BIHAR AGRICULTURAL UNIVERSITY
SABOUR – 813 210 (BHAGALPUR)

Admission Notice for Academic Session 2014 – 15

Applications are invited for eligible candidates for appearing in the Competitive Entrance Test to be held on **15.06.2014** at Bihar Agricultural University, Sabour (Bhagalpur) for admission in Masters degree (only for Domicile of Bihar State) / Ph.D. degree programmes for the academic session 2014 – 15 in various disciplines subject as detailed below:

PROGRAMME	DISCIPLINE		FEE	
	Agriculture Stream	Veterinary Stream	Gen./BC/ EBC/ RCG	SC/ST
Master	Agricultural Economics, Agricultural Statistics, Agronomy, Entomology, Extension Education, Horticulture, Agricultural Biotechnology and Genetic Engineering, Plant Breeding & Genetics, Plant Pathology, Soil Science & Agricultural Chemistry	Animal Genetics & Breeding, Animal Nutrition, ARGO, LPM, Veterinary Medicine, Veterinary Microbiology, Veterinary Parasitology, Veterinary Pathology, Veterinary Public Health & Epidemiology, Veterinary Surgery and Radiology	Rs. 500/-	Rs. 250/-
Ph.D.	Agronomy, Extension Education, Horticulture (Olericulture), Horticulture (Pomology), Plant Breeding & Genetics, Soil Science & Agricultural Chemistry	Animal Genetics & Breeding, Animal Nutrition, ARGO, LPM, Veterinary Parasitology	Rs. 700/-	Rs. 350/-

The application form and prospectus is available on University website **(www.bausabour.ac.in).** The application form and prospectus can also be obtained from the Office of the Registrar, Bihar Agricultural University, Sabour – 813 210 (Bhagalpur) from **15.04.2014 to 15.05.2014** by remitting requisite fee as mentioned above through DD in favour of **Comptroller, Bihar Agricultural University, Sabour payable at State Bank of India, Sabour.** Duly filled in application form along with enclosures and requisite fee should be sent through **registered / speed post** only to the office of the **Registrar, Bihar Agricultural University, Sabour- 813 210 (Bhagalpur)** so as to reach on or before **26.05.2014**.

Registrar

Bihar Agricultural University
Sabour, Bhagalpur (Bihar)

Bihar Agricultural University, Sabour (Bhagalpur) is a State Agricultural University, which has been established on 5th August 2010 by an Act (No. 20 of 2010) State Legislature of Bihar as a State University specified by the UGC under section 22 of the UGC Act. 1956. The area of activity of this University is extended in three Agroclimatic zones spread over in 25 districts that include 12 Research Stations and 20 Krishi Vigyan Kendra (KVKs).

Bihar Agricultural University, Sabour is having following colleges & Institutes.

1. Bihar Agricultural College, Sabour, Bhagalpur
2. Mandan Bharti Agricultural College, Agwanpur, Saharsa
3. Bihar Veterinary College, Patna
4. Sanjay Gandhi Institute of Dairy Technology, Patna
5. College of Horticulture, Noorsarai, Nalanda
6. Vir Kunwar Singh Agricultural College, Dumraon, Buxer
7. Bhola Paswan Shasrti Agricultural College, Purnea.

This University is situated about 8 km east of Bhagalpur and the nearest railway station is Sabour. Sabour is directly connected by road, rail and air links. The National Highway No. 80 previously called Assam link road, passes through Sabour which links Gauhati (Assam) and Patna (Bihar). The nearest Air Port (Bhagalpur) is located about 4 kms away from the University campus, which is likely come in operation soon.

The University offers courses for the award of UG, PG & Ph. D. Degree. The Masters & Ph.D. Degree are available in both Agriculture stream (at BAC, Sabour Campus) & Veterinary stream (at B.V.C., Patna Campus).

MANDATE

The mandate of Bihar Agricultural University, Sabour would include the following objectives:

- To impart education in different disciplines of agriculture and its allied disciplines.
- To undertake strategic and applied research for development of agricultural technology.
- To undertake extension education programme in the State of Bihar, by planning and organizing different programmes of human resource capability in agriculture and related domains.
- To help State Government in production and supply of breeder seeds for multiplication of foundation and certified seeds.
- To serve as a repository of national and international scientific information on various aspects of agricultural and animal production.
- To collaborate with relevant national and international agencies for all round development of agriculture and allied disciplines in the State, in particular and the country as a whole; and also to undertake such other activities, as it may deem fit, from time-to- time.

