Purpose (ESP).

(i) Personal Letter Writing (ii) Official Letter Writing (iii) CV Writting (iv) Report Writing (No Newspaper Report).

Note: ***ESP to be tested in the theoretical part of 80 marks.*** (Refer to III.A.4)

II. Detailed Content and Period Allocation

A. Theoretical:

1. Prose 15 periods

i. "Three Questions" by Leo Tolstoy

ii. "The Parrot's Training" by Rabindranath Tagore

iii. "The Face of Judas Iscariot" by Bonnie Chamberlin

2. Poetry 10 periods

i. "I Remember, I Remember" by Thomas Hood

ii. "Break, Break, Break" by Lord Tennyson

iii. "The Send-off" by Wilfred Owen

3. Textual Grammar 20 periods

i. Narration change

ii. Voice change

iii. Transformation of sentences

iv. Filling in the blanks with articles and prepositions

v. Correction of errors

4. English for Special Purpose (ESP) 12 periods

i. Personal Letter Writing (within 120 words)

ii. Official Letter Writing (within 120 words)

iii. CV Writing (within 120 words)

iv. Report Writing (NO *NEWSPAPER REPORT)* (within 120 words)

5. Unseen Comprehension 15 periods

B. Project/Tutorial:

1. Project Work 10 Periods

i. Listening Skill

ii. Speaking Skill

2. Tutorial 26 Periods

On theoretical work, specially on textual questions and textual grammar

3. Develoing Communicative Skills in English:

i. Developing Listening Skill 24 Periods

ii. Developing Speaking Skill 24 Periods

iii. Practice of ESP items 24 Periods

III. Question Pattern And Marks Allotment

Total Marks: 100 (Theoretical:80, Project Works: 20)

A. Theoretical:

1. Prose: 20 Marks

MCQ (4 Alternatives)	Word limit not applicable (4 out of 4)	1 × 4 = 4 Marks
SAQ	In a single sentence (6 out of 8)	1 × 6 = 6 Marks
DAQ	In about 75 words (2 out of 3)	5 × 2 = 10 Marks

2. Poetry: 20 Marks

MCQ (4 Alternatives)	Word limit not applicable (4 out of 4)	1 × 4 = 4 Marks
SAQ (6 out of 8)	in a single sentence	1 × 6 = 6 Marks
DAQ (2 out of 3)	in about 75 words	5 × 2 = 10 Marks

3. Textual Grammar: 15 Marks

Narration Change	1 × 2 = 2 Marks
Voice Change	1 Marks
Transformation of Sentences	1 × 6 = 6 Marks
Filling in the Blanks With Articles and Preposition	1 × 3 = 3 Marks
Correction of Errors	1 × 3 = 3 Marks

4. ESP: 10 Marks

Personal Letter (within 120 words)	10 Marks
Official Letter (within 120 words)	10 Marks
CV Writing (within 120 words)	10 Marks
Report Writing (No Newspaper report) (within 120 words)	10 Marks
Any* three *out of the four above to be set as questions, any one to be attempted	

5. Unseen Comprehension: 15 Marks

Rearrange	5 Marks
True/False	1 × 4 = 4 Marks
Table Completion	2 × 3 = 6 Marks

B. Project Work : 20 marks

i. Test of Listening Skill	10 Marks
ii. Test of Speaking Skill	10 Marks

Entrepreneurship Development & Computer Application (EDCA)

Class XI

Total no. of weeks for classes / Year: 36		
Classes per week: 8	**Th=4**	**Practical/Project=4**
Total classes per year: 288	**Th=144**	**Practical/Project = 144**
Total marks: 100	**Th= 50**	**Practical = 25 Project = 25**

Course Contents:

Theory:

Group A (Entrepreneurship Development)

Theory (25 marks, 72 Periods)

Module I : Overview and definition of Entrepreneurship [Period - 6]

Content:
1. Definition of Entrepreneurship
2. Definition of Entrepreneur
3. Qualities of an Entrepreneur
4. Creativity and Risk-taking

Module II : Basic forms of Small Business [Period -14]

Content:
1. Sole Proprietorship - Advantages & disadvantages
2. Partnership - Advantages & disadvantages
3. Corporations- Advantages & disadvantages
4. Special forms of business -
   (i) Franchises (Home based and Web bascd), (ii) Self-help Group
5. Reasons for success / failure of small business

Module III : Legal Requirements for starting a small business [Period -16]

Content:
1. Government Policies
2. Government incentives to small businesses
3. Licensing
4. Clearance from Pollution Control Board
5. Others

Modulc IV : Managerial Requirements for starting a small business [Period - 22]

Content:

1. Planning
2. Financing
3. Marketing
4. Human Resource Development
5. Accounting

Module V : Contents of a Project Report for starting a Business [Period -14]

1. Narrc of the Applicant
2. Address of Communication
3. Name ofthe Proposed Enterprise (If Decided)
4. Proposed Location of Enterprise
5. Category of Enterprise

   (i) Micro (ii) Small (iii) Medium
6. Nature of Activity

   (i) Manufacture (ii) Service
7. Nature of Operation

   (i) Perennial (ii) Seasonal (iii) Casual
8. Type of Organisation

   (i) Proprietary (ii) Partnership (iii) Self-help Groups (iv) Others
9. (a) Main Manufacturing/Serviee Activity

   (b) Products to Be Manufactured/Service to Be Provided
10. (a) Proposed Investment In Fixed Assets [Rupees In Lakh]
11. Installed Capacity (Proposed) per Annum

    (i) Quantity (ii) Unit
12. Power Load (Anticipated)
13. Other Sources of Energy/Power
14. Expected Employment

15. Expected Schedule of Commencement of Production/Activity
16. Entrepreneurs' Profile:

    (i) Name (ii) Gender (iii) Community (iv) Knowledge Level

Reference Book :

1. Entrepreneurship Development (in English) - S. Anil Kumar- Jain Book Agency
2. Entrepreneurship Development & Management (in English) - Dr. A. K. Singh
3. Entrepreneurship and Small Business Development (in Enqlish) - Kiran Sankar Chakraborty
4. Entrepreneurship Development & Computer Applications (in English & Bengali, bilingual version)- Bhagabati Publications

Group B (Computer Applications)

Theory (25 Marks, 72 Periods)

Unit 1: Introduction to Computer Systems (Periods 22)

- DeIinition of Computers
  - Features of Computers
  - Functions of Computers
- Evolution of Computers
  - Abacus, Napiers Bone, Pascaline, The Babbage Machine
- Generations of Computers
  - First, Second, Third, Fourth and Fifth Generations of Computers
- Classifications of Computers (Concept only)
  - Analogue, Digital, Hybrid Computers
  - Mainframe and Super Computers
  - Mini, Micro, Laptop Computers
  - Computer Systems
  - Hardware, Software, Data & Information, People
- Computer Organization
  - Block Diagram of a Computer
  - Central Processing Unit: CU, ALU
  - The Bus : Data and Address Bus

- Input Devices
    - Keyboard, Mouse, Scanner, OMR, OCR, Barcode Reader, Joystick, Light Pen
- Output Devices
    - Monitor, Printer, Plotter
- Computer Memory
    - Cache, Primary, Secondary Memory

Unit 2 : Number Systems and Computer Codes (Periods 24)

- Concept Non-positional Number System
    - Roman Number System
- Concept Positional Number System
    - Binary, Octal, Decimal and Hexadecimal Number System
- Inter-conversion between the Number Systems
- Arithmetic
    - Addition, Subtraction, Multiplication and Division of Binary Numbers
- Complements: 1's and 2's Complements, Binary Addition and Subtraction using 1's and 2's Complement methods
- Representation of Numbers: Integer and Floating Point Representation
- Integer and Floating Point Arithmetic
- Computer Codes
    - BCD, ASCII, Gray, Excess-3 Code

Unit 3: Computer Software and Programming Languages (Periods 26)

- Definition of Software
- Classification of Softwares
    - System Software
        - Translator: Compiler, Interpreter. Assembler
        - Operating Systems
            - Definition and functions of OS
            - Classification: Single User. Multi User, Multiprogramming, Timesharing Operating System (Definitions only)
            - Booting: Cold and Worm Booting (Definitions only)
            - Concept of GUI and CUI
            - MS DOS: Popular Internal and External Commands only
            - Concept of Windows OS (Windows 2007 and Compatible)

- Application Software
- Concept of Problem Solving
  - Algorithm, Flowchart (Definitions and Examples)
- Concept of High and Low Level Languages

Reference Book:

1. Fundamentals of Computers - McGraw Hill Education, Balagurusamy
2. Fundamentals of Computers - Oxford University Press, by Thareja
3. Fundamentals of Computers - PHI Pvt. Ltd., by Rajaraman

Project - (25 Marks, 36 Periods)

Entrepreneurship Development

l. Every student should exercise the "Entrepreneurship Readiness Questionnaire" to assess the Entrepreneurial Potential in him.

The assessment is to be made by the student himself or herself, and is required to be ratified by the subject teacher.

Entrepreneurship Readiness Questionnaire [Period -18, Marks allotted-10]

Purpose :

This exercise is intended to assess the subtle qualities of a student. Not everyone is cut out to be an entrepreneur. The fact is, there are certain traits, however, that seem to separate those who will be successful as entrepreneurs from those who may not be. This questionnaire will help to determine in which category a student fits better.

Each student is required to put a tick (✓) mark for each question which best describes his/her traits.

Markings:

- For Question numbers 01,02,06,08,10,11,16,17,21,22,23

  Onc mark for each tick mark is to be awarded to a student if his/her responses to these questions fall under "Agree Completely" and "Mostly Agree". No marks will be awarded for this group of questions if the responses fall under "Partially Agree", "Mostly Disagree" or "Disagree Completely".

- For Question numbers 03,04,05,07,09,12,13,14,15,18,19,20,24,25

  One mark for each tick mark is to be awarded to a student if his/her responses to these questions fall under "Mostly Disagree" and "Disagree Completely". No marks will be awarded for this group of questions if the responses fall under "Agree Completely", "Mostly Agree" or "Partially Agree".

Ques. No.	The Question	Agree Compl-etely	Mostly Agree	Parti-ally Agree	Mostly Disa-gree	Disa-gree Compl-etely
01.	I am generally optimistic					
02.	I enjoy competition and always try to do things better than my competitor					
03.	In solving a problem, I always try to get the best solution first and do not worry about other solutions of the problern					
04.	I enjoy association of my friends after school hours and attending local club every evening					
05.	If I am asked to bet for an event, I try to bet in favour of that outcome which may earn maximum profit for me					
06.	I like setting my own goals and working hard to achieve them					
07.	I am generally casual and do not take anything seriously					
08.	In taking action for any event, I first like to know what is going on in that event: that is I donot take any action without having strong idea on the event					
09.	I work best under the guidance of someone else					
10.	I can convince others, if I am in right position					
11.	I find that other people/friends frequently waste my time					
12.	I enjoy watching football, cricket and other sports events					
13.	I tend to communicate about myself openly with other people					
14.	I donot mind following orders from any person, elder or younger, who has authority to order me (e.g. to follow the order of the captain of your school team, to which you are also a member, and the captain may be older than or younger to you)					

Ques. No.	The Question	Agree Compl-etely	Mostly Agree	Parti-ally Agree	Mostly Disa-gree	Disa-gree Compl-etely
15.	I enjoy more in planning things and less in executing plans					
16.	I donot like to bet on any event that has more chance to occur					
17.	If my attempt to any action fails, I quickly shift to something else and do not stick to the failed action					
18.	To become successful in business, I think enough time should be kept reserved for my family members/friends					
19.	When I earn some money, I donot use it for unnecessary causes, rather I keep it secured for use in future emergencies					
20.	I think that making a lot of money is a turning point in life					
21.	If a problem has a number of alternatives, solving that problem becomes more effective					
22.	I enjoy impressing others with the things that I can do very well					
23.	I enjoy playing carrom, chess, badminton, cards ete. with a person/friend who plays better than me					
24.	In business dealings, I think moral ethics of a person must be bent a little to get things done					
25.	I think that good friends always make another good					

Result:

Your Score	Your Entrepreneurial Potential
21- 25	You have great entrepreneurial potential
16 - 20	You could be quite successful entrepreneur if your other talents and resources are right
11 - 15	You are in transitional range. With some serious work you can probably develop the outlook you need for running your own business
06 - 10	Your entrepreneurial potential is doubtful. It would take considerable re-arrangement of your life philosophy and behavior to make it
00 - 05	Entrepreneurship is not reallY for you.

2. Visit the owner of a small business in your locality. Collect data/informarion from the business person with regard to the following points -
   1. Type of business
   2. Type of customers (e.g. for business dealing with educational stationery, customers are mainly school and college students erc.)
   3. Sources of raw materials
   4. Monthly / annual sales (approximate figures)
   5. Monthly / annual profit (approximate figures)
   6. Threats to the business (like funding, nearest competitor, obsolescence of the product etc.)
   7. Opportunities to the business
   8. Future plans

OR

3. Collect the story of a successful entrepreneur from magazines, journals or through Internet. Read his/her success stories and write an essay on the fact highlighting following points -
   1. What motivated the person to start his/her own business?
   2. How the entrepreneur selected the type of business?
   3. What were the obstacles the entrepreneur faced at the beginning?
   4. How the entrepreneur overcame the obstacles?
   5. What did you learn from the story?

   You can take the examples of Great Indian Entrepreneurs from internet by searching
   1. Succcssful lndian Entrepreneurs
   2. Success stories of small entrepreneurs
   3. Successful Woman Entrepreneurs and so on [Period -18, Marks - 15]

Practical : (25 Marks, 108 Periods)

Computer Applications

- Windows OS (MS Windows 2007 or Compatible)
    - Starting and Shuting down Windows
    - Working with Taskbar, Control Panel and Desktop Icons
    - Changing Desktop Background
    - Locking or Unlocking, Hiding or Unhiding Taskbar
    - Working with Windows Search and Help
    - Working with Windows Libraries and Wndows Explorer
    - Managing Files and Folders
    - Working with Windows Accessories
- DOS: Working with MS DOS Commands as in theory part
- Word Processing (MS Word 2007 or Compatible)
    - Creating, Opening, Editing, Formatting and Saving Word Document
    - Working with Page Setup, Headers and Footers
    - Inserting Clip-Art, Word-Art, Auto Shapes, Picture, Symbols, Equation
    - Working with Table Insertion, Spelling and Grammar Check
    - Working with Mail Merge and Macros
    - Working with Printer Setup and Document Printing
- Spread Sheet (MS Excel 2007 or Compatible)
    - Creating, Opening, Editing and Saving Word
    - Changing Rows and Column Width
    - Formatting Cells and Entering values
    - Use of In-built Commands
        - SUM, PRODUCT, AVERAGE, MAX, MIN, COUNT, IF, OR, NOT, DATE, TIME, UPPER, LOWER
    - Working with Auto Fill, Conditional Formatting
    - Sorting and Filtering Data
    - Working with Charts
- The Internet
    - Browsing the Internet
    - Using Search Engines
    - Creating and accessing E-mails
    - Sending /Receiving mails with attachments

Environmental Studies (ENST)

Class XII

Total of weeks for classes/year: 36		
Classes per week: 2		
Total classes per year:72	**Th=58**	**Project = 14**
Total marks: 100	**Th= 80**	**Project = 20**

Unit Wise Distribution of Marks and Periods

	Unit	Marks	No. of Periods
	I	05	04
	II	06	05
	III	08	06
	IV	06	04
	V	08	05
	VI	10	08
	VII	10	08
	VIII	06	04
	IX	07	05
	X	06	03
	XI	06	04
	XII	02	02
Total	**12**	**80**	**58**

Course content :

Theory :

Unit I Introduction

i What is environment

ii Physical, Biological and Social Environment

iii Perception of environment in ancient India

iv Indian society and environment: Indian heritage, custom and culture

Unit II Man and Environment-A

i Origin of Earth - evolution of its land, ocean and atmosphere

ii Development of Life - its impact on atmospheric composition - emergence of terrestrial life - emergence of homosapien sapiens

iii Earth - a dynamic system - present day environment is a result of continuing geological and life processes and interaction between them.

iv Anthropogenic activities and their impact on environment

v Impact of human activities on environment since industrial revolution.

Unit III Man and Environment-B

i Urban and rural environment

ii Impact of urbanisation on environment

iii Impact of development on environment

iv Impact of population on environment

v Impact of poverty on environment

vi Impact of bad habits (e.g. spitting, responding to nature's call in the open) and superstition on environment

vii Wanton destruction of environment for personal greed

viii Degradation of natural wealth by human activities

ix Importance and need of environmental studies.

Unit IV Disaster and Environment

i Impact of Natural Disasters - earthquakes, volcanic eruptions, forest fires, cyclones, typhoons, hurricanes, tornados, floods, landslides.

Impact of Man Made Disasters -

Destruction of Hirosima and Nagasaki by atom bomb,

ii Bhopal Gas Tragedy, Chernobyl accident and Minamata disease.

Unit V Environmental Pollution - A

i Pollution and pollutant

ii Air Pollution - pollutants (solids, liquids and gases) and their sources, adverse effects of air pollution, control of air pollution

AIR QUALITY

Smog - classical smog and photochemical smog, condition for photochemical smog event, selected photochemical smog species, adverse effects of photochemical smog, control

iii Land Pollution - pollutants and their sources, adverse effects and control

iv Water Pollution - pollutants and their sources, adverse effects and control.

Quality of drinking water

Unit VI Environmental Pollution - B

i Acid Rain - causes of acid rain, adverse effects and control

ii Greenhouse Gases - their sources, greenhouse effect and global warming, effects of global warming, measures to control global warming.

iii Ozone Layer - its range and importance, how it prevents harmful uv radiation from falling on earth.

Depletion of ozone layer - causes and effects.

Antartic and Arctic so called "ozone hole" - its adverse effects.

iv Adverse effects of tobacco smoking including indoor tobacco smoking

v Adverse effects of e-wastes and plastics on environment

vi Radiation pollution

vii Noise pollution

viii Odour pollution, pollen pollution

ix Thermal pollution

x Metal pollution - Cr, Cu, Zn, Cd, Hg, Pb - their sources and adverse effects

Unit VII Environment Conservation

i Importance of environmental conservation

ii Conservation of biodiversity

iii Conservation of forests

iv Conservation of wild life

v Conservation of soil

vi Conservation of wet-lands

vii Role of society in the environmental conservation.

Unit VIII Energy and Environment

i Energy and civilisation

ii Use of conventional sources of energy - coal, petrol, diesel, wood adverse effects on the environment.

iii Use of atomic energy - advantages and disadvantages

iv Use of non-conventional and renewable sources of energy - advantages.

Unit IX Sustainable Development

i The concept of sustainable development

ii Sustainable industry

iii Sustainable agriculture

Unit X Environment - Related Movements in India

i Introduction

ii Chipko movement

iii Save Normada Movement

iv "Silent Valley" Movement

Unit XI International Conferences of Human Environment

i Stockholm Conference, 1972

ii Earth Summit Conference, 1992

iii Montreal Protocol, 1987

iv Kyoto Protocol, 1997

v Conference of the Parties (Cop21), Paris, 2015

Unit XII The Green Bench

i What is Green Bench

ii Jurisdiction of Green Bench

Project :

Full Marks: 20 **No. of Periods: 14**

The students will have to undertake a PROJECT. They may choose the topic of PROJECT in consultation with their teachers. As examples, a few topics are given below:-

01 Domestic solid and liquid disposals in a specified locality

02 Month wise average temperature for the last five years

03 Month wise average rain-fall for the last five years

04 Drainage system in a specified locality

05 Impact of road widening on plant population

06 Rain-water harvesting

07 TV viewing and exposure to extra radiation

08 Hazards of drinking water containing arsenic above safe limit

09 Importance of wet land

10 Occupational health hazards

11 e-waste and plastic disposal

12 Impact of urbanisation on biodiversity

Vocational Subjects
&
Academic Elective Subjects
Class XI

Basic Agriculture (BAAG)

Class XI

Total no. of weeks for classes / Year: 36		
Classes per week: 7	**Th=3**	**Practical=4**
Total classes per year: 252	**Th=108**	**Practical=144**
Total marks: 100	**Th= 50**	**Practical=50**

Course Contents :

Theory :

1. **Introduction** : (4 periods)

   History of agricultural development; Importance, scope and branches of Agriculture and Horticulture; Relation of Science with Agriculture and Horticulture

2. **Weather and Crop Production**: (6 periods)

   Definition of weather and climate; Types of weather parameters (*viz*. temperature, rainfall, humidity, day length, *etc*.); Role of monsoon in agriculture; Agro-climatic zones of West Bengal: classification, characteristics and crops sequence; Crop seasons: characteristics and major crops; Concept of weather forecasting and agro-meteorological advisory services.

3. **Soil and Nutrient Management**: (8 periods)

   Definition of soil and its primary characteristics; Concept of soil profile, texture and structure, Classification of soil; Characteristics of different soil zones of West Bengal and scope for crop production; Differences between manures and fertilizers; Classification and nutrient content of different manures and commercial fertilizers; Types and use of bio-fertilizers; Soil testing and recommendations

4. **Cultivation of Agricultural Crops**: (30 periods)

   Classification of agricultural crops; Basic principles of crop production like season, tillage, sowing/transplanting, intercultural operations, nutrient, weed and water management, insect-disease control, harvesting, threshing, yield, storage, post-harvest operations, etc. with special reference to some important crops like cereals (rice, wheat and maize), oil seeds (rapeseed, mustard and sesamum), pulses (chickpea and lentil), fibre crops (jute), tuber crops (potato), sugar crops (sugarcane) *etc*.; Cropping system; Organic farming.

5. **Cultivation of Horticultural Crops and Post-harvest Processing**: (24 periods)

   Classification of horticultural crops: vegetables, fruits, flowers and spices; Basic principles of production like season, tillage, sowing/planting, intercultural operations, nutrient, weed and water management, insect-disease control, harvesting, threshing, yield, storage, post-harvest preservation and processing with special reference to fruit crops (mango, banana, guava, litchi, orange, *etc.*), vegetables (brinjal, tomato, onion, chilli, cauliflower, cabbage, leafy vegetables, etc.), flowers (marigold, tuberose, chrysanthemum, orchids, *etc*.),

plantation crops (tea, *etc*.); Different methods of propagation (cutting, grafting, budding, layering, tissue culture, *etc*.)

6. **Weed- Insect- Disease Management** (10 periods)

Definition and classification of weeds; Major weeds and their control; Types of insects, mites and nematodes, their infestation and control; Types of diseases like fungal, bacterial and viral, infestation and control measures

7. **Irrigation and Drainage**: (6 periods)

Sources and method of irrigation; Role of irrigation and drainage in crop production; Water requirement of major agricultural and horticultural crops

8. **Seed Production and Certification:** (6 Periods)

Definition and characteristics of seed; Types of seed: nucleus, breeder, foundation, certified and truthfully labeled; Basic principles of seed production (isolation distance, rouging, seed lot, *etc*.); Seed certification; Seed testing

9. **Farm implements and machinery:** (6 Periods)

Types and uses of implements for tillage and intercultural operations; Uses and general maintenance of farm machinery like power tiller, tractor, combined harvester, paddy and wheat thresher, rice milling and oil extraction equipments, *etc*.

10. **Marketing, Crop insurance, Co-operative and Extension services:** (8 Periods)

Definition and concept of agricultural marketing; Panchayati Raj System: Foundations and Organizational set up; Functions of Regulated market and Food Corporation of India (FCI); Concept of Minimum Support Price (MSP), AGMARK, subsidy, *etc*.; Lead bank schemes; Crop insurance: advantages, limitations, estimation of crop losses and status in West Bengal; Co-operative system: functions, credit, structure and successful examples; Agricultural development programmes: Rastriya Kishi Vikas Yojona (RKVY), Agricultural and Training Management Agency (ATMA), *etc.*

Marks Allotment:

Objective type: (1×10)=10 (To be answered total ten questions out of Twelve)

Descriptive type: (8 × 5) =40 (To be answered total five questions out of Eight).

Practical:

Basic Agriculture Lab

Sl. No	Topic	No. of periods
1	Preparation of district-wise map of West Bengal for major agricultural and horticultural crops	4
2	Preparation of map indicating Agro-climatic Zones of West Bengal	2
3	Soil sample collection, preparation and preservation	2

Sl. No	Topic	No. of periods
4	Preparation of compost and vermi-compost	4
5	Identification of fertilizers along with nutrient content	2
6	Calculation of fertilizers (Straight and Compound) for major crops	4
7	Visit to a 'Model Agriculture Farm' including 'Automatic Weather Station' within the district / region	8
8	Study on tillage operation and land preparation	2
9	Sowing of some crops like wheat, rapeseed and mustard, chickpea, jute, etc.	6
10	Transplanting of rice seedlings in main field	2
11	Planting of potato, sugarcane, etc.	4
12	Harvesting and threshing of rice, rapeseed and mustard, lentil, etc.	6
13	Visit to a Rice Mill/ post-harvest threshing unit of other crops within the district	8
14	Lay out and cultivation of vegetables in kitchen garden	6
15	Nursery bed preparation and management for vegetables and flowers	4
16	Demonstration of propagation methods (cutting, grafting, budding, layering, etc.)	4
17	Visit to a 'Model Orchard' within the district	8
18	Preparation of jam, jelly, squash and sauce	6
19	Identification of weeds in fields and wetlands and preparation of weed album	4
20	Identification of insects in fields and storage	4
21	Identification of diseases in agricultural and horticultural crops	4
22	Weed control practices: hand weeding, mechanical and application of herbicides	4
23	Seed treatment (dry and wet) of important field crops	2
24	Calculation and spraying of insecticide, fungicide, herbicide, etc.	4
25	Calculation and dusting of insecticides, etc.	2
26	Demonstration of different sources and methods of irrigation	4
27	Identification of seeds of agricultural crops	2
28	Seed testing: purity, viability, moisture content, germination, etc.	2
29	Demonstration of seed bags/ packets, certification label, etc.	2
30	Visit to Seed production farm and Seed processing unit within the district	8
31	Seed storage: structure and methods	2
32	Identification and use of different farm implements and machinery	4
33	General maintenance of farm machinery	4
34	Preparation of flow charts for production-based marketing of commercial crops	2
35	Visit to Regulated market, Farmers' co-operatives and Panchayat samiti within the area /district	8

Reference Books :

1. Ucchamadyamik Krishi Vigyan (in Bengali) by Prabash Chandra Das and Dr. Ratikanta Ghosh, Oriental Book Company Private Limited, Kolkata.
2. Adhunik Krishi O Udyan Bigyan ebong Krishi Jantropati (in Bengali) by Bijoy Krishna Ghosh and Samiran Bandopadhyay, Sridhar Prakashani, Kolkata.
3. Krishi Jantropati (in Bengali) by Prabash Chandra Das, Oriental Book Company Private Limited), Kolkata
4. Sahaj Kathay Bigyanbithwik Chaasbas (in Bengali) by Gostho Nayban, Ananda Agency, Kolkata.
5. Adhunik Krishi O Uddan Vigyan (in Bengali) by Dr Kajal Sengupta and Dr Renu Dhar, Mehanati Prokashani, Hooghly.
6. Handbook of Agricultural Science (in English) by S S Singh, Kalyani Publishers, New Delhi.
7. Handbook of Agriculture (in English), Indian Council of Agricultural Research, New Delhi.
8. Fundamentals of Agriculture, Vol. I and Vol. II (in English) by Arun Katyan, Kushal Publications and Distributors, Varanasi.

Basic Animal Husbandry (BAAH)

Class XI

Total no. of weeks for classes / Year: 36		
Classes per week: 7	**Th=3**	**Practical = 4**
Total classes per year: 252	**Th=108**	**Practical = 144**
Total marks: 100	**Th= 50**	**Practical = 50**

Course Contents :

Theory :

1. Introduction: (8 periods)

Animal husbandry – definition and importance. Common animals under the domain of animal husbandry and their utility. Various income generating options through animal husbandry – dairy farming, poultry farming, goatery, piggery. Impact of animal husbandry in the national economy of India.

2. Breeds of livestock: (12 periods)

Meaning of species and breed. Classification of Indian cattle breeds according to utility (milch, dual, draught). Name of important exotic dairy cattle breeds experienced in India. Name of important buffalo breeds and their availability. Classification of Indian goat breeds according to utility (meat, milk, dual, fibre). Name of important exotic goat breeds. Comparison between Deshi Indian pigs and exotic breeds. Description of important swine breeds – Ghoongroo, Large White Yorkshire, Landrace. Suitable breeds of various animals in West Bengal and their short description. Principal points for selection of cattle. Genetic improvement of local cattle – cross breeding, grading up and selective breeding.

3. Reproduction of animals: (15 periods)

Reproductive system of cattle (male and female) – various organs and their functions. General information about reproductive events like estrous cycle, pregnancy, parturition. Signs of estrus and right time of insemination in cattle. Care of cow during parturition. Artificial insemination (AI) – definition, brief history and development of AI in India, advantages and disadvantages, equipments needed for AI, Procedure of AI with frozen semen and precautions.

4. Feeds and feeding of animals: (15 periods)

Ruminants and non-ruminants. Digestive system of cattle – its various organs and their functions. Meaning of feed, nutrients and balanced feed. Functions and sources of various nutrients. Deficiency problems of vitamins and minerals in animals. Water requirements of various animals. Classification of feedstuffs – roughages and concentrates. Fodder – meaning and classification. Hay and silage. Thumb rule method of feeding cattle for maintenance, pregnancy and milk production.

5. Animal housing: (8 periods)

Objectives of animal housing; selection of site for livestock farm; types of cattle housing – loose housing system and conventional barn, and floor space requirements; ideal cowshed, ideal goat shed, different types of pig houses and floor space requirements; use of guard rail in farrowing pen; cleaning and sanitation of livestock farm; conservation and utilization of dung and urine.

6. General management practices: (15 periods)

Control of animals, identification, dehorning, castration, age determination. Salient features of care and management of various stages of cattle (calf, heifer and cow). Care and management of goat. Care and management of pig.

7. Common measures for prevention of animal diseases: (10 periods)

Regular deworming, control of ectoparasites, vaccination against dreadful diseases. Vaccination schedule of cattle, buffalo, goat, sheep, pig.

8. Milk and milk products: (10 periods)

Milk and its composition; legal standards of cow milk, toned and double toned milk; properties of milk; factors affecting yield and quality of milk; clean milk production; storage of milk; general idea about common milk products – butter, ghee, dahi, chhana, paneer, khoa.

9. Elementary knowledge of poultry: (15 periods)

Definition of poultry. Role of poultry in relation to human nutrition and self employment. Classification of various breeds of fowl, idea about layer and broiler. Hatching – definition, incubation period, methods of hatching – natural vs. artificial. Systems of poultry keeping – free range, semi-intensive and intensive. Preparations before bringing chicks in poultry farm. Care of chicks on arrival at the farm. Brooding management. Salient features of feeding and management of layer and broiler. Common measures for prevention of poultry diseases. Eggs – Gross structure; nutritive value of egg; how egg is formed; preservation of eggs.

Marks Allotment:

Objective type: (1×10)=10 (To be answered total ten questions out of Twelve)

Descriptive type: (8×5)=40 (To be answered total five questions out of Eight).

Practical:

Basic Animal Husbandary Lab

Sl. No	Topic	No. of periods
1	Study of external body parts of cattle	2
2	Study of external body parts poultry	2
3	Control of large animals (cattle)	4
4	Handling and control of fowl	2

Sl. No	Topic	No. of periods
5	Methods of identification of animals – branding, tattooing, ear tagging, neck tagging	6
6	Identification of feed ingredients of livestock and poultry	4
7	Preparation of concentrate mixture	2
8	Thumb rule method of feeding cattle	4
9	Study of ideal cowshed	4
10	Study of housing systems of poultry	6
11	Demonstration of AI in cow	8
12	Study of methods of hand milking – full hand and stripping	4
13	Attending newborn calf	6
14	Attending newborn kids	4
15	Cleaning and disinfection of cowshed	4
16	Study of common appliances used in livestock farm	4
17	Study of various types of eggs available in the market	2
18	Study of structure of egg	2
19	Study of quality of egg	2
20	Study of incubator	2
21	Hatching of eggs by natural method	4
22	Hatching of eggs by artificial method	6
23	Brooding of chicks	4
24	Study of various types of liquid milk available in the market	2
25	Determination of specific gravity of milk	2
26	Determination of fat and SNF percentage of milk	4
27	Visit to livestock farms (dairy farm, goat farm, pig farm)	24 (3x8 pds)
28	Visit to poultry farms (backyard poultry, layer farm, broiler farm)	24 (3x8 pds)

Reference Books :

1. Unnata Prathai Pashu Palan O Pashu Chikitsa (Animal Production, Diseases and Treatment, in Bengali) by Dr Nilotpal Ghosh, Kalyani Publishers, New Delhi.
2. Poultry Farming (in Bengali) by Dr Nilotpal Ghosh, Kalyani Publishers, New Delhi.
3. Livestock Production Management (in English) by N S R Sastry and C K Thomas, Kalyani Publishers, New Delhi.
4. Animal Husbandry and Dairy Science (in English) by Jagdish Prasad and S R Vinita Abraham, Kalyani Publishers, New Delhi.
5. A Textbook of Animal Husbandry (in English) by G C Banerjee, Oxford & IBH, New Delhi of the rack reagents. They should not waste the valuable chemicals. They should learn the art of working with small amounts of samples and neagents].

Biology (BIO1)

Class XI

Total no. of weeks for classes / Year: 36		
Classes per week: 6	**Th=4**	**Practical =2**
Total classes per year: 216	**Th=144**	**Practical =72**
Total marks: 100	**Th= 70**	**Practical =30**

Course Contents :

Theory :

Topic	No. of Periods
Unit I : Diversity of Living Organism	
Chapter – 1 : Science of Life	
1. Definition and characteristics of life.	2
2. Biological Sciences – its application and relationship with other sciences.	2
Chapter – 2 : Taxonomy	
1. Need for classification,	1
2. Taxonomy and systematics,	1
3. Binomial nomenclature	2
Chapter – 3 : Classification of Living Organisms	
1. Five kingdom classification; Salient features of Monera, Protista and Fungi.	4
2. Salient features and classification of plants into major groups - Algae, Bryophyta, Pteridophyta, Gymnospermae and Angiospermae (three to five salient and distinguishing features and at least two examples of each category);	6
3. Salient features and classification of animals - non chordates up to phyla level and chordates up to class level (three to five salient features and at least two examples of each category).	6
Chapter – 4 : Microbiology	
1. Virus - general concept;	1
2. Common viral diseases (plants and animals)	1

Unit II: Structural Organisation In Plants And Animals	
Chapter – 5 : Structural Organisation in Plants	
1. Plant tissue – meristematic and permanent tissue – types with characterization and functions.	3
2. Anatomy and functions of different parts of flowering plants: root, stem and leaf.	5
3. Functions of different parts and types of inflorescence, flower, fruit and seed.	6
Chapter – 6 : Structural Organisation in Animals	
1. Animal tissue- types with functions and examples.	3
Unit III: Cell Structure And Function	
Chapter – 7 : Cell	
1. Ultrastructure and function of cell membrane, cell wall, endoplasmic reticulum, Golgi bodies, lysosomes, mitochondria, ribosomes, plastids, centrioles, vacuoles, nucleus.	8
Chapter – 8: Biomolecules	
1. Structure and function in outline of proteins, carbohydrates, lipids, nucleic acids;	4
2. Enzymes- types, properties,	3
Chapter – 9: Cell division	
1. Cell cycle,	2
2. Meiosis and its significance.	4
Unit IV: Plant Physiology	
Chapter – 10: Transport in plants	
1. Diffusion, Osmosis,	2
2. Active transport; Water and ion absorption,	2
3. Transport of food- phloem transport,	2
Chapter – 11: Mineral nutrition	
1. Essential minerals, macro- and micronutrients and their role; deficiency symptoms;	2
2. Hydroponics- definition and uses.	2
Chapter – 12: Photosynthesis	
1. Photosynthesis as a mean of autotrophic nutrition;	2
2. Photochemical and biosynthetic phases of photosynthesis (in brief).	2
Chapter – 13: Respiration	
1. Cellular respiration - glycolysis, fermentation, TCA cycle and electron transport system (in brief).	6

Chapter – 14: Plant growth and development	
1. Germination of seeds;	1
2. Growth regulators - auxin, gibberellin, cytokinin, ethylene, ABA;	3
3. seed dormancy; vernalisation; photoperiodism.	3
Unit V: Human Physiology	
Chapter – 15: Digestion and absorption	
1. Calorific values of proteins, carbohydrates and fats;	1
2. Nutritional and digestive disorders - PEM, indigestion, constipation, vomiting, jaundice, diarrhea; Obesity and BMR index.	3
Chapter – 16: Breathing and Respiration	
1. Respiratory system in humans;	2
2. mechanism of breathing and its regulation in humans - exchange of gases,	2
3. Respiratory volumes – TV, IRV, ERV, VC, RV, Dead space air;	2
4. Disorders of respiratory system – asthma, emphysema, occupational respiratory disorders.	2
Chapter – 17: Body fluids and circulation	
1. Composition of blood, blood groups, coagulation of blood	4
2. Composition of lymph and its function;	1
3. Human circulatory system - Structure of human heart and blood vessels;	3
4. cardiac cycle, cardiac output,;	4
5. Blood pressure;	1
6. Blood transfusion	1
7. ECG.	1
Chapter – 18: Excretory products and their elimination	
1. Urine- normal and abnormal composition;	1
2. Dialysis and artificial kidney.	2
Chapter – 19: Locomotion and movement	
1. Skeletal muscle - contractile proteins and muscle contraction;	4
2. Skeletal system and its functions; joints;	2
3. Major skeletal muscles (related to movement).	2

Chapter – 20: Neural control and coordination	
1. Nervous system in humans - central nervous system; peripheral nervous system and visceral nervous system (names and functions of parts only, flow chart, with special emphasis on autonomic nervous system);	6
2. elementary structure and functions of eye and ear.	2
Chapter – 21: Chemical coordination and regulation	
1. Human endocrine system - pituitary, thyroid, parathyroid, adrenal, pancreas, gonads (in tabular form) with emphasis on major diseases caused by disorders of endocrine system.	6

Question Pattern

Sl. No.	Unit	MCQ (1 mark)	Section - I	Section-II			Total
			Very Short Answer Questions (1mark)	Short Answer Questions I (2 marks)	Short Answer Questions II (3 marks)	Long Answer Questions (5 marks)	
1	Diversity Of Living Organism	1×2 = 2	-	2×1 = 2	3×1 = 3	-	07
2	Structural Organisation In Plants And Animals	1×3 = 3	1×1 = 1	2×1 = 2	3×2 = 6	-	12
3	Cell Structure And Function	1×2 = 2	-	2×1 = 2	3×2 = 6	5×1 = 5	15
4	Plant Physiology	1×4 = 4	1×1 = 1	2×1 = 2	3×2 = 6	5×1 = 5	18
5	Human Physiology	1×3 = 3	1×2 = 2	2×1 = 2	3×2 = 6	5×1 = 5	18
		14	**4**	**10**	**27**	**15**	**70**

- Question Paper will have two sections.
- Section I : for MCQ (Question nos. 1 to 14)
- Section II will have four groups :

Group A – VSA (1 mark) - (Question nos. 1 to 4)

Group B – SA I (2 marks) - (Question nos. 5 to 9)

Group C – SA II (3 marks) - (Question nos. 10 to 18)

Group D – LA (5 marks) - (Question nos. 19 to 21)

- There should be no fractions in marks distribution.
- For SA I, marks may be divided into 1+1.
- For SA II, marks may be divided into 2+1.
- For LA , marks may be divided into 3+2 or 4+1.
- Option summary :

Section I	No internal options.
Section II VSA	Internal option for at least any two questions.
Section II SA I	Internal option for at least any three questions.
Section II SA II	Internal option for at least any five questions.
Section II LA	Internal option for at least any two questions.