PROSPECTUS FOR ADMISSION TO
POST-GRADUATE (MASTER DEGREE) PROGRAMME, 2014–15

I. DEGREE PROGRAMME :

Admission during the academic session 2014 ï 15 is open to the following Master Degree Programme in the Bihar Agricultural University, Sabour- 813 210, Bhagalpur for domicile of Bihar.

Sabour Campus: Agricultural Biotechnology and Genetic Engineering, Agricultural Economics, Agricultural Statistics, Agronomy, Entomology, Extension Education, Horticulture, Plant Breeding & Genetics, Plant Pathology, Soil Science & Agricultural Chemistry.

Patna Campus: Animal Genetics & Breeding; Animal Nutrition; Animal Reproduction, Gynecology and Obstetrics; Livestock Production & Management; Veterinary Medicine; Veterinary Microbiology; Veterinary Parasitology; Veterinary Pathology; Veterinary Public Health & Epidemiology and Veterinary Surgery & Radiology.

II. ADMISSION CRITERIA AND ENTRANCE EXAMINATION :

1. Admission to the University implies acceptance without any modification by the candidate and his/her parents/guardians of all provisions given in the prospectus or any change in the University rules, regulation, fees, etc. that are made from time to time.

2. The students who have been temporarily dismissed or permanently dropped from this/any University either on account of poor academic performance or on account or act(s) or indiscipline or those who have been debarred from seeking admission in this/any University shall not be eligible to apply for admission to any programme of this University.

3. If any document submitted by the candidate is found to be false at any stage during his/her stay in this University, his/her admission will be cancelled.

4. The informationõs indicated in this prospectus are only for general guidance and could be modified/changed from time to time by the University without giving any notice.

5. For correspondence regarding admission, contact

REGISTRAR

Bihar Agricultural University, Sabour ï 813 210, Bhagalpur
Phone: - 0641 ï 2452614, Fax:-0641 ï 2452614
Website: www.bausabour.ac.in
Email: registrarbau2013@gmail.com

6. Admission to Master Degree Programme shall be made at the commencement of the academic year 2014-15.

7. The Competitive Test for admission to Master Degree Programme shall be conducted at BAU, Sabour on **15.06.2014** from 11.00 AM to 1.00 PM.

8. Candidate must affix or paste on the application form only the recent and clear photographs taken within last three months failing which the candidature would be rejected.

III. SALE OF APPLICATION FORM :

A.	The Application form shall be available for sale at the Office of the Registrar, BAU, Sabour only on payment of Rs. 500/- for General, EBC, BC & Others and Rs. 250/- for SC & ST category through Demand Draft.	15.04.2014 to 15.05.2014
B.	The application form may also be sent through Registered / Speed Post provided a demand draft of Rs. 500/- (for General / EBC / BC / RCG category) and Rs. 250/- (for SC / ST category) is enclosed along with request letter and a self addressed envelope (30 cm x 25 cm) with postal stamp of Rs. 70/- to the Office of the Registrar, BAU, Sabour.	
C.	The DD should be in favour of **Comptroller, Bihar Agricultural University, Sabour** payable at **State Bank of India, Sabour.** (*Cash, Cheque, Postal orders and money order shall not be accepted).*	
D.	Last Date for receipt of application form in the office of the Registrar through **Registered/Speed Post** only.	26.05.2014
E.	The Application form along with Prospectus can also be downloaded from University Website (www.bausabour.ac.in) Dully filled application form can be submitted along with requisite fee.	

IV. LAST DATE FOR SUBMISSION OF APPLICATION FORM :

The completed application form on the prescribed proforma along with self addressed envelop, bearing postage stamp of Rs. 27/- only for sending the admit card along with Acknowledgement Card must reach office of the **Registrar, Bihar Agricultural University, Sabour- 813 210, Bhagalpur on or before the date i.e. on 26.05.2014 by Registered/Speed Post only**. Application received after this date shall not be entertained.