Practical/Project :

Biology Practical

1. Study of parts of simple and compound light microscopes.
2. Study of typical plant cell from onion scale leaf (dissection, drawing and labeling).
3. Spot identification of –
   A. Bacteria (Lactobacillus)
   B. Fungi (Mucor)
   C. Algae (Spirogyra)
   D. Protozoa (Paramoecium)
4. Seed identification of monocotyledonous and dicotyledonous crops; Germination of seeds – Epigeal and Hypogeal.
5. Study of modified roots and modified stems.
6. Temporary slide preparation –
   A. T. S. of root (Monocot – Arum, Dicot – Gram)
   B. T. S. of stem (Monocot – Maize, Dicot – Sunflower)

7. Qualitative Biochemical Analysis of -
   A. Glucose – Benedict's test
   B. Starch – Iodine test
   C. Protein – Biuret test & Coagulation test
   D. Fat – Grease spot test
8. Biochemical test to detect -
   A. Presence of GLUCOSE in urine
   B. Presence of UREA in urine
   C. Presence of BILE PIGMENTS in urine
9. Human blood film preparation – Cell study, T.C. , D.C.
10. Determination of blood pressure by sphygmomanometer and determination of heart rate and pulse rate.

Question Pattern

1.	A) Experiment A	=	7 marks
	B) Experiment B	=	7 marks
2.	Spotting (5 specimens)	=	2×5 = 10 marks
3.	Laboratory Note Book	=	6 marks
	Total	**=**	**30 marks**

Basic Science (Physics + Chemistry) (BSPC)
Class XI

Total no. of weeks for classes / Year: 36		
Classes per week: 6	**Th=4**	**Practical = 2**
Total classes per year: 216	**Th=144**	**Practical = 72**
Total marks: 100	**Th= 70**	**Practical = 30**

Course Contents :

Theory :

Group A (Physics)

Full Marks: 35 **Total number of periods : 72**

Unit wise distribution of Periods and Marks

Unit	Title	No. of Periods	Marks
I	Physical World & Measurement	04	02
II	Kinematics	08	04
III	Laws of Motion	08	04
IV	Work, Energy & Power	07	03
V	Motion of System of Particles	08	04
VI	Gravitation	06	03
VII	Properties of Bulk Matter	13	05
VIII	Thermodynamics	06	03
IX	Behaviour of Perfect Gas & Kinetic Theory of Gases	07	03
X	Oscillations	05	04
	T O T A L	**72**	**35**

Unit I **Physical World & Measurement** **[Periods: 04]**

Physics – scope and excitement; nature of physical laws; physics, technology and society. Need for measurement; units of measurement; systems of unit; SI units, accuracy and precision of measuring instruments; errors in measurement; significant figures; error analysis.

Dimension of physical quantitites, dimensional analysis and its applications, limitation of dimensional analysis.

Unit II **Kinematics** **[Periods: 08]**

Motion in a straight line; position-time graph, speed and velocity. Uniform and non-uniform motion, average speed; average and instantaneous velocity. Acceleration and retardation; uniformaly accelerated motion, velocity-time, graphs. Average and instantaneous acceleration. Kinematical equations in one dimension: $s=ut$, $v=u+at$, $s=ut+\frac{1}{2}at^2$, $v^2=u^2+2as$, $S_{t\,th} = u+\frac{1}{2}a(2t-1)$

Scalar and vector quantities: position and displacement vectors, equality of vectors, multiplication of vector by a real number; addition and substraction of vectors. Unit vector; resolution of a vector in a plane-rectangular components. Scalar and vector products of vectors.

Unit III **Laws of Motion** **[Periods: 08]**

Frame of reference – inertial and non-inertial; examples; Newton's first law – concept of force and inertia. Momentum and Newton's Second Law – F = ma. Impulse and Impulsive force. Newton's third law of motion – action and reaction. Law of conservation of linear momentum and its applications. Static and kinetic friction, minimization of friction. Dynamics of uniform circular motion; centripetal force, examples of circular motion – vehicle on level circular road, vehicle on banked road.

Unit IV **Work, Energy & Power** **[Periods: 07]**

Work done by a constant force; kinetic energy, power-units. Work-energy thoerem. Notion of potential energy, potential energy of a spring. Conservative force – conservation of mechanical energy; non conservative forces.

Unit V **Motion of System of Particles** **[Periods: 08]**

Centre of mass of a two particle system - conservation of momentum and centre of mass motion. Moment of a force, torque, angular momentum, conservation of angular momentum with some examples Moment of inertia and radius of gyration.

Unit VI **Gravitation** **[Periods: 06]**

The universal law of gravitation. Acceleration due to gravity and its variation with altitude, depth and rotation due to the earth. Gravitational potential energy; gravitational potential. Keplar's laws of planetary motion, orbital velocity of satellite, escape velocity, geo-stationary satellite.

Unit VII **Properties of Bulk Matter** **[Periods: 13]**

Elastic behavior, stress-strain relationship, Hooke's law; Young modules, bulk modulus, shear modulus of rigidity, Poison's ratio; elastic energy. Hydrostatic pressure due to a fluid column ; Pascal's law and its applications [hydraulic lift, hydraulic brakes].

Thermal physics – heat, temperature; thermal expansion of solids, liquids and gases; ideal gas laws, isothermal and adiabatic processes; anomalous expansion and its effect on marine life. Specific heat- calorimetry, change of state, latent heat, Cp, Cv.

Heat transfer – conduction, convection and radiation. Newton's law of cooling, green house effect, thermal conductivity.

Unit VIII **Thermodynamics** **[Periods: 06]**

Thermal equilibrium, zeroth law of thermodynamics – definition of temperature. Heat, work and internal energy, first law of thermodynamics.

Unit IX **Behaviour of Perfect Gas and Kinetic Theory** **[Periods: 07]**

Equation of state of a perfect gas, work done in compression and expansion of a gas. Kinetic theory of gases-assumptions, concept of pressure, kinetic energy and temperature. RMS speed of gas molecules.

Unit X **Oscillations** **[Periods: 05]**

Periodic motion – period, frequency; displacement as a function of time. Simple harmonic motion [SHM]; restoring force and force constant. Simple pendulum, free, damped and forced vibration, resonance.

Question Pattern [Class XI]

Units	Titles	MCQ [1 Mark] question [1 mark]	Very short answer type [2 marks]	Short answer type question question [3 marks]	Long answer type marks	Total
I	Physical World & Measurement	1 x 1	1 x 1			02
II	Kinematics		1 x 1		3 x 1	04
III	Laws of Motion	1 x 1			3 x 1	04
IV	Work, Energy & Power		1 x 1	2 x 1		03
V	Motion of System of Particles	1 x 1	1 x 1	2 x 1		04
VI	Gravitation	1 x 1		2 x 1		03
VII	Properties of Bulk Matter			2 x 1	3 x 1	05
VIII	Thermodynamics	1 x 2	1 x 1			03
IX	Behaviour of perfect gas & Kinetic Theory of Gases	1 x 1	1 x 2			03
X	Oscillations	1 x 1	1 x 1	2 x 1		04
	TOTAL NO.OF QUESTIONS	**08**	**08**	**05**	**03**	**35**

- MCQ should have 4 options with only one correct answer
- Alternative questions should be from the same unit
- For short answer type questions marks [2] should be divided into smaller parts like 1+1
- For long answer type questions marks [3] should be divided into smaller parts like 1+2 or 1+1+1.

Option Pattern

Sl No.	Question Pattern	No. of Options
01	Very short answer type questions	At least 5
02	Short answer type questions	At least 4
03	Long answer type questions	3

Group B (Chemistry)

Full Marks: 35 **Total number of periods : 72**

Unit wise distribution of Periods and Marks

	Unit	No. of Periods	Marks
	I	07	03
	II	10	05
	III	09	04
	IV	08	04
	V	10	05
	VI	10	05
	VII	10	05
	VIII	08	04
Total	**08**	**72**	**35**

Unit I : Scope And Chemical Arithmetic

A. Scope Of Chemistry

Chemical industries [including small scale industries]

1) Inorganic chemical industries 2) Organic chemical industries 3) Pharmaceutical industries. Brief mention of chemical industries in India

B Chemical Equation

Its significance. Mole and molar mass equivalent weight. Weight – weight, weight – volume, volume – volume calculations.

C Percentage composition, empirical formula, molecular formula – including problems.

Unit II

A. Extranuclear Structure Of Atom

Orbital, sub shell, shell. Quantum numbers [n, l, m, s]. Pauli exclusion principle, Hund's rule of maximum multiplicity. Auf – bau principle. Ground state electronic configuration of atoms.

B. Classification Of Elements And Periodicity In Properties

Modern periodic law and present form of periodic table

S – block and P – block elements. Periodic trend of the elements – atomic radii, ionization enthalpy, electron – gain enthalpy, electronegativity

C. Chemical Bonding And Molecular Structure

Ionic bond, covalent bond, bond parameters [bond length, bond strength and directional character of covalent bond]. Hybridization involving *s* and *p* orbitals and shapes of some simple molecules – methane, ethane, ethylene, $BeCl_2$, BF_3. Hydrogen Bond: intermolecular and intramolecular.

Unit III

A. States Of Matter

Gaseous State Of Matter

Boyle's Law Charle's Law, Gay Lussac's Law, Avogadro's Law, Ideal Gas Equation, Universal Gas Constant – its unit, numerical problems. Liquification of gases

Liquid State Of Matter

Vapour pressure, viscosity, surface tension [qualitative idea only]

B. Thermodynamics System

Types of system – open, closed, isolated [definition with example] Work, heat, energy, extensive and intensive property, First Law of Thermodynamics – internal energy and enthalpy $\blacktriangle Q = \blacktriangle H + P \blacktriangle V$ [deduction not required]Entropy and Gibbs Free Energy. Second Law of Thermodynamics. Significance of the relation $\blacktriangle G = \blacktriangle H - T\blacktriangle S$

Unit IV : Equilibrium And Acidimetry – Alkalimetry

A. Dynamic nature of equilibrium

Law of Mass Action. Equilibrium constant, factors affecting equilibrium, Le Chatelier Principle – simple application.

B. Ionic product of water

pH and pH scale. Buffer solution [definition with example of acid and basic buffer solutions]

Universal pH paper and universal indicator. Simple calcul tion of pH.

C. Acidimetry And Alkalimetry

Normal and molar solution. Neutralization reaction. Indicator and choice of indicator $S_1V_1 = S_2V_2$

Unit V

A. Hydrogen

Large scale preparation[no technical details]. Uses

B. Water

Natural water: hard water and soft water. Expression of hardness of water. Estimation of hardness of water. Water for injection. Important water quality parameters and their significance: total dissolved solid [TDS], dissolved oxygem [DO] BOD, COD. Water purifiers. Rain – water harvesting

C. Hydrogen Peroxide

Preparative reaction. Anti – chlor, bleaching and anti – bacterial property. Volume strength of hydrogen peroxide; stability and preservation. Uses.

D. Preparation And Uses Of

Sodium carbonate, sodium hydroxide, calcium oxide, bleaching powder, borax, industrial use of limestone.

Unit VI : Organic Chemistry And Organic Compounds

Introduction

A. Detection of elements present in organic compounds [N, S. Cl]. Estimation of nitrogen [Kjeldahl's Method]. Classification of organic compounds. IUPAC nomenclature

B. Alkanes

Physical properties :

Chemical properties: combustion and substitution reaction [reaction of methane with chlorine in diffused sunlight].Uses

C. Alkenes

Methods of preparation:

By dehydration of alcohol and dehydro – halogeneration of haloalkanes.

Physical properties:

Chemical properties – Addition Reactions [hydrogenation, hydration and addition of bromine], addition of HBr to propene – Markownikoff and Anti Markownikoff addition. Uses

D. Alkynes

Preparation by dehydrohalogenation of vicinal – dihalides.

Physical properties

Chemical properties – addition reaction [hydrogenation including partial hydrogenation]. Uses

E. Arenes

Introduction

Substitution reaction [Nitration, Friedel – Crafts alkylation and acylation reaction of benzene]. Uses and health hazards of benzene, xylenes.

Unit VII

A. Fuels

Definition, characteristics of ideal fuel. Domestic and industrial importance of fuel. Calorific value of fuels. Solid Fuel, Liquid fuel: Petrol, Kerosene, Diesel, Biofuel. Gaseous Fuel : Hydrogen, natural gas, coal gas, petrol gas, biogas, LPG, CNG. Important properties of liquid fuels: viscosity, flash point, fire point, octane number, cetane number, knocking and anti knocking properties.

B. Petrochemicals

Some important primary petrochemicals and their uses

C. Lubricants

Lubrication, lubricants, solid, liquid and semi fluid lubricants.Important properties of lubricating oil, additives.

Unit VIII

A. Environmental Chemistry

Introduction [Environment and Pollution]

B. Air Pollution

Tropospheric Pollution

Common solid particulates, liquid and solid pollutants – their sources. Smog – photochemical smog. Selected smog species – their sources. PANS – their significance (a) Acid Rain – atomospheric formation of nitric acid and sulfuric acid (b) Green House Gases – green house effect, global warming: danger and control. Stratospheric pollution. Ozone layer and its depletion

Water Pollution

Surface water – major pollutants and their sources [domestic, agricultural, industrial]Ground water – arsenic and fluoride in ground water. Arsenic determination in ground water [simple idea]. Status of arsenic and fluoride in ground water of West Bengal.

Soil Pollution

Major pollutants and their sources. Environmental pollution control strategy

Practical

Physics

Full marks: 15 **Total No. of Periods = 36**

Every student has to perform at least 5 (Five) experiments out of the list of following experiments and to carry out one project under the guidance of teacher.

List of Experiments

1) To determine the volume of the material of a hollow cylinder by slide calipers.
2) To measure the radius of curvature of a spherical surface by spherometer.
3) To determine specific gravity of granular substance soluble in water using specific gravity bottle.
4) To measure the Young's modulus of the material of a wire.
5) To find the force constant of a helical spring by plotting a graph between load and extension.
6) To study the variation of volume with pressure for a sample of air at room temperature by plotting graph between P and V and hence to verify Boyle's law.
7) To draw L-T^2 curve by determing time period of a simple pendulum for at least five different effective lengths and to find the value of the acceleration due to gravity.
8) To study the relationship between the temperature of a hot body and time by plotting a cooling curve.

Marks Distribution

01	One experiment is to be performed	06 marks
02	Practical record	02 marks
03	Project	05 marks
04	Viva voce on experiment and project	02 marks
	Total	15 marks

Chemistry

Full marks: 15 **Total No. of Periods = 36**

A. Introduction to Chemical Laboratory

General Acquaintance with The Laboratory

1 Entrance and exit. Solid and liquid reagent racks. Concentrated acid rack. Disposal of solid and liquidwastes. General precautions [A chart should be hanged at a convenient place in the laboratory]

2 Acquaintance with Bunsen burner with fuel source / spirit lamp / LPG burner [whichever is used the laboratory]. Lighting the burner. Luminous and non-luminous flames. Controlling the flame height. Strike back – its remedy. Turning off the burner when not required. **2 Periods**

B. Actual Experiements

Expt 1

1.1 To cut glass – rod and glass-tube into two different lengths

1.2 To bend glass-tubes in different angles

1.3 To draw a jet

1.4 To bore a cork [both velvet and rubber corks]

Expt 2

To compare pH values of 0.1M HCl, 0.1M CH_3COOH, 0.1M NaCl and 0.1M NaOH solution by universal pH paper or universal indicator.

expt 1 & expt 2 : 6 Periods

Expt 3

To estimate dissolved oxygen [DO] in water

Expt 4

To estimate total hardness of water by EDTA.

expt no. 3 & expt no. 4 : 6 Periods

Expt 5 Qualitative Analysis Of An Inorganic Salt

To identify the basic radical and the acid radical present in a single salt sample by systematic analysis. The salt should be water or dilute hydrochloric acid soluble containing one basic radical and one acid radical from the following lists:-

Basic Radicals

Cu^{2+}, Fe^{2+} / Fe^{3+}, Al^{3+}, Ni^{2+}, Zn^{2+}, Ca^{2+}, Mg^{2+}, NH_4^+

Acid Radicals

Cl^-, NO_3^-, S^{2-}, SO_4^{2-}, CO_3^{2-} [The students should be acquainted with the strengths of the rack reagents. They should not waste the valuable chemicals. They should learn the art of working with small amounts of samples and reagents]. **22 Periods**

Marks Distribution

Sl. no.	Particulars	Marks
01	One of the Expts in Expt No.1 and Expt No.2 OR One of the Expts between Expt. No.3 and Expt. No.4 [standard solutions will be supplied]	2+3 5
02	Expt. No.5[Only dry and preliminary tests and confirmatory test [wet test including preparation of the solution for the wet test] for the basic and acid radicals detected are to be written. Writing of group separation table is not required.	8
03	Laboratory Note Book regularly signed by teacher [s]	2
	Total	**15**

Vocational Subjects
&
Academic Elective Subjects
Class XII

Pisciculture (PISC)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	Th=3	Practical/Project=4
Total classes per year: 252	Th=108	Practical/Project =144
Total marks: 100	Th= 50	Practical = 40 Project = 10

Course Contents :

Theory :

Sl. No.	Topic	No. of Periods
1.	Definition of fish and fisheries. Demand and availability of fish in our state and country.	8
2.	Classification of fish; feeding habits of important species of fish, prawn (*viz*, IMC, live fishes, exotic fishes, prawn); Induced breeding, bandh breeding.	12
3.	Principles of pisciculture, pond preparation, nursing, rearing, stocking, seed production and landing, transport, care of fish, harvesting, pond weeds and their control; pond insects and their control; composite fish culture; scampi culture, marketing.	22
4.	Integrated fish culture – paddy cum fish culture, duck cum culture, poultry/ piggery cum fish culture.	18
5.	Ornamental fish culture – definition and background, indigenous and exotic species in India, construction of aquarium, aquatic plants, physioco-chemical conditions of aquarium water, food and feeding habits of ornamental fishes, management of domestic aquarium, causes of ornamental fish mortality and control.	16
6.	Fish diseases and their treatment and control.	12
7.	Sweage fed fishery, Brackish water fishery – preparation, management and harvesting.	12
8.	Outline of fish by-products.	8

Marks Allotment :

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. ($1 \times 10 = 10$)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. ($8 \times 5 = 40$)

Practical :

Pisciculture Lab

Sl No	Topic	No. of periods
1	Identification of commercially important fishes including ornamental species	18
2	Identification of common aquatic weeds, plankton (zoo and phyto)	10
3	Identification of aquatic insects	10
4	Water and soil sample analysis - pH, CO_2, DO_2, salinity, turbidity etc.	16
5	Design and types of model fish farm	12
6	Construction of aquarium with decoration	16
7	Collection of pituitary gland and process of injection for induced breeding	12
8	Record keeping in fish farm	6
9	Economics of fish farming, bankable scheme	10
10	Visit to fish hatcheries and preparation of reports	12
11	Visit to various fish culture ponds and preparation of reports	12
12	Preparation of project on pisciculture	10

Reference Books :

1. Fish and Fisheries of India by Jhingran, V.G. (Hindustan Publishing Corporation (India), New Delhi)
2. Aquaculture: Principles and Practices by TVR Pillay (Wiley-Blackwell)
3. An Introduction to Fishes by SS Khanna and N. Kapoor (Silverline Publications, Allahabad)
4. Hand Book of Fisheries by ICAR, New Delhi.
5. Aadhunik Paddhatite Mach O Chingri Chas (in Bengali) by Subhendu Datta (Mehanati Prakashani, Hooghly)
6. Rangin Macher Projanan O Pratipalan (in Bengali) by Subhendu Datta (West Bengal Book Board, Kolkata)
7. Mach Chas (in Bengali) by B B Jana (Ananda Publisher, Kolkata)
8. Sahaj Kathai Mach Chas (in Bengali) by Biswajit Goswami (Deys Publishing, Kolkata)

Poultry Farming (POFG)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	**Th=3**	**Practical/Project=4**
Total classes per year: 252	**Th=108**	**Practical/Project =144**
Total marks: 100	**Th= 50**	**Practical = 40 Project = 10**

Course Contents:

Theory:

Sl. No.	Topic	No. of Periods
1.	**Introduction:** Definition of poultry. Role of poultry in relation to human nutrition, self employment and contribution of national economy. Status of poultry farming in West Bengal.	6
2.	**Body parts of poultry:** Morphology of poultry – cock and hen. Body systems of poultry - skeletal system, digestive system, reproductive system (male and female).	6
3.	**Breeds of poultry:** General idea about class, breed and variety of poultry; Classification of breeds of fowl; Characteristics of important breeds of fowl – RIR, New Hampshire, Australorp, White Leghorn, Light Sussex; Idea about layer and broiler chicken; Low input technology birds – Vanaraja, Gramapriya.	8
4.	**Housing of poultry:** Selection of site for poultry farm; Systems of rearing poultry– free range system, semi-intensive system, intensive system (deep litter system and cage system); Various poultry farm equipment; Ways to improve production potentiality of backyard poultry.	10
5.	**Feeds and feeding of poultry:** Principles of poultry feeding; Classification of poultry feed ingredients – energy rich ingredients, protein rich ingredients, vitamin supplements, mineral supplements, feed additives; Non-conventional poultry feed ingredients; Maximum level of inclusion of various feed ingredients in poultry ration; Different types of feeds for different categories of poultry and their requirements; Nutrient requirements and feed formulae of different types of feeds for different categories of poultry; Water requirements of poultry; Feeding systems of poultry.	16
6.	**Hatching of eggs:** Hatching or incubation; Incubation period of various poultry species; Selection of hatching eggs; Handling and care of hatching eggs; Methods of hatching – natural and artificial; Optimum conditions for artificial hatching of chicken eggs; Management of incubator for successful hatching of eggs; Testing of incubated eggs; Sexing of newborn chicks; Factors affecting hatching percentage.	12

Sl. No.	Topic	No. of Periods
7.	**Care and management of poultry:** Care and management of layer – chicks, grower and layer; Care and management of broilers; Special care of poultry during summer and monsoon.	16
8.	**Health care of poultry:** Classification of poultry diseases – bacterial, viral, protozoan, fungal, parasitic, nutritional; Important infectious diseases, their symptoms, prevention and control – Ranikhet disease, Marek's disease, Fowl pox, Gumboro disease, Infectious Bronchitis, Coccidiosis, Fowl Cholera, Bird Flu; Diagnosis of poultry diseases on the basis of symptoms and PM lesions; General preventive measures in poultry farm – vaccination schedule in broiler and layer farm	14
9.	**Eggs :** its structure, formation, grading and preservation: Gross structure of egg; How egg is formed? Grading of eggs; Preservation of eggs; Transport of eggs; Marketing of eggs; Slaughter and dressing of chicken.	8
10.	**Gneral idea about poultry species other than chicken:** Duck farming – Characteristics of duck; Duck breeds, broiler duck; Care and management, feeding and disease control of duck with special reference to Khaki Campbell duck.Quail farming – Characteristics of quail; its care and management, feeding and disease control measures.Turkey farming – Characteristics of turkey; its care and management, feeding and disease control measures.	12

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Poultry Farming Lab

Sl. No	Topic	No. of periods
1	Study of external body parts of chicken	2
2	Identification of various species and breeds of poultry	6
3	Study various systems of rearing poultry	6
4	Preparation of deep litter house	4
5	Study of equipment used in poultry farm	2

Sl. No.	Topic	No. of periods
6	Identification of different feed ingredients and preparation of concentrate mixture for poultry	2
7	Calculation of feed requirements of chicks, growers, layers and broilers, and calculation of FCR of broiler chicken	4
8	Selection of eggs for hatching	2
9	Study of incubator and other hatchery equipment	6
10	Day to day management of incubator for artificial hatching of eggs	4
11	Care of newborn chicks and packing before marketing	4
12	Practice of natural hatching – care of broody hen	2
13	Brooding of chicks	4
14	Feeding and watering of chicks, growers and layers	6
15	Feeding and watering of broiler starters and broiler finishers	6
16	Practice of vaccination of poultry	6
17	Practice of routine medication in poultry farm – use of vitamins, mineral supplements, liver tonics, anticoccidials.	8
18	Practice of culling	2
19	Structure of egg	4
20	Study of egg quality, candling and grading of eggs	4
21	Practice of egg preservation by different techniques	4
22	Packing of eggs and familiarizing with local marketing channels of poultry and poultry products	4
23	Slaughter and dressing of chicken	6
24	Calculation of dressing yield, hen day egg production and hen housed egg production	6
25	Various activities of duck rearing with special reference to Khaki Campbell duck	8
26	Record keeping in poultry farm	4
27	Profit and loss accounting in poultry farm	4
28	Visit to a broiler farm and preparation of report	8
29	Visit to a layer farm and preparation of report	8
30	Preparation of project on small scale poultry farming	8

Reference Books:

1. Poultry Farming (in Bengali) by Dr Nilotpal Ghosh (Kalyani Publishers, New Delhi)
2. Sahaj Kathai Vigyan Vittik Murgee Palan O Swasthya Raksha (Scientific Poultry Rearing and Health Care in Simple Language, in Bengali) by Dr Nilotpal Ghosh (Mehanati Prokashani, Hooghly)
3. Poultry Production in India (in English) by R.P. Sharma, R.N. Chatterjee, S.V. Rama Rao and S.R. Sharma (Indian Council of Agricultural Research, New Delhi)
4. Poultry Science and Practice : A Text Book (in English) by N. Ghosh (CBS Publishers & Distributors Pvt Ltd, New Delhi)
5. Poultry Production and Management (in English) by J. Prasad (Kalyani Publishers, New Delhi)
6. Poultry Production (in English) by R.A. Singh (Kalyani Publishers, New Delhi)
7. Poultry Diseases (in English) by J.L. Vegad (International Book Distributing Co., Lucknow)
8. Poultry Diseases, Diagnosis and Treatment (in English) by H.V.S. Chauhan (Wiley Eastern Ltd., New Delhi)

Animal Health Care (ANHC)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	Th=3	Practical/Project=4
Total classes per year: 252	Th=108	Practical/Project =144
Total marks: 100	Th= 50	Practical = 40 Project = 10

Course Contents:

Theory:

Sl No	Topic	No. of Periods
1.	**Introduction:** Definition of health and disease. Signs of ill health of animals. Classification of animal diseases – according to cause, body systems affected, origin of disease, intensity of disease, and spread of disease.	6
2.	**Control of animals:** Use of crate or trevis, lifting of foreleg, use of anti-cow kicker, casting, use of medicine for controlling animals.	4
3.	**Methods of drug administration:** Surface medication – ointment, spray, dipping, hot fomentation; internal routes – oral route, rectal route, vaginal route, inhalation; parenteral route or injection – intramuscular, sub-cutaneous, intra-venous; intra mammary infusion.	6
4.	**Preliminary diagnosis of diseases:** History taking, general observation and test – determination of body temperature, respiration rate and pulse rate; observation of mucus membrane of eye; observation of various organs in diseased animals; diagno-sis of diseases on the basis of symptoms; Special laboratory examinations – examination of faeces, urine analysis, examination of blood. Post mortem examination; Dispatch of specimen to laboratory.	12
5.	**Bacterial diseases:** General idea about bacteria; important bacterial diseases and their treatment and control – Haemorrhagic Septicaemia, Black Quarter, Anthrax, Brucellosis, Johne's disease, Enterotoxaemia, Pneumonia, Mastitis.	6
6.	**Viral diseases:** General idea about virus; important viral diseases and their treatment and control – Foot and Mouth Disease (FMD), PPR, Orf, Goat pox, Hog cholera, Rabies, Ranikhet disease, Gumboro disease, Fowl Pox.	6
7.	**Fungal diseases:** General idea about fungus; important fungal diseases and their treatment and control – Ringworm, Aspergillosis, Aflatoxicosis.	4
8.	**Parasitic diseases:** General idea about parasites. Diseases caused by internal parasites or worm - round worms, tape worms and flukes; general symptoms and treatment and control of worm infestation; precautions for using anti-worm drugs.	12

	Diseases caused by ectoparasities – fly, lice, ticks, mites; use of ectoparasiticide drugs. Protozoan diseases – Babesiosis, Theileriasis, Trypanosomiasis, Coccidiosis.	
9.	**Common diseases and their first aid treatment:** Fever, Diarrhoea, Constipation, Colic, Tympany or Bloat, Metritis, Retention of placenta, Prolapse of uterus and vagina, Anoestrus, Repeat breeding, Milk fever, Burns, Wounds, Broken horn, Poisoning, Snake bite, Allergy, Anorexia, Anaemia, Arthritis, Sprain, Cracked teats, Yoke gall, Epistaxis.	12
10.	**Common measures for preventing animal diseases:** Proper care and management, regular deworming, control of ectoparasites, prevention of infectious diseases. Vaccines and vaccination – vaccination schedule for cattle, buffalo, goat, sheep, pig, poultry.	8
11.	**Veterinary Pharmacy:** General idea about prescription, Abbreviations commonly used in prescription, Relationship between various weights and measures. Various doses form. Formula of some drugs and their uses – Tincture iodine, Lugol's iodine, Skin bath (1-2% Gention violet), Common antiseptics (Mercurochrome, Potassium permanganate, Hydrogen per-oxide, Boric acid, Cetavlon), Mouth wash (1% alum, 1:2000 Potassium permanganate, 2-3% Borax), Disinfectants (Phenol, Formalin, Bleaching powder), Boro-Zinc lotion, Appetizer, Antibloat, Diuretic, Laxative, Astringent, Carminative.	12
12.	**Medicines and vaccines used in veterinary practice:**Common allopathic veterinary medicines - antibiotic, sulphonamide, deworming agents, vitamin supplements, mineral supplements, antihistaminics, steroid, rumenotoric, electrolytes, antipyretics, analgesic, anti-inflamatory, ectoparasiticides. Few examples of generic names and trade names of such medicines, their uses and doses. Medicines used in eye/ear. Medicines used in skin disease. Ayurvedic/Herbal veterinary medicines – Digestive and appetizer, liver tonic, antidiarrhoeal, uterine tonic, medicines used in cough and cold, retention of placenta, cystitis, skin disease, ectoparasite infestation and for increasing milk production. Vaccines – commercial vaccines available against infectious diseases, their uses and doses – FMD, HS, BQ, Goat pox, PPR, Enterotoxaemia, Hog cholera, Rabies, RD, Gumboro disease, Fowl pox.	20

Marks Allotment :

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1 x 10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8 x 5 = 40)

Practical :

Animal Health Care Lab

Sl No.	Topic	No. of periods
1	Control of animals – use of crate, lifting of fore leg, use of anti-cow kicker or English-8-knot, casting	6
2	Recording of body temperature, respiration rate, pulse rate and ruminal motility of cattle	6
3	Weighing of animals and birds	4
4	Washing, grooming and cleaning of animals	4
5	Methods of administration of medicines– drenching, injection (IM, SC, IV)	8
6	Methods of vaccination – oral, nasal/ocular drop, subcutaneous injection	4
7	Dipping and Spraying	4
8	Castration of calf/goat by Burdizzo's castrator	8
9	History taking and recording of symptoms	6
10	Methods of examination of different body systems	8
11	Collection of materials like urine, faeces, skin scrapings, blood, serum, milk for laboratory tests	8
12	Preparation of blood slides	4
13	Microscopic examination of faecal samples	6
14	Attending normal cases of parturition	4
15	Demonstration of PM examination	8
16	Study of various parts of a prescription and prescription serving	6
17	Study of common appliances used in veterinary practice	6
18	Study of different doses forms – tablet, bolus, capsule, powder, solution,tincture, mixture, ointment, intra-mammary infusion, injection.	8
19	Study of common medicines and feed supplements	14
20	Visit to Block Animal Health Centre and preparation of reports	8
21	Visit to Animal Health Camp and preparation of reports	8
22	Preparation of project on Establishment of First Aid Unit for Animal Health Care	6

Reference Books :

1. Unnata Prathai Pashu Palan O Pashu Chikitsa (Animal Production, Diseases and Treatment, in Bengali) by Dr Nilotpal Ghosh (Kalyani Publishers, New Delhi)
2. Essentials of Veterinary Practice (in English) by D. Jana and N. Ghosh (Daya Publishing House, Delhi)
3. Hand Book of Veterinary Practitioners (in English) by S.K. Das (Kalyani Publishers, New Delhi)
4. A Handbook for Veterinary Physician (in English)V A Saprae (International Book Distributing Co., Lucknow)
5. Veterinary Pharmaceuticals (in English), B. Prasad (CBS Publishers & Distributors Pvt. Ltd., New Delhi)
6. Infectious diseases of animals, their identification and treatment (in English) by S. Nandi (New India Publishing Agency, New Delhi)
7. Textbook of Clinical Veterinary Medicine (in English) by Amalendu Chakrabarty (Kalyani Publishers, New Delhi)

Dairy Farming (DAFG)
Class XII

Total no. of weeks for classes / Year:	36		
Classes per week: 7	Th=3	Practical/Project=4	
Total classes per year: 252	Th=108	Practical/Project =144	
Total marks: 100	Th= 50	Practical = 40	Project = 10

Course Contents:

Theory:

Sl.No.	Topic	No. of Periods
1.	**Introduction:** Definition of Dairy Farming. Role of Dairy Farming in relation to human nutrition, self employment and contribution to national economy of India. Important dairy animals in India. Population of cattle & buffalo and milk production statistics. Demand and availability of milk in our state and country.	6
2.	**Breeds of cattle and buffalo:** Name of recognized indigenous breeds of cattle and buffalo in India. Name of exotic breeds of cattle experienced in India for milk production. Classification of indigenous cattle breeds according to utility (milch, draught and dual purpose). Origin, characteristics and production capabilities of important cattle and buffalo breeds – Sahiwal, Red Sindhi, Gir, Jersey, Holstein Friesian, Murrah, Surti, Mehsana. Suitable breeds of cattle in West Bengal.	16
3.	**Reproduction:** Reproductive system of cow and bull – an overview. Composition of bull semen. Estrous cycle. Age at first mating and pregnancy period of cattle and buffalo; Pregnancy diagnosis; Forecasting of expected date of calving; Parturition – mechanism of parturition, care and management of cow during parturition. Artificial Insemination (AI) – definition, advantages and disadvantages. Steps of AI – collection, evaluation, dilution and preservation of semen. Technique and procedure of AI with frozen semen, precautions; Transport of semen; Equipment needed for AI; Care of biological cryocan.	16
4.	**Feeds and feeding:** Digestive system of cattle – an overview, digestion and absorption. Roughages and concentrates – examples. Proximate analysis of feeds. Cultivation of fodder crops–maize, jowar, berseem, lucerne, rice bean, hybrid napier, para grass; Supply of fodder throughout the year. Conservation of fodder – hay and silage. Hay making - suitable fodder crops, method. Silage preparation – suitable fodder crops, method of silage making. Some unconventional cattle feeds. Preparation of concentrate mixtures for dairy animals. Feeding schedule of calf, heifer, cow, bull.	16

Sl.No.	Topic	No. of Periods
5.	**Housing:** Types of dairy cattle housing – loose housing system and conventional barn, floor space requirements for cow, heifer, calf, bull. Ideal cowshed – constructional details; ancillary structures in dairy farm. Cleaning and sanitation of dairy farm, conservation and utilization of dung and urine – organic manure, gobar gas.	10
6.	**Care and management:** Care and management of various stages of cattle-calf, heifer, cow	14
7.	**Maintenance of health of dairy animals:** Health and disease, classification of various cattle diseases – viral, bacterial, parasitic, nutritional. Common infectious diseases – FMD, Haemorrhagic Septicaemia, Black Quarter, Anthrax, Brucellosis, Mastitis; Prevention and control of infectious diseases – routine vaccination schedule. Prevention and control of parasitic diseases- routine deworming schedule. Common health problems and their first aid treatment – fever, diarrhoea, tympany, retention of placenta, milk fever, cuts and wounds, fracture of horn, anorexia, sprain, cracked teat, epistaxis.	16
8.	**Lactation, milk and milk products:** General idea about udder and teat. Physiology of milk secretion. Let-down of milk. Composition of cow milk, buffalo milk, toned milk and double toned milk. Legal standards. Factors affecting yield and quality of milk. Clean milk production. Storage and transport of milk.Common milk products – butter, ghee, *dahi*, *chhana*, *paneer*, *khoa*, milk powder. Preparation of milk based sweets – *rosogolla*, *sandesh*, *misti doi* and *chhana podo*. Common bacteria present in milk; diseases transmitted through milk. Marketing of milk and milk products.	14

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Dairy Farming Lab

Sl.No.	Topic	No. of Periods
1	Study of external body parts of cow	2
2	Study of breed characteristics of dairy animals– Sahiwal, Red Sindhi, Gir, Jersey, Holstein Friesian, Murrah	8
3	Layout of houses for dairy animals – conventional housing and loose housing	4

Sl.No.	Topic	No. of Periods
4	Identification of feeds and fodder	4
5	Computation of ration by thumb rule	2
6	Feeding of calf, heifer and cow	6
7	Hay making	4
8	Silage making	4
9	Detection of heat	2
10	Preparation of artificial vagina	4
11	Demonstration of semen collection	8
12	Demonstration of AI	8
13	Attending of calving	4
14	Attending of newborn calf	4
15	Cleaning and disinfection of cowshed	4
16	Disposal of farm waste	4
17	Study of common appliances used in dairy farm	4
18	Grooming of animals	2
19	Marking of animals – tagging, branding, tattooing	4
20	Cleaning and sterilization of dairy utensils	2
21	Milking of animals and care of udder	4
22	Handling of milk	2
23	Field test to evaluate bacteriological quality of milk	4
24	Determination of common milk adulterants – glucose, cane sugar, starch	4
25	Determination of fat percentage of milk	4
26	Determination of SNF of milk	4
27	Methods of administration of drugs	4
28	Record keeping in dairy farm	2
29	Profit loss accounting in dairy farm	4
30	Study of marketing channels of milk and milk products	4
31	Visit to AI centre and preparation of report	8
32	Visit to dairy farms (small household farm, large organized dairy farm) and preparation of reports	10
33	Preparation of project on Small Scale Dairy Farming	6

Reference Books :

1. Sahaj Kathai Vigyan Vittik Go-Palan O Swasthya Raksha (Scientific Cattle Rearing and Health Care in Simple Language, in Bengali) by Dr. Nilotpal Ghosh (Mehanati Prokashani, Hooghly)
2. Unnata Prathai Pashu Palan O Pashu Chikitsa (Animal Production, Diseases and Treatment, in Bengali) by Dr. Nilotpal Ghosh (Kalyani Publishers, New Delhi)
3. Dairy Bovine Production (in English) by C.K. Thomas and N.S.R. Sastry (Kalyani Publishers, New Delhi)
4. Dairy Animal Production (in English) by B. Roy (New Indian Publishing Agency, New Delhi)
5. Dairying in India (in English) by H.C. Gupta (Kalyani Publishers, New Delhi)
6. Livestock Production Management (in English) by N.S.R. Sastry and C.K. Thomas (Kalyani Publishers, New Delhi)
7. Animal Husbandry and Dairy Science (in English) by J. Prasad and S.R. Vinita Abraham (Kalyani Publishers, New Delhi)
8. Hand Book of Animal Husbandry (in English) by Indian Council of Agricultural Research, New Delhi.