V. SUBJECT WISE SEATS AND ELIGIBILITY CRITERIA :

Subject wise seats and eligibility criteria for admission in Master Degree Programme for Academic Session 2014 ï 2015 are as under:-

Agriculture Faculty					
Sl. No.	**Subjects**	**BAU Seats**	**ICAR Seats**	**Total Seats**	**Eligibility Criteria**
7.	Agricultural Biotechnology and Genetic Engineering	2	0	2	B.Sc. (Ag)/B.Sc. (Hort)
1.	Agricultural Economics	2	0	2	B.Sc. (Ag)/B.Sc. (Hort)
2.	Agricultural Statistics	2	0	2	B.Sc. (Ag)/B.Sc. (Hort)
3.	Agronomy	7	3	10	B.Sc. (Ag)/B.Sc. (Hort)
4.	Entomology	4	1	5	B.Sc. (Ag)/B.Sc. (Hort)
5.	Extension Education	4	1	5	B.Sc. (Ag)/B.Sc. (Hort)
6.	Horticulture	18	5	23	B.Sc. (Ag)/B.Sc. (Hort)
8.	Plant Breeding & Genetics	9	3	12	B.Sc. (Ag)/B.Sc. (Hort)
9.	Plant Pathology	4	1	5	B.Sc. (Ag)/B.Sc. (Hort)
10.	Soil Science & Agricultural Chemistry	9	3	12	B.Sc. (Ag)/B.Sc. (Hort)
Veterinary Faculty					
1.	Animal Genetics & Breeding	5	2	7	B.V. Sc. & A.H.
2.	Animal Nutrition	5	2	7	B.V. Sc. & A.H.
3.	Animal Reproduction, Gynecology and Obstetrics	4	1	5	B.V. Sc. & A.H.
4.	Livestock Production & Management	2	0	2	B.V. Sc. & A.H.
5.	Veterinary Medicine	2	0	2	B.V. Sc. & A.H.
6.	Veterinary Microbiology	2	1	3	B.V. Sc. & A.H.
7.	Veterinary Parasitology	4	1	5	B.V. Sc. & A.H.
8.	Veterinary Pathology	2	0	2	B.V. Sc. & A.H.
9.	Veterinary Public Health & Epidemiology	2	0	2	B.V. Sc. & A.H.
10.	Veterinary Surgery and Radiology	2	0	2	B.V. Sc. & A.H.

VI. ELIGIBILITY REQUIREMENT :

The University reserves the right to make addition or deletion in number of seats without any notice. Candidates possessing the minimum eligibility qualifications as given above shall be eligible for admission to the respective Master Degree Programme, provided that they fulfill the following conditions and qualify the written test and secure a place in the merit list.

(a) A candidate should possess at least 60% marks in aggregate or 6.0/10.0 in Bachelorôs Degree and in the case of SC/ST, 55% marks in aggregate or 5.5/10.0 OGPA is required.

(b) Cut of marks for SC/ST candidate is 45% and 50% for all other categories in the merit list of Entrance Test ï cum- Academic Performance.

VII. VERIFICATION OF ANTECEDENTS :

Each applicant who seeks admission to this University will be required to submit a Character Certificate from the Head of the Institution last attended certifying the following points:

(a) That the applicant has not taken part in any activity subversive of Rules, Regulations and Discipline of the Institution.

(b) That the applicant has never used unfair means in any examination of the Institution.

VIII. MODE OF ADMISSION :

(a) Scheme of Examination :

Candidates willing to secure admission in **Agriculture (Code- A)** and **Veterinary (Code - V)** streams will have to appear in Competitive Entrance Test.

The candidates will have to of the subject at the time of counseling on the basis of seat availability and reservation policy of Bihar Government.

Merit list:

The merit list shall be prepared on the basis of total marks obtained by the candidates in Entrance Test-cum-Academic Performance as mentioned below:

Entrance Test-cum-Academic Performance

(i)	Entrance Examination Test	80%
(ii)	Undergraduate	10%
(iii)	12^{th} standard	5%
(iv)	10^{th} standard	5%

(c) Breaking of tie:

For determining the merit of candidates in case of a tie, performance at Bachelor Degree level examination will form the criteria. If performance at Degree level is equal, then their age would determine the priority.