Goatery & Piggery (GOPG)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	**Th=3**	**Practical/Project=4**
Total classes per year: 252	**Th=108**	**Practical/Project =144**
Total marks: 100	**Th= 50**	**Practical = 40 Project = 10**

Course Contents:

Theory:

Sl. No.	Topic	No. of Periods
A.	**Goatery**	
1.	**Introduction:** Definition of goatery. Why goat is called ' poor man's cow'? Importance of goatery in human nutrition, self employment and economic progress.	4
2.	**Breeds of goat:** Name of recognized indigenous breeds of goat. Classification of Indian goat breeds according to utility (meat, milk, fibre, dual) and regional distribution. Name of exotic breeds of goat experienced in India. Characteristics and production capabilities of important goat breeds – Black Bengal, Jamunapari, Barbari, Beetal, Surti, Osmanabadi. Suitable breed of goat in West Bengal	6
3.	**Reproduction:** Reproduction characteristics of goat – estrous cycle, signs of estrus, gestation period, age at first mating, pregnancy diagnosis, litter size. Selection of doe. Selection of breeding buck. Breeding of goat.	8
4.	**Feeds and feeding of goat:** Digestive system of goat – its various organs and their functions. Roughages and concentrates for goats. Water requirements of goat. Fodder cultivation for goat. Practical feeding of newborn kids, growing kids, pregnant and lactating goat, breeding buck.	8
5.	**Goat housing:** Systems of goat keeping – extensive, semi-intensive, intensive, tethering. Space requirements for different categories of goats. Design of goat shed. Rearing of goat in free grazing pasture.	6
6.	**General management practices:** Salient features of care and management of various stages of goats – care of newborn kids, care of she-goat during pregnancy and parturition, care of lactating goat, and care of breeding buck. Routine goat farm operations –Identification, Ageing, Castration of male kids, Dehorning, Weighing, Administration of medicines.	12

Sl. No.	Topic	No. of Periods
7.	**Maintenance of goat health:** Important goat diseases – Goat pox, Pneumonia, Enterotoxaemia, PPR, Orf, Lice infestation, Worm infestation, Bloat. General health control measures – regular deworming, control of ectoparasites, vaccination against dreadful diseases, care of sick goats.	10
B.	**Piggery**	
1.	**Introduction:** Definition of piggery. Role of piggery in human nutrition, self employment and economic progress.	4
2.	**Breeds of pig:** Name of recognized indigenous breeds of pig. Name of exotic breeds of pig experienced in India and their classification according to origin. Characteristics and production capabilities of important pig breeds – Ghoongroo, Large White Yorkshire, Middle White Yorkshire, Berkshire, Hampshire, Landrace. Suitable breeds of pig in West Bengal.	6
3.	**Reproduction:** Reproduction characteristics of pig – estrous cycle, signs of estrus, gestation period, age at first mating, farrowing, litter size. Selection of sow. Selection of breeding boar. Genetic improvement of non-descript pigs – grading up, cross breeding.	8
4.	**Feeds and feeding of goat:** Common feed ingredients for pig feed. Preparation of feed for different categories of pigs. Water requirements of pigs. Examples of cheap feed for homestead piggery. Pasture grazing of pig. Practical feeding of pigs.	8
5.	**Pig housing:** Space requirements for different categories of pigs. Design of pig shed. Special provision in farrowing pen to prevent trampling by mother. Cleaning and sanitation of pig shed.	6
6.	**General management practices:** Salient features of care and management of various stages of pigs – care of piglets, care of sow during pregnancy and parturition, care of breeding buck, and care of fattening pigs. Routine pig farm operations – Identification, Weaning, Castration, Cutting of needle teeth, Creep feeding. Daily work schedule in a pig farm.	12
7.	**Maintenance of goat health:** Normal physiological conditions of pigs – body temperature, respiration rate, pulse rate. Classification of pig diseases. Important pig diseases – Hog cholera or Swine fever, FMD, Swine erysipelas, Navel ill, Worm infestation, Piglet anaemia, Piglet enteritis, Hypoglycaemia of piglets. General health control measures – sanitation and hygiene, regular deworming, regular vaccination against dreadful diseases	10

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Goatery & piggery lab

Sl. No	Topic	No. of periods
	A. Goatery	
1	Study of external body parts of goat	2
2	Determination of body weight of goat by spring balance	2
3	Estimation of age of goat by dentition	2
4	Recording of rectal temperature, respiration rate, pulse rate and ruminal motility of goat	2
5	Identification of various breeds of goat	4
6	Selection of breeding buck and doe	4
7	Breeding of goat and reducing inbreeding depression	2
8	Methods of identification of goats – tattooing, ear tagging, neck tagging	4
9	Study of common feed ingredients and fodders	2
10	Feeding of goat along with pasture grazing	2
11	Preparation of concentrate mixture for supplementary feeding of goat	2
12	Preparation of goat shed, space requirements	4
13	Care of she-goat during pregnancy	2
14	Care of she-goat during parturition	2
15	Care of newborn kids	2
16	Castration of male kids by Burdizzo's castrator	2
17	Care of castrated kids for fattening	2
18	Routine deworming of goats	2

Sl. No.	Topic	No. of periods
19	Routine vaccination of goats	4
20	Use of ectoparasiticides for goats	2
21	Use of vitamin and mineral supplements for goat	4
22	Record keeping in goat farm	2
23	Profit loss accounting	4
24	Visit to goat farm and preparation of report	8
	B. Piggery	
1	Study of external body parts of pig	2
2	Identification of different breeds of pigs	4
3	Recording of rectal temperature, respiration rate and pulse rate of pig	2
4	Selection of breeding boar and sow	4
5	Identification of pigs	2
6	Preparation of pig sty, space requirements	4
7	Study of common feed ingredients for pigs	2
8	Preparation of concentrate mixtures for piglets, growers and adult pigs	2
9	Study of ready made pig feeds available in the market	2
10	Feeding schedule for pigs	4
11	Care of gilt/sow during pregnancy	2
12	Attending of farrowing	2
13	Care of newborn piglets	2
14	Care of breeding boar	2
15	Routine deworming procedure	2
16	Routine vaccination technique	4
17	Use of vitamin and mineral supplements	2
18	Cleaning and disinfection of piggery	2
19	Demonstration of pig slaughter and handling of slaughtered pig	2
20	Record keeping in piggery	2
21	Profit loss accounting	4
22	Visit to pig farm and preparation of report	8
23	Visit to bacon factory and preparation of report	8
24	Preparation of project on small scale goat farming and piggery	6

Reference Books:

1. Unnata Prathai Chhagol Palan O Chikitsa (Goat Production, Diseases and Treatment, in Bengali) by Dr. Nilotpal Ghosh (Kalyani Publishers, New Delhi)
2. Goat Production and Health Management (in English) by S.K. Jindal (New India Publishing Agency, New Delhi)
3. Village based goat meat production in Asia (in English) by A. Quartermain and N.K. Bhattacharya (Oxford & IBH Pub. Co. Pvt .Ltd., New Delhi)
4. Sahaj Kathai Vigyan Shukor Palan O Swasthya Raksha (Scientific Pig Rearing and Health Care in Simple Language, in Bengali) by Dr. Nilotpal Ghosh (Mehanati Prokashani, Hooghly)
5. Swine Production (in English) by D.P. Sharda (Indian Council of Agricultural research, New Delhi)
6. Swine Production and Health Management (in English) by U. Dimri (New India Publishing Agency, New Delhi)
7. Goat, Sheep and Pig Production and Management (in English) by J. Prasad (Kalyani Publishers, New Delhi)
8. Sheep and Goat diseases (in English) by P.B. Mathur and S.C. Dubey (Indian Council of Agricultural Research, New Delhi)

Processing And Preservation of Fruits & Vagetables (PPFV)
Class XII

Total no. of weeks for classes / Year: 36			
Classes per week: 7	Th=3	Practical/Project=4	
Total classes per year: 252	Th=108	Practical/Project =144	
Total marks: 100	Th= 50	Practical = 40	Project = 10

Course Contents:

Theory:

Sl.No.	Topic	No. of Periods
1.	Definition of preservation. Necessity for preservation	8
2.	Utility of fruits and Vegetable processing	6
3.	Commercial potentiality of processing Industries	6
4.	Principles and methods of preservation of fruits and Vegetables	12
5.	Preparation Procedure of Processed fruits and vegetables – Juice, Squash, Jam, Jelly, Sauce, Pickle	30
6.	Necessity of Preservation to control spoilage of fruits and Vegetables	6
7.	Bottling and Packaging	4
8.	Creation of self employment potentiality through processing and Preservation	6
9.	Infrastructure development of fruits processing industries	6
10.	Post harvest management of fruits and vegetables- maturity indices, harvesting, grading, packaging, transportation and storage	10
11.	Market preparation for fruits and vegetables	4
12.	Ripening changes in fruits and delaying ripening processes	6
13.	General concept of quality and control	4

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Processing And Preservation of Fruits & Vagetables Lab

Sl. No	Topic	No. of periods
1	Identification of processing equipments	10
2	Preparation of processed fruits and vegetables products - squash, jelly, pickle, tomato ketchup, dehydration etc.	70
3	Visit and training in processing units	24
4	Market survey on packaging of fresh fruits and vegetables	16 (2×8)
5	Survey on Market availability of different processed products	8
6	Preparation of label for processed products.	6
7	Preparation of project on establishment of a unit for processing and preservation of fruits and vegetables	10

Reference Books :

1. Khadya Samrakshan O Prakriakaran (in Bengali) by Archak Gupta (Mehanati Prakashani, Hooghy)
2. Fruit and Vegetable Preservation: Principles and Practices (in English) by RP Srivastava and Sanjeev Kumar (International Book Distributing Company, Lucknow)
3. Ghare Karo Shilpa Garo (in Bengali) by Tilak Bandyopadhyay (Paschim Bango Rajya Pustak Parshad, Kolkata)

Prodution of Fruits (POFR)
Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	Th=3	Practical/Project=4
Total classes per year: 252	Th=108	Practical/Project =144
Total marks: 100	Th= 50	Practical = 40 Project = 10

Course Contents:

Theory:

Sl. No.	Topic	No. of Periods
1.	Importance of fruits on nutrition	10
2.	Selection of land; Area identification; Land preparation	10
3.	lay out of orchard and different methods of planting	10
4.	Outline of propagation of fruit crops (sexual and asexual)	12
5.	Fertilizer application and planting	10
6.	Cultivation of some important fruits: mango, litchi, banana, sweet orange, mandarin orange, citrus, pineapple, guava, strawberry and coconut (in respect of varieties, propagation, climate and soil, spacing, nutrient requirement, inter culture operation, pests and disease)	24
7.	Harvesting, washing and cleaning, sorting, grading; Packaging, transportation. Storage	10
8.	Ripening: Changes during ripening , ripening treatments and delaying ripening methods	10
9.	General concept of high density planting 6	
10.	Economics of fruit production	6

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Plant Health Management Lab

Sl. No	Topic	No. of periods
1	Layout and land preparation	20
2	Different methods of propagation	20
3	Different methods of planting	14
4	Nutrient application, irrigation, drainage, and other intercultural operations	25
5	Control of disease and insect pests	15
6	Harvesting, cleaning, packing, storage considerations	30
7	Ripening and delaying ripening processes	10
8	Preparation of project on fruit production	10

Reference Books:

1. Fruit Physiology and Production (in English) by Amar Singh (Kalyani Publishers, New Delhi)
2. RakamariPhaler Chas O Rog PokaNiyantran (in Bengali) by SuvadeepNath and MithunSaha (MehanatiPrakashani, Hooghly)
3. BigyanbhittikPhool, Phal Sabji Chas (in Bengali) by Hrikrishna Dey (KrishiBitan, Kolkata)
4. AdhunikPrajuktitePhasal Chas (Phool O Phal) (in Bengali) by Hrikrishna Dey (KrishiBitan, Kolkata)
5. Bharatiya Phal (in Bengali) by Ranjit Singh (National Book Trust, India)
6. Paschimbanger Phal Chas (in Bengali) by Md. Golam Rahaman (Asoke Pustakalaya, Kolkata)
7. AdhunikPadhdhatite Phal Chas (in Bengali) by Dr. Bimala Kinkar Jana and Arobinda Ghosh (Deys Publishing, Kolkata)
8. Bigyanbhittik Phaler Chas (in Bengali) by Tapas Kr. Chattopadhyay, Bibhas Chandra Majumdar and Aloke Nandi (Central Book Publishers, Kolkata)

Prodution of Vegetables (POVG)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	**Th=3**	**Practical/Project=4**
Total classes per year: 252	**Th=108**	**Practical/Project =144**
Total marks: 100	**Th= 50**	**Practical = 40 Project = 10**

Course Contents:

Theory:

Sl. No.	Topic	No. of Periods
1.	Importance of vegetables in our daily life	10
2.	Selection of land; area identification; land preparation	14
3.	Seed and Seedling- source; nursery practices, seed and seedling preparation	10
4.	Preparation of field, lay out and transplanting of vegetable crops	10
5.	Fertilizer application, irrigation, drainage,weed control and other intercultural operations, plant protection measures against disease, insect pests and physiological disorders	14
6.	Cultivation of some important vegetable crops – Potato, Tomato, Brinjal, Chilli, Cucurbits (Bitter gourd, Pointed Gourd, Pumpkin, Bottlegourd), Bhindi, Garden Pea, Cole crops (Cabbage, Cauliflower), Onion; Leafy vegetables (Palak, Amaranthus and Dhania)	28
7.	Harvesting, washing and cleaning, sorting, grading; Packaging, transportation; Storage	16
8.	Economics of vegetable production	6

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Production of vegetables lab

Sl. No	Topic	No. of periods
1	Land preparation and lay out	24
2	Seed treatment, seed sowing and soil treatment	24
3	Raising of seedling and sapling, sowing and transplanting	24
4	Intercultural operation- irrigation, drainage, weeding, plant protection and other intercultural operations	36
5	Harvesting, cleaning, packing, storage and preparation for market	26
6	Preparation of project on Vegetable production	10

Reference Books:

1. Vegetables (in English) by B Choudhury (National Book Trust, India)
2. Sabjichas O Beej Utpadann (in Bengali) by Nrmalendu Samanta (Mehanati Prakashani, Hooghly)
3. Bigyanbhittik Phool, Phal Sabji Chas (in Bengali) by Hrikrishna Dey (Krishi Bitan, Kolkata)
4. Adhunik Paddhatite Phasal Chas (Sabji) (in Bengali) by Hrikrishna Dey (Krishi Bitan, Kolkata)
5. Sasya Baichitre Masalapatir Chas (in Bengali) by Hrishi Krishna Dey (Bharati Book Stall, Kolkata)
6. Handbook of Horticulture (in English) by Indian Council of Agricultural Research, New Delhi.

Horticultural Nursery Management (HNMG)
Class XII

Total no. of weeks for classes / Year:	36		
Classes per week: 7	Th=3	Practical/Project=4	
Total classes per year: 252	Th=108	Practical/Project =144	
Total marks: 100	Th= 50	Practical = 40	Project = 10

Course Contents:

Theory:

Sl.No.	Topic	No. of Periods
1.	Introduction: What is nursery management?	6
2.	Objective of commercial nursery	4
3.	Preparation of nursery bed	8
4.	Identification of seeds, seedling materials, fruits, Vegetables and flowers	12
5.	Land preparation, Sowing, transplanting, intercultural operation	8
6.	Preparation of media for different potted plants	8
7.	Potting and repotting of plants in different stages	8
8.	Different commercial methods of propagation layering, cutting budding, grafting, tissue culture etc	10
9.	Pruning and training practices	8
10.	Layout of annual flowerbeds rose beds, Measurements geometrical and other design.	12
11.	Layout of a nursery – in respect of building position, water supply, path, culverts, borders, planting position of hedge, edge, shrubs, wind break etc.	10
12.	Propagation from corm, rhizome, tubers, suckers.	10
13.	Dormancy of seeds: methods of breaking dormancy.	4

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Horticultural Nursery Management Lab

Sl.No.	Topic	No. of Periods
1	Preparation of land, drainage channel, seed bed , demarcation of plots and erection of fencing	20
2	Mixing of basal fertilizer	4
3	Seed treatment, seed sowing and seed bed protection	10
4	Raising of seedling, sowing and transplanting	10
5	Intercultural operation- top dressing, irrigation and crop protection, weeding	10
6	Lifting, packing and transportation of nursery stocks and cost profit ratio	10
7	Preparation and maintenance of pots – preparation of potting media, method of potting and repotting	10
8	Preparation of grafts- cutting; layering; grafting; budding etc	20
9	Propagation from corm, rhizome, tubers, suckers	10
10	Training and pruning practices	10
11	Maintenance of mother plants	10
12	Methods of breaking dormancy of seeds	10
13	Preparation of project on Establishment of Horticultural Nursery	10

Reference Books :

1. Chara Toirir Chabikathi (in Bengali) by Radhagobinda Maity
2. Phalgacher Chara Toiri (in Bengali) by Radha Gobindo Maiti (Bharati Book Stall, Kolkata)
3. Fruit physiology and Production (in English) by Amar Singh (Kalyani Publishers, New Delhi)

Floriculture And Medicinal & Aromatic Plants (FMAP)
Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	**Th=3**	**Practical/Project=4**
Total classes per year: 252	**Th=108**	**Practical/Project =144**
Total marks: 100	**Th= 50**	**Practical = 40 Project = 10**

Course Contents:

Theory:

Sl. No.	Topic	No. of Periods
1.	Introduction, scope and importance of commercial floriculture and medicinal and aromatic plants, Use of various medicinal and aromatic plants.	10
2.	Basic concepts of annual, bi-annual, perennial and seasonal flowers	6
3.	Concept of indoor plants & Ornamental Plants	10
4.	Commercial propagation of flowering plants; Different methods of raising seedlings, cutting, grafting, budding and layering.	14
5.	Cultivation of commercial flowers; Tuberose, Gladiolus, Gerbera, Marigold, Chrysanthemum, Dahlia, Anthurium, Rose and annuals.	24
6.	Poly-house- its concept and types. Cultural Practices for growing high value crops in poly- house – Rose, Gerbera and Orchid	10
7.	Dry flowers- its concept and commercial value.	4
8.	Classification of Medicinal and Aromatic Plants on the basis of parts used.	6
9.	Propagation technique of medicinal and aromatic plants.	6
10.	Cultivation and processing of important medicinal and aromatic plants – Kalmegh, Sarpagandha, Tulsi, Ghritakumari, Basak, Periwinkle, Ashwagandha, Isabgul, Poppy, Citronella and Lemon grass.	14
11.	Marketing of flowers,medicinal and aromatic plants	4

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Plant Health Management Lab

Sl. No	Topic	No. of periods
1	Raising seedling in nursery bed	10
2	Pot filling- potting mixture for different plants-method of filling	10
3	Hands on experiences - Different types of propagation of flower plants	16
4	Harvesting, packaging, storing and handling of flowers	10
5	Arrangement of cut flower	10
6	Cultivation of commercial flowers in individual plot	18
7	Visit to floriculture units of commercial importance	8
8	Identification of some commercially important medicinal and aromatic plants	10
9	Layout and cultivation of some important medicinal and aromatic plants	18
10	Propagation technique and seed production technology	10
11	Storage or preservation technique of medicinal and aromatic plant parts	4
12	Preparation of project on floriculture	10
13	Preparation of project on medicinal and aromatic plants	10

Reference Books:

1. Introductory Ornamental Horticulture (in English) by J S Arora (Kalyani Publishers, New Delhi)
2. Adhunik Paddhatite Phool Chas (in Bengali) by Renu Dhar and Kajal Sengupta (Mehanati Prakashani, Hooghly)
3. Bhesaja Udvider Banijyk Chas O Byabahar (in Bengali) by Gostho Nyaban and Goutam Mandal (Mehanati Prakashani, Hooghly)
4. Introduction to Spices, Plantation Crops, Medicinal and Aromatic Plants (in English) by N Kumar (Oxford and IBH Publishing Company Pvt. Ltd., New Delhi)
5. Bigyanbhittik Phool, Phal Sabji Chas (in Bengali) by HrikrishnaDey (Krishi Bitan, Kolkata)
6. Adhunik Prajuktite Phasal Chas (Phool O Phal) (in Bengali) by Hrikrishna Dey (Krishi Bitan, Kolkata)
7. Cactus O Phool Chas (in Bengali) by Balai Lal Jana (Paschim Bango Rajya Pustak Parshad)
8. Banijya O Sakher Phool Chas (in Bengali) by Gostho Nyayban (Ananda Agency, Kolkata)

Crop Nutrient Management (CNMG)
Class XII

Total no. of weeks for classes / Year: 36			
Classes per week: 7	Th=3	Practical/Project=4	
Total classes per year: 252	Th=108	Practical/Project =144	
Total marks: 100	Th= 50	Practical = 40	Project = 10

Course Contents:

Theory:

Sl. No.	Topic	No. of periods
1.	Introduction [list of essential plant nutrients, available forms/forms in which nutrients are utilized by plants, beneficial elements for plants].	6
2.	Importance and role of different plant nutrients.	6
3.	Deficiency and toxicity symptoms of different plant nutrients.	6
4.	Different sources of plant nutrients. Loss of plant nutrients from the soil.	6
5.	Differences between manure and fertilizers.	2
6.	Definition and types of manures and their nutrient content [bulky organic manure, concentrated organic manures, liquid manure].	10
7.	Definition and types of commercial fertilizers and their nutrient content [commercial N fertilizers, P fertilizers, K fertilizers, complex fertilizers].	6
8.	Importance of organic manure in present day agriculture and benefits of organic source of plant nutrients.	4
9.	Vermicompost and its advantages.	4
10.	Bio-fertilizers [Rhizobium, Azotobacter, Azospirillum, VAM, PSB/PMB].	6
11.	Preparation procedure of manures; FYM, Compost and Vermicompost. Merits / Demerits of different methods. Tips for judging the completion of composting method.	10
12.	Precautions to be taken during preparation of organic manures / bio-fertilizers.	4
13.	Enriched compost / vermicompost.	4
14.	Methods and time of application of manure/ bio-fertilizers.	6
15.	Methods and time of application of commercial fertilizers [basal application, top dressing, fertigation, foliar application].	6

Sl. No.	Topic	No. of periods
16.	Secondary nutrients, Trace elements / Micro-nutrients [their sources and crop specific uses]	4
17.	General recommendations of fertilizer management for increasing use efficiency of fertilizer inputs in crop fields.	4
18.	Soil amendments and their role in nutrient availability.	4
19.	Economics/ Cost of preparation of compost / vermicompost.	10

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practical :

Crop Nutrient Management Lab

Sl.No.	Topic	No. of periods
1	Identification of different nutrient sources [commercial fertilizers, organic manures]	8
2	Selection of composting materials	6
3	Identification of earthworm species	6
4	Compost preparation [Different methods]	10
5	Preparation of vermicompost [Different methods – bed / pit / wooden box]	10
6	Collection of compost / vermicompost	8
7	Collection of vermi / earthworms	8
8	Preparation of liquid manure	10
9	Application of compost / vermicompost / liquid manure /bio- fertilizers / fertilizers in crop field / individual plot	14
10	Study on the effect of applied plant nutrients on crops [Field study / Field visit]	16
11	Pot study on nutrient deficiency symptoms	12
12	Study on storing of commercial fertilizers / Packaging of organic manures	12
13	Simple calculations for doses of nutrients, amount of fertilizers, cost of fertilizer application [for important field / horticultural crops]	16
14	Visit to commercial vermicompost unit	8

Reference Books:

1. Mati, Sar O Phasal (in Bengali) by Balailal Jana (Mehanati Prakashani, Hooghly)
2. Phalan Barate Chaser Mati O Tar Paricharja (in Bengali) by Sk Jahangir Ali (Mehanati Prakashani, Hooghly)
3. Jaibo Saar O Kencho Saar (in Bengali) by Kajal Sengupta and Renu Dhar (Mehanati Prakashani, Hooghly)
4. Krishi Kaje Anukhadyer Byabhar (in Bengali) by Gostha Nayban (Bharati Book Stall, Kolkata)
5. Maati Parikha O Chun Proyog (in Bengali) by Ranjan Kr. Basak (Kalyani Publishers, New Delhi)
6. Soil Testing & Recommendation (in English) by Ranjan Kr. Basak (Kalyani Publishers, New Delhi)
7. Hand book of Agriculture (in English) by Indian Council of Agricultural Research, New Delhi.

Seed Production (SEPR)
Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	Th=3	Practical/Project=4
Total classes per year: 252	Th=108	Practical/Project =144
Total marks: 100	Th= 50	Practical = 40 Project = 10

Course Contents:

Theory:

Sl No	Topic	No. of Periods
1.	**Seed and agriculture:** Importance and scope, concept on seed & grain, different kinds of seed used in crop cultivation, classification of seed in multiplication program, quality seed, deterioration pattern and post-harvest handling, seed village concept, seed quality index, seed processing zone in west Bengal.	10
2.	**Seed structure and development:** Definition of seed, component of seed, procedure for seed development, types of pollination, and pollinating agents, types of fruits, seed maturity**.**	9
3.	**Seed quality:** Quality concept, quality parameters of seed, seed certification, objective, agencies, procedures, field inspections, seed inspection, power of seed inspector.	9
4.	**Seed sampling:** Types of sample, procedures for sampling in field and laboratory, idea on seed sampling instruments.	5
5.	**Seed testing:** Importance of seed testing, different kinds of test, purity test, germination test, viability test, seed health test, seed moisture test, seed vigour test.	12
6.	**Seed storage:** Types seed on their storability, factors affecting seed in storage, upgrading of storability in pre and post-harvest stage of seed, seed borne diseases, storage pests, maintenance of plant materials through advance techniques, idea on different storing devices, and structure of a Godown.	10
7.	**Seed processing:** Concept, steps of seed processing, seed drying, drying methods and management, seed treatment and its methods, packaging of seed.	10
8.	**Seed production: Agricultural crops:** Rice,Wheat, Maize, Black Gram, Green Gram, Sesame, Mustard, Cotton, Potato, Jute.	20
9.	**Horticultural crops:** Tomato, Brinjal, Chilli, Bhindi, Bottle Gourd, Ridge Gourd, Onion, Cabbage, Cauliflower, Cucumber, Watermelon	23

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practical :

Seed Production Lab

Sl. No.	Topic	No. of periods
1.	Prepare a sample plot for seed production of three (3) important crops considering the different steps	
	a) Area/land/crop/variety selection appropriate for seed production,	4+4+4=12
	b) Maintenance of seed standard (quality seed, their source etc.),	3+3+3=9
	c) Agronomic management with emphasis on seed quality,	12+12+12=36
	d) Maintenance of Isolation distance (various modes), Rouging, Off-type identification etc.	7+7+7=2
	e) Harvesting techniques, lebelling ,	4+4+4=12
	f) Threshing, drying, packing etc. with proper grading,	3+3+3=9
	g) Concept on seed storing and simple storing techniques	2+2+2=6
2.	Pollination mechanism of different kinds of crops	2+2+2=6
3.	Identification of simple seed sampling and seed testing equipment	5
4.	Visit a seed testing laboratory,	6
5.	Basic idea on important seed tests (important crops)	
	a) seed moisture test	2+2+2=6
	b) Physical purity test	2+2+2=6
	c) Simple Genetic purity test	2+2+2=6
	d) Germination test	3
6.	Visit to a seed processing plant	1

Reference Books:

1. Beej Shangsitakaran O Sangrakhan (in Bengali) by Nirmalendu Samanta
2. Principles of Seed Technology (in English) by G M Kulkarni (Kalyani Publishers, New Delhi)
3. Seed Technology (in English) by R. L. Agarwal (Oxford, IBH Publishing Co., New Delhi)
4. Seed Science and Technology (in English) by S. Sen and N. Ghosh (Kalyani Publishers, New Delhi)

Plant Health Management (PHMA)
Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	Th=3	Practical/Project=4
Total classes per year: 252	Th=108	Practical/Project =144
Total marks: 100	Th= 50	Practical = 40 Project = 10

Course Contents:

Theory:

Content [Name of the topic]		
Part- I	**Plant pathogens, diseases and their management**	**Periods**
	1. Introduction: Definition and importance of plant health management. Factors affecting plant health – Biotic factors include plant pathogens (fungi, bacteria, algae, protozoa, phenarogamic parasites and nematodes), pests (insects, mites, animals) and weeds, mesobiotic factors (viruses) and abiotic factors (physical and nutritional). Definitions and terms related to plant pathogens, plant diseases and disorders. Classification of plant pathogens and plant diseases with examples.	7
	2. General characteristics and structures of fungi, bacteria and viruses: Brief idea about general characteristics and structures of fungi, bacteria and viruses. Name some plant pathogenically most important fungal (Pythium, Phytophthora, Peronospora, Pseudop-eronospora, Plasmopara, Albugo, Taphrina, Erysiphe, Puccinia, Ustilago, Helminthosporium,Alternaria, Pyricularia, Cercospora, Colletotrichum, Fusarium, Sclerotium, Phomopsis,Septoria) and bacterial (Xanthomonas, Pseudomonas, Ralstonia, Erwinia, Agrobacterium, Mycoplasma) genera and the diseases they cause.	7
	3. Plant disease management principles and chemicals: Principles of plant disease management – Avoidance, eradication, exclusion, protection, resistance and therapy. Brief idea about biological control and integrated disease management. Classification of fungicides and bacteriocides (major groups). Fungicide formulations and modes of application.	9
	4. Very brief diagnostic symptoms and management of important diseases of field crops, fruits, vegetables and flowers: Diseases of Rice – brown spot, blast, sheath blight and bacterial leaf blight **Wheat** – rusts, loose smut, **Maize** –Leaf blight, **Green gram/ Black gram-** powdery mildew, anthracnose, mosaic, **Mustard, cabbage and cauliflower –***Alternaria* leaf spot, black vein, **Groundnut –** Tikka disease**, Til/ Sesamum** – sesamum phyllody, **Jute –** stem rot**, Potato and tomato –** Late blight, early blight and bacterial wilt of potatoand tomato, leaf curl of tomato, **Brinjal** – *Phomopsis* blight, bacterial wilt, little leaf **Chilli –** anthracnose/ die back **Cucurbits (Cucumber,Ridge gourd, Pumpkin, Bottle gourd) –**downy and powdery mildew,	23

	Bhindi – Yellow vein mosaic of bhindi**, Ginger –** rhizome rot**, Mango –** anthracnose, malformation, black tip**; Banana –** sigatoka, wilt**,** bunchy top**, Pineapple –** fruit rot**, Guava –** wilt**, Citrus –** canker, **Marigold –** leaf spot and petal rot**, Tuberose –** stem rot**, Rose –** black spot, die back**, Chrysanthemum –**leaf blight	
Part- II	**Insect-pests, their damage symptoms and management**	**Periods**
	1. Introduction: Definitions of insect - pest. Significance of insect – pests management. Causes of insect pest outbreak. Animals injurious to crops – insects, mites, nematodes, avis, mammalia and mollusca with examples.	3
	2. General characteristics of insect- pests: General characteristics of Phylum - Arthropoda and Nematoda, Class - Insecta and Aracnida. Different body parts and external morphological features of an ideal insect – grass hopper. Metamorphosis of insect – simple and complete metamorphosis. Definition of egg, larva, grub,maggot, pupa and adult of insect. Name of mouth parts of plant feeding insects. Insect order injurious to crops – Name of the order (Orthoptera, Isoptera, Hemiptera, Lepidoptera, Coleoptera, Hymenoptera and Diptera) with example of one or two pests.	7
	3. Integrated pest management: Definition, significance, economic threshold level (ETL).Economic injury level (EIL), Tools /components of integrated pest management (IPM).	3
	4. Insect pest management principles and chemicals: Principles of pest management –Cultural,mechanical, physical, legislative, resistance, biological, microbial and chemical. Brief idea about biological control. Insecticides – chemical and botanicals; formulation and classification of chemical insecticides – based on the mode of entry, mode of action and chemical nature.	11
	5. Very brief about the nature of damage and management of important pest of field crops, fruits vegetables and flowers: Pests of Rice – Stem borer, brown plant hopper, gundhi bug **Wheat** -stem borer, termite, **Maize** –Stem borer, **Pulses –** aphid, pod borer, **Mustard, cabbage and cauliflower –** Mustard aphid, diamond black moth, cabbage butterfly **Groundnut –** Hairy caterpiller, **Sesamum** – leaf and pod caterpiller, **Jute –** Semilooper **Potato –** Cutworm **Tomato –**fruit borer **Brinjal** – Fruit and shoot borer, epilachna beetle **Chilli –** Thrips, mite **Cucurbits –** Red pumkin beetle, fruit fly, **Bhindi–** Leaf hopper, fruit borer **Turmeric-** Shoot borer**, Mango –** Mango hopper, fruit fly, **Banana –** Pseudostem weevil, fruit and leaf scaring beetle **Litchi –** fruit borer**, Pine apple–** mealy bug**, Guava –** Fruit fly**, Citrus –** Leaf minor **Coconut** - mite **Marigold –** Red spider mite**, Rose –** Red spider mite, **Chrysant-hemum -** Aphid, Tube Rose – Foliar nematode.	20
Part-III:	**Weed management**	**Periods**
	1. Definition, characteristics, useful and harmful effects of weeds.	2
	2. Classification, propagation and dissemination of weeds.	4
	3. Methods of weed management – mechanical, cultural, biological and chemical methods, Integrated weed management	7
	4. Herbicides – Classification, mode of action and application	3
	5. Integrated weed management	2

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. ($1 \times 10 = 10$)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. ($8 \times 5 = 40$)

Practicals :

Plant Health Management Lab

Sl. No	Topic	No. of periods
1	Acquaintance of fungi, bacteria, algae, phanerogamic parasite, nematode	4
	Procedure for collection and preservation disease and pest samples	4
2	Study of different types of symptoms – spot, blight, rot (root rot, stem rot, fruit rot, flower rot), powdery mildew, downy mildew, rust, smut, galls, canker, blight (In absence of live specimen, coloured printed photograph could be used)	10
3	Study of different damage symptoms caused by insect: White head, dead heart, onion leaf, stem-, shoot- and fruit borer, root feeder, bark eating caterpillar, leaf minor, foliage feeder, gall, knots.	10
4	Study of different body parts and appendages of grass hopper/ cockroach Study of cutting chewing and sucking type of mouth parts (In absence of live specimen, coloured printed photograph could be used)	10
5	Studies on common weeds of the location and their seasonality (summer, rainy, winter)	10
6	Identification of different types of diseases and pests of field crops, fruits vegetables under field condition	40
7	Collection of disease specimen (8 – 10 in no.), weeds (8 – 10 in no.) for herbarium and insect preserved (8 – 10 in no.) in dry/ formalin (take 10 ml formaldehyde and dissolve in 90 ml distilled water)	14
8	Visit to a local fertilizer - pesticide shop(s) to take the stock of fertilizers and pesticides sold	10
9	Demonstration of some commonly available fungicides, insecticides, herbicides, rodenticides, plant protection equipments	10
10	Study the modes of application of pesticides - seed treatment (dry and wet). soil treatment, spraying, dusting	10
11	Preparation of Bordeaux mixture (Copper sulphate, lime and water)	4
12	Determination of toxicity level of pesticide based on colour of label red blue, – orange, green	4
13	Calculation of fungicides and insecticides, preparation of spray formulation and its spraying	4

Reference Books:

1. Udvider Rog (in Bengali) by Dr. Nilangsu Mukherjee and Dr. Mrinal Kanti Dasgupta (West Bengal State Book Board, Kolkata)
2. Keetatatta, Keetadaman O Shasya Sanrakshan (in Bengali) by Dr. Punyabrata Chattopadhyaya (West Bengal State Book Board, Kolkata)
3. Sahaj Aagachha Niyantran (in Bengali) by Goshta Nayban (Bharati Book Stall, Kolkata)
4. Sabjir Rog O tar Pratikar (in Bengali) by Dr. S. B. Chattopadhyay (Bharati Book Stall, Kolkata)
5. Fasaler Rog Poka O Tar Pratikar (in Bengali) by Golam Rahaman (Mahanati Prakashan, Hooghly)
6. Hand Book of Pest Control (in English) by K. K. Marwaha, K. H. Siddiqui and J. P. Singh (Kalyani Publisher, New Delhi)
7. Agricultural Insect Pest of Crops and their Management (in English) by Dr. V. P. S. Panwar (Kalyani Publishers, New Delhi)
8. Diseases of Crop Plants in India (in English) by Dr. G. Rangaswami (Prentice Hall of India Private Limited, New Delhi)
9. Diseases of Ornamental Plants in India (in English) by H. S. Sohi (Indian Council of Agricultural Research, New Delhi)

Operation & Maintenance of Farm Machinery (OMFM)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	**Th=3**	**Practical/Project=4**
Total classes per year: 252	**Th=108**	**Practical/Project =144**
Total marks: 100	**Th= 50**	**Practical = 40 Project = 10**

Course Contents:

Theory:

Sl. No.	Topic	No. of Periods
1.	**Introduction:** Farm Mechanization - meaning, needs, status, farm power availability, advantages of improved implements over conventional tools, field capacity of farm implements, machinery for different farm operations.	4
2.	**Farm machines and their operation:** Tillage system - indigenous plough, mould board plough, disc plough, disc harrow, cultivator, rotatiller, rotavator. Sowing and transplanting – seed drill, planters, seed drill calibration, drum seeder, paddy transplanter, potato planter, multi-crop seeder. Tools for Intercultural operation – hoe, weeder, wheel hoe, power hoe. Harvesting and threshing – principle of crop harvesting, cutting tools, sickles, power reaper, combine harvester.	20
3.	**Pump set for irrigation:** Irrigation pumps – components of a pump-set, classification of wells, pumps;working principle of motor and pumps; selection of pumps, capacity calculation.	6
4.	**Irrigation Systems:** Types of irrigation systems, drip system-advantages, components, installation and maintenance; sprinkler system – advantages, components, installation and maintenance.	6
5.	**Systems of tractor and power tiller:** Engine – definition, types, working principle of CI and SI engines, engine parts, dismantling and assembling. Fuel supply system – need for fuel system, components, working. Cooling system–importance, types, components, working principle. Lubrication system – use, types, components. Power Transmission system – types, components, efficiency, differential. Hydraulic System – use, controls.	24

Sl. No.	Topic	No. of Periods
6.	**Operational Controls and safe driving of tractor:** Operational control of tractor – steering, clutch, brake, hydraulic levers, gear levers. Safety rules for driving a tractor - Precautions while driving a tractor. Checking the Tractor before driving – condition of different systems, tire inflation etc. Steps for driving a tractor – getting in and out of a tractor, driving procedure. Fuel saving tips.	10
7.	**Operational controls of power tiller:** Controls of power tiller – steering clutch, handle, levers (operational, directional, engine related); attachment with power tiller, specifications and working of rototiller, power tiller driving.	6
8.	**Adjustments of farm implements:** Need for implement adjustments; adjustments in MB plough - horizontal and vertical suction; disc plough – disc angle and tilt angle; adjustable parameters for harvesting and threshing machines.	8
9.	**Hitching of farm machinery:** Hitching – meaning, devices. Drawbar– use and specifications. Three-point linkage – use and components. Power take off (PTO) shaft – use, configuration and different speeds. Hitching procedure. Safety measures while implement hitching.	8
10.	**Trouble shooting of farm machinery:** Troubles during field operation – possible causes and remedies. Trouble shooting of tractors. Trouble shooting of power tiller. Trouble shooting of farm implements	6
11.	**Routine Maintenance of farm machinery:**Maintenance – needs and required frequency, daily, periodic. Maintenance during off-season.	6
12.	**Mechanized Hubs and Custom hiring:** Cooperative farming, Implement hubs, Custom hiring – needs, feasibility, operational conditions; Subsidy schemes, RKVY programs on farm mechanization schemes.	4