IX. REFUSAL OF ADMISSION :

(a) The Vice-Chancellor reserves the right to refuse the admission of any candidate despite his/her fulfillment of the academic requirements for admission on the basis of Entrance Test-cum-Academic performance, for reasons to be recorded in writing, whose admission in the opinion of the Vice-Chancellor shall not be in the best interest of the University. The decision of the Vice-Chancellor shall be final.

(b) The students who have been permanently dropped or temporarily dismissed from this/any University either on account of poor academic performance or on account of act of indiscipline or those who have been debarred from seeking admission in this University shall not be allowed to appear in the Competitive Test or will also not be allowed to seek admission as a sponsored candidate. Even if such a candidate has appeared in the competitive Test either by concealing the facts or due to oversight, shall not be eligible for admission.

(c) Candidates found using unfair means in Entrance Competitive Test of this University shall be permanently debarred from appearing in future in the Competitive Test of the University.

(d) It is the responsibility of the candidate to furnish full and correct information on the application form. Any admission made on the basis of wrong or concealed information, supplied by the candidates or due to any oversight or error in the Registrar office and detected subsequent to the admission or joining of the candidate would be cancelled at the cost and risk of the candidate.

X. RESERVATION OF SEATS :

Code numbers of various reservation categories have been given below:

Category	Code number
General (General)	101
Scheduled Caste (SC)	102
Scheduled Tribe (ST)	103
Extremely Backward Class (EBC)	104
Backward Class (BC)	105
Reserve Category Girls (RCG)	106

Reservation of seats shall be given as per Bihar Govt. Rules.

Categories wise seats for M.Sc. (Ag.) Degree Programme.

SI. No.	Subject	BAU Seats	UR	EBC	SC	BC	RCG	ST	Roaster Point
1.	Agricultural Biotechnology and Genetic Engineering	2	1	-	-	-	1	-	52-53
2.	Agricultural Economics	2	1	1	-	-	-	-	54-55
3.	Agricultural Statistics	2	1	-	1	-	-	-	56-57
4.	Agronomy	7	3	1	1	2	-	-	58-64
5.	Entomology	4	2	1	1	-	-	-	65-68
6.	Extension Education	4	2	1	-	1	-	-	69-72
7.	Horticulture	18	9	3	3	2	1	-	73-90
8.	Plant Breeding & Genetics	9	5	1	2	1	-	-	91-99
9.	Plant Pathology	4	2	2	-	-	-	-	100-03
10.	Soil Science & Agricultural Chemistry	9	4	1	2	2	-	-	04-12
	Total	**61**	**30**	**11**	**10**	**8**	**2**	**-**	**52-12**

Categories wise seats for M.V. Sc. Degree Programme.

SI. No.	Subject	BAU Seats	UR	EBC	SC	BC	RCG	ST	Roaster Point
1.	Animal Genetics & Breeding	5	3	1	1	-	-	-	25-29
2.	Animal Nutrition	5	2	1	1	1	-	-	30-34
3.	Animal Reproduction, Gynecology and Obstetrics	4	2	1	-	1	-	-	35-38
4.	Livestock Production & Management	2	1	-	1	-	-	-	39-40
5.	Veterinary Medicine	2	1	1	-	-	-	-	41-42
6.	Veterinary Microbiology	2	1	-	-	-	-	1	43-44
7.	Veterinary Parasitology	4	2	-	1	1	-	-	45-48
8.	Veterinary Pathology	2	1	1	-	-	-	-	49-50
9.	Veterinary Public Health & Epidemiology	2	1	-	-	-	1	-	51-52
10.	Veterinary Surgery and Radiology	2	1	1	-	-	-	-	53-54
	Total	**30**	**15**	**6**	**4**	**3**	**1**	**1**	**25-54**

XI. STREAM CODE :

A candidate has to clearly specify in the application form the stream code number given under section VIII (a).

XII. INSTRUCTION FOR FILLING THE APPLICATION FORM :

Instructions to the candidates for filling the application form are given in Appendix ï I.

XIII. FEE :

The details of the fee have been given in Appendix ï II. Selected candidates shall have to take admission by depositing the required fee.

XIV. SYLLABUS :

Syllabus for Entrance Test for admission in Masterôs Degree Programme shall be as below:

(a) For Agriculture stream: Syllabus of B. Sc.(Ag.)/ B. Sc.(Hort.) degree.

(b) For Veterinary stream: Syllabus of B. V. Sc. & A.H. degree.

XV. COUNSELING :

Candidates called for counseling will be required to submit their relevant documents in original as given below with one set of attested photocopies of the certificates/marks sheet.

(a) High School/equivalent examination mark sheet as well as certificate for proof of age.

(b) Intermediate/equivalent examinations mark sheet and certificate.

(c) Bachelor Degree Examination Mark sheet/Transcript and Provisional Degree Certificate or Degree Certificate.

(d) Caste certificate issued by the C.O/B.D.O. (in case candidates claiming reservation).

(e) Two points Character Certificate from Head of the Institution last attended.

(f) Domicile Certificate issued by the Competent Authority.

Counseling does not guarantee admission. It depends on merit and availability of seats in a particular stream/ discipline. In case, candidates fail to attend the counseling his/her candidature shall automatically stand rejected. University shall not bear any responsibility for any postal delay.

XVI. RESIDENTIAL REQUIREMENT :

A minimum 4 semesters shall be the residential requirement for completing the courses in Master Degree programme and the maximum period in which the regular student must obtain his/her degree shall be 8 semester.

It is compulsory for the students to stay in the University/College Hostel. The students may be required to move to other campuses also for one or more semesters for particular courses or research work.

XVII. UNIVERSITY FELLOWSHIP :

The University Fellowship shall be awarded to 75% students admitted in a particular subject on the basis of their performance in First Semester result.

XVIII. PROCEDURE TO APPLY :

(a) The application form along with Admit Card and Acknowledgement card (affixed with postal stamp), self-addressed envelope bearing postal stamps of Rs. 27/- only, and filled neatly and correctly by the applicant should be forwarded with necessary set of attested copies of the documents viz, High School Certificate as a proof of date of birth, mark sheet of 10^{th}, 12^{th}, Degree Examination, domicile certificate and caste certificate if applicable so as to reach the **Registrar, Bihar Agricultural University, Sabour- 813 210, Bhagalpur on or before the last date i.e. 26.05.2014** by **Registered/Speed Post** only. Any application received after the last date shall not be entertained.

(b) The Candidate who is appearing for the Bachelor Degree Examination is also eligible to apply provisionally for admission and appear in the Competitive Test. However, he/she must complete the degree requirement on or before **01.07.2014**.

(c) If a candidate furnishes wrong information or suppresses any relevant information, his/her admission will be cancelled.

(d) Candidate must enclose attested copies of the following certificate (whichever is applicable) and document in order as indicated below. The candidature of the candidate, who fails to attach

photocopies of certificate, will not be considered. If selected, candidate has to submit original certificate at the time of counseling.

(1) Proof for date of birth

(2) Matriculation (Class X) or equivalent certificate and marks sheet

(3) 10+2/Intermediate Examination certificate and marks sheet

(4) Bachelor Degree Certificate/ Provisional Degree Certificate and Transcript.

(5) Caste Certificate (if applicable)

(6) Self-addressed envelope bearing postage stamp worth Rs. 27/- only for sending admit card along with a postcard for acknowledgement

(7) Domicile certificate

Admit card for the Competitive Test to be conducted on **15.06.2014** will be sent by Registered post well in advance to all eligible candidates who have submitted their application form completed in all respect by the due date. Those who do not get the Admit Card may approach the office of Registrar one day before the Examination i.e. on **14.06.2014** for issue of Duplicate Admit Card with payment of Rs. 50.00 only.