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1×10 = 10)

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8×5 = 40)

Practicals :

Operation & Maintenance of Farm Machinery Lab

Sl. No	Topic	No. of periods
1.	Familiarization with sources of farm power	4
2.	Familiarization with different farm machinery and implements	4
3.	Calculation of field capacity of various farm machinery	4
4.	Demonstration on working of four stroke engine	6
5.	Study of different components of I.C. Engine	6
6.	Demonstration on various systems of a tractor *viz*. fuel, lubrication, cooling, electrical	8
7.	Identification of transmission, hydraulic and final drive system	6
8.	Study of M.B. plough and its different parts	2
9.	Measurement of size, horizontal and vertical suction of M. B. Plough	4
10.	Study of disc plough and its parts	2
11.	Measurement of disc and tilt angle of disc plough	4
12.	Study of secondary tillage implements - disc harrow and cultivator	4
13.	Study of seed–cum-fertilizer drills	4
14.	Study of different types of furrow openers	2
15.	Study and demonstration on different types ofmetering mechanism	4
16.	Demonstration and calculation of Seed drill calibration	4
17.	Familiarisation with tractor controls, traffic rules and road safety	6
18.	Field planning and operation of farm machinery (Cultivator, MB Plough)	6
19.	Field operation and estimation of field capacity and field efficiency	6
20.	Study, maintenance and operation of power tiller	6
21.	Driving of power tiller with and without rotatiller engaged	6
22.	Starting and stopping practice of the tractor	8
23.	Driving of tractor in forward and reverse gears	6
24.	Study and practising the hitching of implements (three-point linkage)	6

Sl. No.	Topic	No. of periods
25.	Field operation and adjustments of seed drill/planter/sprayer	4
26.	Field operation of power reaper	6
27.	Visit to Mechanized Hub and Custom Hiring Centres (CHC)	6
28.	Project formulation for operating implement hub or custom hiring centre	10

Reference Books:

1. Principle of Agricultural Engineering (in English) by A.M. Michael and T. P. Ojha (Jain Brothers, New Delhi)
2. Elements of Agricultural Engineering (in English) by J. Sahay(Agro Book Agency)
3. A Practical Guide to Field Operation and Maintenance of Farm Machinery (in English) by SubrataKarmakar(Bidhan Chandra KrishiViswavidyalaya, West Bengal)
4. AdhunikKrishi O UdyanBigyanebongKrishiJantropati (in Bengali) by Bijoy Krishna Ghosh and SamiranBandopadhyay (Sridhar Prakashani, Kolkata)
5. AdhunikKrishi Katha (in Bengali) by HarshitMajumder (MehanatiPrakashani, Hooghly)
6. KrishiJantropati (in Bengali) by Prabash Chandra Das (Oriental Book Company Private Limited, Kolkata)

Production of Field Crops (POFC)
Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 7	Th=3	Practical/Project=4
Total classes per year: 252	Th=108	Practical/Project =144
Total marks: 100	Th= 50	Practical = 40 Project = 10

Course Contents:

Theory:

Area of cultivation, uses, soil and climatic requirements, varieties, agronomic practices (sowing/planting time, seed rate, seed treatment, spacing, method of sowing/planting, nutrient, weed and pest management, harvesting, threshing, yield), post-harvest operations and storage of the following crops:

Sl No	Topic	No. of Periods
a.	**Cereals :** Rice, Wheat and Maize	30
b.	**Pulses :** Chickpea, Lentil, Pigeonpea, Mung bean, Urd bean and Lathyrus	24
c.	**Oilseeds :** Rapeseed and Mustard, Groundnut, Sesame and Linseed	24
d.	**Tuber crops :** Potato	6
e.	**Fibre crops :** Jute and Cotton	10
f.	**Sugar crop :** Sugarcane	4
g.	**Narcotic crop:** Tobacco	3
h.	**Forage crop:** Cow pea, Rice bean, Para grass and Napier	7

Marks Allotment:

The theory paper will be divided into two sections, Section I (10 marks) and Section II (40 marks).

Section I will contain twelve objective questions of which candidates will be required to answer any ten questions. (1 x 10 = 10).

Section II will contain eight descriptive questions, of these candidates will be required to answer any five questions. (8 x 5 = 40).

Practical

Production Of Field Crops Lab.

Sl. No.	Topic	No. of periods
1	Study on morphological characteristics of important field crops	6
2	Preparation and management of rice nursery (dry, wet and dapog)	2
3	Calculation of seed rate of important field crops	4
4	Study on different seed treatment methods	4

Sl. No.	Topic	No. of periods
5	Land preparation and seed bed preparation	4
6	Sowing of wheat, chickpea, lentil, rapeseed and mustard, groundnut, jute, etc.	6
7	Planting of potato, sugarcane and tobacco	4
8	Transplanting of rice seedlings in main field	2
9	Calculation of manures and fertilizers (straight and compound) including split applications	4
10	Application of manures (FYM, vermicompost and mustard cake), fertilizers (straight and compound) and bio-fertilizers (Azospirillum, Rhizobium, etc.) in crop fields	4
11	Identification of crop plants, weeds	6
12	Identification of disease, symptoms of some important crops	6
13	Study on weed control methods: hand weeding, mechanical and herbicide application	6
14	Calculation of herbicides, insecticides and fungicides and their application through sprayer, duster, etc.	6
15	Study on special intercultural operations like earthing up, rouging, wrapping and propping, etc.	6
16	Irrigation in crop fields (rice, wheat, potato, sugarcane)	4
17	Cultivation and uses of forage crops	6
18	Estimation of yield of field crops like rice, rapeseed and mustard, lentil, jute, potato, etc.	4
19	Harvesting of field crops like paddy, lentil, rapeseed and mustard, potato, jute, sugarcane, etc.	4
20	Threshing of crops like paddy, wheat, chickpea, groundnut, etc.	4
21	Storage of grains like paddy, wheat, chickpea, groundnut, etc.	2
22	Retting and grading of jute	2
23	Post-harvest processing	2
24	Maintenance of individual plots	12
25	Calculation of cost of cultivation and B:C ratio for major agricultural crops	4
26	Preparation of Project on crop-based production technology	6
27	Base-line survey on production to marketing sequence of important crops in the region	8
28	Visit to Farmers' field, 'Block Agriculture Office'/ 'Model Agriculture Farm' within the block / district / regionPeriods)	16 (2 × 8)

Reference Books:

1. Ucchamadyamik Krishi Vigyan (in Bengali) by Prabhash Chandra Das and Dr. Ratikanta Ghosh (Oriental Book Company Private Ltd, Kolkata)
2. Adhunik Krishi O Udyan Bigyan ebong Krishi Jantropati (in Bengali) by Bijoy Krishna Ghosh and Samiran Bandopadhyay (Sridhar Prakashani, Kolkata)
3. Adhunik Krishi O Udyan Bigyan (in Bengali) by Kajal Sengupta and Sudip Bhui (Mehanati Prakashani, Hooghly)
4. Sahaj Kathay Bigyanbhitwik Chaasbas (in Bengali) by Gostho Nayban (Ananda Agency, Kolkata)
5. Handbook of Agriculture (in English) by Indian Council of Agricultural Research, New Delhi
6. Handbook of Agricultural Sciences (in English) by A.K.Gupta, S. S. Singh and P. Gupta (Kalyani Publishers, New Delhi)

Biology (BIO2)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 6	**Th=4**	**Practical/Project=2**
Total classes per year: 216	**Th=144**	**Practical/Project =72**
Total marks: 100	**Th= 70**	**Practical = 30**

Course Contents :

Theory :

Content [Name of the Topic]

Unit - I : Reproduction		**Periods**
1.	**Sexual reproduction in flowering plant** 1. Development of male and female gametophytes; 2. Pollination-types, agencies and examples; Outbreedings devices; Double fertilization; 3. Post fertilization events - Development of endosperm and embryo, Development of seed and formation of fruit.	10
2.	**Human Reproduction** 1. Male and female reproductive systems; 2. Microscopic anatomy of testis and ovary (in brief); 3. Gametogenesis-spermatogenesis & oogenesis; 4. Menstrual cycle; Fertilisation embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elementary idea).	8
3.	**Reproductive health** 1. Need for reproductive health and prevention of sexually transmitted diseases (STD); 2. Birth control – Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); 3. Amniocentesis; Infertility and assisted reproductive technology – IVF (Elementary idea for general awareness).	12

Unit – II : Genetics And Evolution		Periods
4.	**Heredity and variation** 1. Mendelian Inheritance; Deviations from Mendelism-Incomplete dominance, Multiple alleles and Inheritance of blood groups, 2. Chromosome theory of inheritance; Chromosomes and genes; 3. Sex determination - in humans; 4. Linkage and crossing over; Sex linked inheritance - Haemophilia, Colour blindness; 5. Mendelian disorder in humans - Thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.	12
5.	**Molecular Basis of Inheritance** 1. DNA replication, transcription and translation (brief outlines only), 2. DNA finger printing.	6
6.	**Evolution** 1. Origin of life; 2. Darwin's contribution in concept of evolution.	4
7.	**Mechanism of evolution** 1. Variation (Mutation and Recombination) and Natural Selection with examples.	5
Unit-III : Biology and Human Welfare		
8.	**Health and Disease** 1. Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); 2. Basic concepts of immunology - vaccines; Cancer, HIV and AIDs; drug and alcholol abuse.	9
9.	**Improvement in food production** 1. Plant breeding (selection and hybridization process), 2. Single cell protein, Biofortification.	6
10.	**Microbes in human welfare** 1. In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.	6

11.	**Economic Botany** 1. Economic importance of algae and fungi and of higher plants (drug yielding, fibre yielding, timber yielding, oil yielding plants) Salient features of some economically important families – Poaceae, Solanaceae, Fabaceae and Cucurbitaceae.	11
12.	**Economic Zoology** 1. Sericulture, Apiculture, Pisciculture, Prawn culture, 2. Poultry and Dairy farming, Animal breeding (cow); other economic aspects of poultry and dairy farming – manure and biogas production.	12
Unit-IV : Biotechnology and its Applications		
13.	**Principles and process of Biotechnology** 1. Concept of totipotency, plant tissue and organ culture, artificial seed, uses of tissue culture technique, 2. Genetic engineering (Recombinant DNA technology). 3. Application of Biotechnology in health and agriculture: Human insulin and vaccine production, gene therapy; Genetically modified organisms-Bt crops; Transgenic Animals.	11
Unit-V : Ecology and Environment		
14.	**Organisms and environment** 1. Ecological adaptations; 2. Population attributes - growth, birth rate and death rate, age distribution.	7
15.	**Ecosystems** 1. Patterns, components; productivity and decomposition; 2. Nutrient cycling (carbon and phosphorous).	6
16.	**Biodiversity and its conservation** 1. Concept of Biodiversity; Importance of Biodiversity; Loss of Biodiversity; Biodiversity conservation; Hotspots, endangered organisms, extinction, Red Data Book, Biosphere reserves, National parks and Sanctuaries.	8
17.	**Environmental issues** 1. Air pollution and its control; 2. Water pollution and its control; 3. Agrochemicals and their effects; 4. Solid waste management; Greenhouse effect and global warning; Ozone depletion; Deforestation.	11

Practical :

Biology Lab

Sl. No.	Topic	Periods 72
1.	**Demonstration of experiment on plant physiology -** A. Light is essential for photosynthesis. B. Transpiration (Bell jar or poly bag method) C. Absorption of water D. Osmosis (Potato osmoscope) E. Diffusion	
2.	Study of different parts of plant (two plants each from families Poaceae, Solan aceae, Fabaceae and Cucurbitaceae	
3.	Field practice of hybridization.	
4.	**Identification of crop plants.** A. Paddy B. Wheat C. Maize D. Mung E. Soyabean F. Cucumber G. Mango H. Radish I. Carrot J. Jute K. Kalmegh L. Thankuni M. Ashwagandha N. Vinca	
5.	**Spot identification of –** A. Silk worm B. Honey bee C. Rice bug	

Sl. No.	Topic	Periods 72
	D. Stem borer E. Rice Hispa F. Major carp G. Minor carp H. Tiger prawn	
6.	Collect soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity. Correlate with the kinds of plants found in them.	
7.	Visit to Sericulture, Apiculture and Pisciculture farm.	
8.	Field report on any one of the above.	

Question Pattern

Sl. No.	Unit	Section-I	Section - II				Total
		MCQ (1 mark)	Very Short Answer (1 mark)	Short Answer Questions I (2 marks)	Short Answer Questions II (3 marks)	Long Answer Questions (5 marks)	
1	Reproduction	1×3 = 3	1×1 = 1	2×1 = 2	3×1 = 3	5×1 = 5	14
2	Genetics And Evolution	1×4 = 4	1×1 = 1	2×1 = 2	3×2 = 6	5×1 = 5	18
3	Biology And Human Welfare	1×2 = 2	1×1 = 1	2×1 = 2	3×3 = 9	-	14
4	Biotechnology And Its Applications	1×2 = 2	-	2×1 = 2	3×2 = 6	-	10
5	Ecology And Environment	1×3 = 3	1×1 = 1	2×1 = 2	3×1 = 3	5×1 = 5	14
		14	4	10	27	15	70

- Question Paper will have two sections.
- Section I : for MCQ (Question nos. 1 to 14)
- Section II will have four groups :

  Group A – VSA (1 mark) - (Question nos. 1 to 4)

Group B – SA I (2 marks) - (Question nos. 5 to 9)

Group C – SA II (3 marks) - (Question nos. 10 to 18)

Group D – LA (5 marks) - (Question nos. 19 to 21)

- There should be no fractions in marks distribution.
- For SA I, marks may be divided into 1+1.
- For SA II, marks may be divided into 2+1.
- For LA , marks may be divided into 3+2 or 4+1.
- Option summary :

Section I	No internal options.
Section II VSA	Internal option for at least any two questions.
Section II SA I	Internal option for at least any three questions.
Section II SA II	Internal option for at least any five questions.
Section II LA	Internal option for at least any two questions.

Question Pattern

Class – XII

1.	A) Experiment A	=	5 marks
	B) Experiment B	=	5 marks
2.	Spotting (5 specimens)	=	2×5 = 10 marks
3.	Field Report	=	5 marks
4.	Laboratory Note Book	=	5 marks
	Total	=	**30 marks**

Physics (PHYS)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 6	**Th=4**	**Practical/Project=2**
Total classes per year: 216	**Th=144**	**Practical/Project =72**
Total marks: 100	**Th= 70**	**Practical = 30**

Topic	Periods
Unit I : Electrostatics	15
Electric charge; conservation of charge, Coulomb's Law – force between two point charges; principle of superposition – force due to multiple charges.Electric field - electric field due to a point charge, electric field lines; electric dipole – field due to a dipole, torque on a dipole placed in uniform electric field.Electric flux – Gauss' theorem and its applications to find field due to uniformly charge infinite plane sheet and uniformly charged thin spherical shell [field inside and outside].Electric potential, potential diference, relation between intensity of electric field and potential, potential due to a point charge, equipotential surface. Potential energy of two point charges.Conductors and insulators, free charge and bound charge inside a conductor. Dielectrics and electric polarization. Capacitor and capacitance, combination of capacitors in series and in parallel. Parallel plate capacitor, energy stored in a capacitor, Van De Graff generator.	
Unit II : Current Electricity	10
Electric current, flow of elctrons in a metallic conductor, drift velocity, and its relation with electric current, volume density of current; Ohm's law, electrical resistance. V-I characteristics [linear and non-linear] electrical energy and power, units of power, electrical resistivity and conductivity.Carbon resistors, colour code for carbon resistors, series and parallel combination of resistors; temperature dependence of resistors. Potential difference and e.m.f. of cells, internal resistance of a cell, series and parallel combination of cells, secondary cell.Kirchhoff's laws and simple applications. Wheatstone bridge, metre bridge, potentiometer-principle and its applications to measure potential diference and for comparing emf of two cells, measurement of internal resistance of a cell. Household wiring, three pin plug point, miniature circuit breaker [MCB].	

Topic	Periods
Unit III : Magnetic Effect of Current & Magnetism	16
Concept of magnetic field, Oersted's experiment. Biot Savart Law and its application to current carrying circular loop at the centre, magnetic moment due to a current carrying circular loop. Ampere's circuital law and its applications to infinitely long straight wire, straight and toroidal solenoids. Force on a moving charge in uniform magnetic and electric fields. Force on a current carrying conductor in a uniform magnetic field. Force between two parallel current carrying conductors (no deduction) – definition of ampere. Torque on a current carrying loop in uniform magnetic field; moving coil galvanometer and its conversion to ammeter and voltmeter.Earth's magnetic field and magnetic elements. Dia,para-and ferro-magnetic substances. Electro magnet and permanent magnet.	
Unit IV : Electromagnetic Induction & Alternating Currents	16
Electromagnetic induction; Faraday's laws, induced e.m.f. and current; Lenz's law; eddy currents, self and mutual inductance. Alternating current, peak and rms values of alternating current and voltage; reactance and impedance; series LCR circuit, resonance, power in AC circuits, Wattless Current. AC generator and transformers, its different types; power station-thermal and hydel; transmission and distribution of power,renewable energy (basic principle only).	
Unit V : Electromagnetic Waves	7
Need for displacement current; Electromagnetic waves and their characteristics; Transverse nature of electromagnetic waves. Electromagnetic spectrum.	
Unit VI : Optics	25
Reflection of light, spherical mirror, mirror formula, refraction of light, total internal reflection and its application, optical fibres. Refraction at spherical surfaces, lenses, thin lens formula, lens maker's formula, combination of thin lenses in contact. Refraction and dispersion of light through a prism, dispersive power of prism.Scattering of light – blue colour of the sky and reddish appearance of the sun at sun rise and sun set.Optical instruments: Microscopes and astronomical telescopes [reflecting and refracting] and their magnifying powers (no deduction), human eye – image formation and accommodation, correction of eye defects using lenses.Wave optics: wave front and Huygens' principle. Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light.Diffraction due to a single slit, width of central maxima (no deduction).Polarization: plane polarized light, Brewster's law, uses of plane polarized light and polaroids.	

Topic	Periods
Unit VII : Dual Nature of Matter & Radiation	10
Dual nature of radiation, photoelectric effect, Einstein's photoelectric equation, particle nature of light.Matter waves – wave nature of particles, de Broglie relation.	
Unit VIII : Atoms & Nuclei	10
Bohr's model, energy level, hydrogen spectrum. Continuous and characteristic x rays spectra. Composition and size of nucleus, atomic masses, isotopes, isobars, isotones. Radioactivity – alpha, beta and gamma particles / rays and their properties; radioactive decay law.Mass energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.	
Unit IX : Electronic Devices	20
Energy bands in solids – conductors, insulators and semiconductors; pn junction diodes – I-V characteristics in forward and reverse bias; diodes as rectifier – half wave, full wave and bridge rectifier; filter. I-V characteristics of LED, Zener diode, voltage regulator, three-pin voltage regulator. Junction transistor, transistor action, transistor configurations, input and output characteristics of a transistor in common emitter [CE] configuration. Transistor as an amplifier in CE configuration – diac, triac, SCR, LDR, Photodiode, Phototransistor, solar cell. Logic gates – OR, AND, NOT, NAND and NOR gates. NAND & NOR gate as universal gate. Transistor as a switch.	
Unit X : Communication System	15
Elements of a communication system [block diagram only], band width of signal [audio, video and digital]; bandwidth of a transmission medium, transmission media. Noise, Signal to noise [S/N] ratio.Propagation of electromagnetic waves – ground, sky and space waves.Need for modulation – production and detection of amplitude modulated wave, satellite communication.	

Unit wise distribution of periods and marks

Unit	Title	Periods	Marks
I	Electrostatics	15	08
II	Current Electricity	10	05
III	Magnetic effect of Current & Magnetism	16	08
IV	Electromagnetic induction and Alternating Current	16	08
V	Electromagnetic Waves	07	03

Unit	Title	Periods	Marks
VI	Optics	25	12
VII	Dual Nature of Radiation & Matter	10	05
VIII	Atoms & Nuclei	10	05
IX	Electronic Devices	20	10
X	Communication Systems	15	06
	Total	**144**	**70**

Marks Distribution

Units	Titles	MCQ [1] Mark]	Very short answer type question [1 mark]	Short answer type question [3] marks]	Long answer type question [5] [marks]	Total marks
I	Electrostatics	1 × 3	1 × 2	3 × 1		08
II	Current Electricity	1 × 4	1 × 1			05
III	Magnetic effect of current & magnetism			3 × 1	5 × 1	08
IV	Electromagnetic induction and alternating current	1 × 1	1 × 1	3 × 2		08
V	Electromagnetic waves			3 × 1		03
VI	Optics	1 × 1	1 × 3	3 × 1	5 × 1	12
VII	Dual nature of radiation & matter	1 × 1	1 × 1	3 × 1		05
VIII	Atoms & Nuclei	1 × 2		3 × 1		05
IX	Electronic Devices	1 × 1	1 × 1	3 × 1	5 × 1	10
X	Communication System	1 × 2	1 × 1	3 × 1		06
	Total No.of Questions	**15**	**10**	**10**	**03**	**70**

- MCQ should have 4 options with only one correct answer.
- Alternative questions should be from the same unit.

- For short answer type question, marks [3] should be divided into smaller parts like 1+2 or 1+1+1
- For long anser type question, marks [5] should be divided into smaller parts like 1+4 or 2+3 or 1+1+3.

Option Pattern

Sl No	Question Pattern	No. Of Options
01	Very short answer type questions	At least 5
02	Short answer type questions	At least 6
03	Long answer type questions	3

Practical :

Every student has to perform at least 10 (Ten) experiments out of the list of following experiments and to carry out one project under the guidance of teacher.

List of Experiments :

1) To measure resistance of a given wire using metre bridge and hence to find the specific resistance of its material.
2) To compare the emf of two given primary cells using potentiometer.
3) To verify the laws of series and parallel combination of resistance using post office box.
4) To determine resistance of a galvanometer by half deflection method and to find its figure of merit.
5) To convert the given galvanometer of known resistance and figure of merit into an ammeter and voltmeter of desired range and to verify the same.
6) To find the focal length of a convex lens by plotting 1/u against 1/v.
7) To determine refractive index of a glass slab using a travelling microscope.
8) To construct a full wave rectifier using pn junction diodes with capacitor filter and to draw load current – load voltage graph and hence to find percentage regulation using bread board.
9) To draw the I-V characteristics of a Zener Diods in the reverse bias and to find the break down voltage.
10) To draw the output characteristics of a pnp/npn transistor in the common –emitter configuration and to find the current gain.
11) To verify the truth table of NAND / NOR gate and to show that they are universal gate [using bread board].

12) To study the variation of resistance of a LDR with intensity of light from LED as a source [using bread board]

13) Use of solar cell as generator of energy.

14) To fabricate and test a circuit consisting of two lines, one with two bulbs and a fan and the other with a high current plug point using a MCB and feed by AC mains.

Students should be conversant with the use of multi-meter.

Evaluation Scheme For Practical Examination

01	One experiment to be performed	15 marks
02	Practical record	05 marks
03	Project	05 marks
04	Viva voce on experiment and project	05 marks
	TOTAL	**30 marks**

Chemistry (CHEM)

Class XII

Total no. of weeks for classes / Year: 36		
Classes per week: 6	**Th=4**	**Practical/Project=2**
Total classes per year: 216	**Th=144**	**Practical/Project =72**
Total marks: 100	**Th= 70**	**Practical = 30**

Course Content :

Thory :

Unit I : Solid State

Introduction: Classification of solids based on differences in binding forces: ionic, molecular, covalent, metallic solids (definition with example).Crystalline and amorphous solids (elementary idea with examples)Two dimensional and three dimensional latticesUnit Cell – cubic unit cell [Primitive, body centered and face centered) Number of atoms per unit cell in a cubic cell.Schottky defect and Frenkel defect.

Unit II : Solution

Types of Solutions: Solution of solids in liquids, solubility of gases in liquids, solid solutions.Colligative properties: relative lowering of vapour pressure – Raoult's Law; Elevation of Boiling Point; Depression of Freezing Point; Osmotice Pressure. Rverse Osmosis (qualitative idea)Determination of molar masses using colligative properties.

Unit III : Electro Chemistry

Oxidation – reduction reaction :

Concept of red – ox reaction

Oxidation number and balancing of simple red – ox reactions by oxidation number method.

Red – ox titration :-

Oxalic Acid – $KMnO_4$

$KMnO_4 - Fe^{2+}$

$K_2Cr_2O_7 - Fe^{2+}$

Conductance in electrolytic solutions :

Specific and molar conductivity (definition with example)

Electrolysis – Laws of Electrolysis

Electrolytic Cell

Galvanic Cell (Voltaic Cell)

Half – cell reaction, cell reaction, emf of a cell, standard electrode potential

Dry cell (dry cell battery)

Primary dry cell battery
Common dry cell battery
Alkaline battery
Mercury battery
Lithium battery
Secondary dry cell battery
Lead storage battery (lead accumulator)
Nickel – cadmium ("Ni-cd") battery
(precaution in disposal)
(Only electrodes, cell reactions and emf of cells)
Fuel cell.

Corrosion: Introduction
Cause of corrosion
Factors influencing corrosion
Various methiods of corrosion control

Unit IV : Chemical Kinetics

Rate of a reaction (average and instantaneous):
Factors influencing rate of a reaction: concentration, temperature, catalyst.
Order and molecularity of a reaction.
Rate law of first order, second order and zero order reaction.
Definition of half life of a reaction.
Concept of activation energy of a reaction

Unit V : Surface Chemistry

Adsorption: Physisorption and chemisorption; factors affecting adsorption of gases on solid catalysis: homogeneous and hetrogneous

Colloidal State: Distinction between true solutions, colloids and suspensions; lyophobic and lyophilhc colloids.

Properties of Colloids: Tyndal effect, Brownian Movement, electrophoresis, coagulation

Emulsion: Type of emulsion

Unit VI : Extraction of Metals

General principles and methods of extraction

Ores and minerals

Concentration: Froth floatation

Calcination, roasting

Flux and slag

Electrolylic reduction, carbon reduction

Self reduction

Occurrence and principles of extraction of aluminium, copper and iron (no technical details)

Distinction and uses of cast iron, wrought iron and steel.

Alloys: Purpose of making alloys

Composition and uses of Bronze, Brass, Bell Metal, Duralumin, Stainless Steel.

Unit VII : S – Block & P – Block Elements

S – Block Elements (alkali and alkaline earth metals)

Group 1 And Group 2 Elements

General introduction

Elements of groups 1 & 2

Electronic configuration

Trends in variation in ionization enthalpy, atomic and ionic radii.

Trends in chemical reactivity with oxygen and halogens.

P – Block Elements

General introduction

Anomalous behavior of first period elements compared to havier elements of each group – to highlight differences in oxidation states and composition of compounds.

Group 13 Elements

Elements of Group 13, Valence Shell electronic configuration, possible oxidation states, natural occurrence comparative chemical properties of boron and aluminium - reaction with acides and alkalis.

Uses of some important compounds of boron and aluminium: boric acid, boron trifluoride, diborane, alumina, alums, anhydrous aluminium chloride

Group 14 Elements

Elements of group 14

Valence Shell electronic configuration

Oxidation states

Natural occurrence

Carbon : catenation property; allotropic forms – physical properties and uses. Uses of silicon and carborundum.

Group 15 Elements

Elements of group 15, valence shell electronic configuration, possible oxidation status with examples of respective compounds; natural occurrence; allotropy of phosphorous.

Comparative chemical reactivity of nitrogen and phosphorous with respect to reaction with oxygens & halogens

Important compounds of nitrogen and phosphorous; Nitrous acid & nitric acid; phosphine, phosphorous pentoxide, phosphorous pentachloride, phosphorous acid and phosphoric acid (preparation and uses only)

Group 16 Elements

Elements of group 16, valance shell electronic configuration, possible oxidation status with examples of respective compounds, natural occurrence (chalcogens) (allotropy of Sulphur)

Preparation, physical properties and reaction of ozone (oxidation reaction with mercury, lead sulphide, lead sulphide and acidified KI)

Important compounds of Sulphur : Hydrogen Sulphide – use in analysis of basic radicals.

Sulfur dioxide and sulfur trioxide [preparation and uses]

Sulfur dioxide shows both oxidizing and reducing properties – explantion with examples.

Group 17 Elements

Elements of Group 17, valence shell electronic configuration, possible oxidation status with examples of compounds; natural occurrence (halogens)

Preparation of halogens (only preparative reaction) and comparative reactions of halogens: oxidizing property, reactcion with water and alkal.

Hydrohalic acid : preparation and reactions; detection of halides.

Bleaching powder – preparation and uses

Group 18 Elements

Elements of group 18

General electronic configuration, chemical inertness, occurrence, important uses.

Unit VIII : Compounds of xenon : xenon fluorides – preparation and structure only.

d- Block Elements: General introduction and electronic configuration, occurrence and characteristic of transition metals, general trends in properties of the first row transition metals – ionization enthalpy, oxidation states, ionic radii, colour, catalylic property, magnetic property, alloy formation.

Preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$

Unit IX : Coordination Compounds

Coordination compounds: introduction with examples ligands, coordination number, shapesBonding: Werner's Theory and Simple IsomerismA few important coordination complex (formula, structure, colour):Brown ring compound, sodium nitroprussde, tetraamine copper (II) sulphate.A few examples of coordination compounds, important in biological system: haemoglobin, chlorophyll, Vitamin B_{12} (nature and function)

Unit X : Haloalkanes and Haloarenes

Haloalkanes: Introduction

Preparation : Preparation from alcohols by reaction with PX_3 (= Cl, Br), Iodine and red phosphorous thionyl chloride.

Haloform reaction – prepration of chloroform and iodoform [preparative methos not required]

Physical properties

Chemicsl properties – hydrolysis and dehydrohalogeneration

Reaction of methyl iodide with Mg – corrignard reagent

Uses of chloroform and iodoform

Freons:

Introduction, examples, uses and environmental hazards.

DDT and its environmental hazards.

Haloarenes:

Introduction

Preparation of chlorobenzene and bromobenzeneSubstitution reacton (directive influence of chlorine) : Nitration of chlorobenzene

Unit XI : Alcohols, Phenols And Ethers

Alcohols:

Aliphatic alcohol and aromatic alcohol (benzyl alcohol)

Introduction

Primary, secondary and tertiary alcohols (examples)

Method of preparation (primary alcohol only): Hydrolysis of alkyl halides

Hydrolysis of esters

Reduction of esters

(Bouvault Blanc Reduction)

Preparation of methanol from water gas and synthesis gas.

Preparation of ethanol by fermentation and hydration of ethenePreparation of rectified spirit, absolute alcholol, spectroscopic alcohol, "super dry" alcohol.

Identification of methanol and ethanol

Physical properties

Chemical properties : oxidation; reaction with Na, PCl_5, $SoCl_2$, esterification reaction, uses of methanol and ethanol.

Phenols:

Introduction

Preparation (phenol) from aniline (laboratory process) by cumene process (industrial process)

Chemical Properties:

Acidic nature of phenol. Acetylation, Benzoylation reaction with Br_2 – water, Reimer – Tieman reaction. Kolbe-Schmitt reaction. Phenol – formaldehyde resin.

Identification and uses of phenol.

Ethers:

Aliphatic Ether And Aromatic Ether (Anisole)

Introduction

Preparation of diethyl ether from ethanol (no experimental details)

Williamson Synthesis.

Preparation of anisole from phenol

Physical properties

Chemical properties: inflammability of diethyl ether (precaution to be taken)

Reaction with HIReaction of diethyl ether with aerial oxygen in the presence of light.

Preparation of peroxide – free diethyl etherUses of diethyl ether

Unit XII : Aldehydes, Ketones And Carboxylic Acids And Their Derivatives

Aldehydes:

Aliphatic aldehydes and aromatic aldehyde (benzaldehyde)

Ketones

Aliphatic ketones and aromatic ketone (acetophenone)

Introduction

Preparation from:

Alcohols

Carboxylic acid

Acid chlorides (Rosenmund reduction – aldehydes)

Gatterman – Koch and Gatterman aldehyde

Synthesis (benzaldehyde)

Friedel – craft acylation reaction (acetophenone)

Physical properties

Chemical properties

Oxidation reaction (including reaction of aldehydes with Fehling's and Tollens' Reagents)

Reduction reactions

Reduction with H_2 / Catalysl;

Na – Hg, H_2O; lithium aluminium hydride, sodium borohydride; clemmensen reduction

Addition reaction : with HCN and $NaHSO_3$

Hemiacetal and acetal formation

Reaction with hydroxylamine, hydrazine, phenylhydrazine, 2,4 – dinitrophenylhydrazine (Brady's Reagent), Semicarbazide

Aldol reaction

Cannizzaro and crossed cannizzaro reaction

Benzoin condensation

Perkin reaction

Distinction between aldehydydes and ketones

Identification of acetaldehyde and acetone formation – uses.

Carboxylic Acids:

Aliphatic carboxylic acids and aromatic carboxylic acid (benzoic acid)

Introduction

Preparation

By the oxidation of alcohols and aldehydes, oxidation of toluene (benzoic acid).

By the hydrolysis of alkyl and aryl cyanides

By using Grignard reagent B

By the hydrolysis of esters.

Physical properties

Chemical properties

Acidic properties – reaction with alkali and $NaHCO_3$.

Reaction with PCl_3, PCl_5 and $SoCl_2$

Esterification reaction

Hunsdiecker reaction

Hell – Volhard – Zelinsky reaction

Identification of formic acid and acetic acid.

Uses of Acetic Acid

Derivatives of Carboxylic Acids:

Acetyl chloride, acetic anhydride, Acetamide ethyl acetate – preparation and uses

Unit XIII : Organic Compounds Containing Nitrogen

Amines:

Introduction

Classification – primary, secondary and tertiary amines (examples with structures) Preparation of primary amines by

reduction of nitro compounds.

Gabriel's phthalimide synthesis.

Hofmann degradation reaction

Aniline

Preparation from nitrobenzene

Physical properties

Chemical properties

Basic nature

Isocyanide (carbylamine) reaction

Diazo reaction.

Benzenediazonium Salts:

Preparation

Reactions involving replacement of diazo group by H, OH, Halogen, CN, NO_2

Coupling reaction

Reduction

Cyanides and Isocyanides: preparation

Nitro Compounds:

Introduction

Preparation of nitroethane

Nitrobenzene and 1,3-di-nitrobenzene

Reduction of nitrobenzene under different conditions.

Unit XIV : Biomolecules

Carbohydrates:

Introduction

Classification (aldose and ketose)

Monosacchaharides

Glucose and fructose structure (no elucidation) with D/L nomenclature

Oxidation and reduction reactions

Osazone formation

Identification

Oligosaccharides:

Sucrose structure (no elucidation)

Non reducing sugar, hydrolysis

Identification

Polysaccharides:

Starch, Monomer units, Hydrolysis

Identification

Proteins:

Introduction

Elementary idea of - amino acids (examples: glycine, alanine, cysteine, serine, methionine, aspartic acid) zwitterionic structure, isoelectric point.

Peptide bond, polypeptides

Primary structure of proteins

Identification

Nucleic Acid:

DNA & RNA

Nucleotides and nucleosides

Unit XV : Polymers

Natural and synthetic polymers

Homopolymer and copolymer

Polymerization reaction : addition and condensation polymerization

Thermoplastics and thermosetling plastics (definitioin with examples)

Preparation (no technical details) and uses of polyethylene, Teflon, Bakelite, Nylon, Terylene (synthetic fibres)

Hazards of using plastic materials

Biodegradable polymers

Unit XVI : Chemistry in Every Day Life

Chemicals in Medicines:

Analgesics, antipyretics, tranquilisers, antimicrobials, antifungals, antifertility drugs, anti viral drugs, antacids, antihistamines, antimalarials, antiseptics, disinfectants (examples only)Side effects of aspirin and paracetamol

Chemicals:

In food preservatives, artificial sweetening agents

Cleansing Agents:

Soaps and detergents – their chemical composition and cleansing action.

Unit wise distribution of Marks and Periods

Unit	Marks	No. of Period
I	03	08
II	04	08
III	06	10
IV	04	08
V	04	10
VI	04	08
VII	08	16
VIII	04	08
IX	03	08

Unit	Marks	No. of Period
X	04	10
XI	05	08
XII	06	08
XIII	04	08
XIV	04	10
XV	04	08
XVI	03	08
16	**70**	**144**

Practical :

Chemistry Practical Lab

List of Experiments:

Experiment 1

1.1 To prepare starch sol (hydrophilic sol)

1.2 To prepare hydrated ferric oxide sol (hydrophobic sol)

Experiment 2

2.1 To prepare potash alum

2.2 To prepare ferrous ammonium sulfate (Mohr's Salt)

2.3 To prepare acetanilide

2.4 To prepare 2-phenylazo-2-naphthol dye (2-naphtholaniline dye)

Experiment 3

To identify one of the following functional groups present in a solid organic sample:

Aromatic primary amino (azodye test)

Phenolic- OH ($Fecl_3$ test)

Carboxylic acid group ($NaHCo_3$ test)

Addehydie and Ketonic groups (Brady's Reagent and Tollen's Reagent test)

Experiment 4

4.1 To prepare methyl orange indicator solution

4.2 To prepare BDS indicator solution

4.3 To prepare Fehling's Solution A and Fehling's Solution B

4.4 To prepare 0.1 M Mohr's Salt Solution in 0.5 – 1 M H_2SO_4

Experiment 5

To identify carbohydrates, fats and proteins given as pure samples.

Experiment 6

General acquaintance with chemical balance – sartorius / bunge / electronic (preferably electronic)

6.1 To prepare ~ 0.1 N standard sodium carbonate solution

6.2 To determine the strength of unknown ~ 0.1N HCL/H_2SO_4 (in normality, molarity and g/l) by titration with the standard ~ 0.1 N Na_2Co_3 solution.

6.3 To prepare standard 0.1 N oxalic acid solution

6.4 To determine the strength of unknown 0.1N NaoH solution (in normality, morality and g/l) by titration with the standard ~ 0.1N oxalic acid solution.

6.5 To determine the strength of unknown ~ 0.1 N $KMnO_4$ solution (in normality, molaity and g/l) by titration with the standard ~ 0.1 N oxalic acid solution.

6.6 To determine the amount of iron in g/l present in the unknown ~ 0.1N Mohr's Salt Solution by titration with the standardised 0.1N $KMnO_4$ solution.

6.7 To prepare standard ~ 0.1 N $K_2Cr_2O_7$ solution.

6.8 To determine the amount of iron in g/l in the unknown ~ 0.1N Mohr's Salt Solution by the standard ~ 0.1N $K_2Cr_2O_7$ solution.

Marks Distribution

Sl No	Description	Marks
01	One Expt. From Expt. 1 (any one) or Expt. 2 (any one) [Both the expts will be set and the candidate will choose one by lottery].	6
02	One Expt from Expt. 3 or Expt.4 (any one) or Expt.5 [All three Expts. will be set and the candidate will chose one by lottery].	5
03	Expt. 6 (any one)	12
04	Viva Voce	3
05	Laboratory Note Book	4
	Total Marks	**30**