IMPORTANT DATES

1.	Sale of Application Form and Prospectus	:	15.04.2014 to 15.05.2014
2.	Last date of submission of Application Form	:	26.05.2014
3.	Issue of Admit Card	:	03.06.2014
4.	Issue of Duplicate Admit Card	:	14.06.2014
5.	Date, time and venue of Examination	:	15.06.2014 11.00 AM to 1.00 PM B.A.U. Sabour (Bhagalpur)
6.	Date of Publication of Merit List	:	09.07.2014
7.	Date, time and venue of Counseling	:	23.07.2014 : Examination Hall, BAC, Sabour 9.30 AM to 5.00 PM

(Candidate may have to stay for one more Day for counseling at his/her own cost)

8.	Date of Admission	:	25.07.2014

DIRECTIONS FOR CANDIDATE

1. The candidate shall be present at the centre 30 minutes before the commencement of the Examination.

2. Candidate will not be admitted to the Examination Hall after 30 minutes from the commencement of the Examination.

3. Candidate who does not produce the Admit Card shall not be allowed to sit in the examination hall by the Centre Superintendent/Invigilator.

4. Candidate must preserve the Admit Card till his/her admission in the institution/Department.

5. Candidates are not allowed to leave the Examination Hall before expiry of the time and handing over the answer sheet and Question paper (Test Booklet) to the concerned Invigilator.

6. The candidate shall not remove any page(s) from the Test Booklet and if any page(s) is/are found missing from his/her booklet, he/she will be prosecuted against and shall be liable for cancellation of his/her candidature and legal action.

7. The candidate must fill in the Box with **blue ballpoint pen** of good quality.

8. Candidates are not allowed to bring any **books, notes or calculator, cell phone** etc. in the Examination Hall.

9. Candidate must follow the instructions strictly as given by the invigilators in the examination hall.

10. No cutting or overwriting is allowed.

11. Impersonation in any form will lead to cancellation of candidature and legal action.

Appendix – I

INSTRUCTION FOR FILLING THE APPLICATION FORM

Please read the following instruction carefully before filling up the application form.

Application form must be filled by applicantôs own handwriting in English only.

All entries in the box provided in item 1 to 10 must be made in block letters only with a ball pen. Please ensure that three recent identical passport size photographs from same negative (showing the portion of body chest upward) are pasted at appropriate places. The photographs to be affixed must be attested by Head of the Institution last attended/attending.

Do not fill in the spaces meant for office use.

1. The candidate is required to write his/her name in Capital letter in English in the same order as entered in his/her Matric examination/Mark sheet/certificate as blow :

P	U	J	A		R	A	N	I		K	U	M	A	R	I					

2. Write the name of father :

3. Write the name of mother :

4. Write the name of Guardian (if father is not alive) :

5. Date of birth must be entered in Christian era as recorded in High School Certificate e.g. 5th September1991 be entered as

0	5		0	9		1	9	9	1
Date			Month			Year			

6. Write complete address:

7. Sex (Write ôMô for male and ôFô for female)

8. Nationality :

9. Domicile of Bihar (Write ôYesô or ôNoô)

10. Reservation Category : As defined in item-X

11. Write your caste, if you sought reservation:

12. Stream; As defined in item- VIII (a)

13. The details of the Bank Draft should be entered at the appropriate space provided in the application form.

14. Percentage of marks secured: Enter the actual percentage of marks secured in Matric/10th, Inter/12th and Bachelorôs Degree up to two digits after decimal, for example 79.66.

15. Please write your Phone / Mobile No.

16. Please ensure that the declaration is duly signed by the father/guardian (if father is not alive). Forged signature is liable to disqualify the candidate from counseling.

17. The candidate must ensure that the certificate of forwarding officer is duly signed by the Head of the Institution last attended/attending along with seal. The forwarding officer must be the same who has attested the photograph on the application form of the candidate.

18. The candidate who is appearing in the Bachelor Degree Examination is also eligible to apply provisionally for admission and appear in the Competitive Test Examination. However, He/ She must complete the degree requirement on or before **01.07.2014** and attested copy of mark sheet/ transcript must be submitted to the office of Registrar latest by **07.07.2014** through email **registrarbau2013@gmail.com** only.

19. Conversion formula for conversion of OGPA into percentage of marks and vice-versa adopted by the University from where candidate has obtained degree certificate may be mentioned in application form at appropriate place.

Appendix – II

Master Degree Programme

Sl. No.	Item	Rs.
1.	Course Registration fee (per student per semester)	125.00
2.	Migration fee/Emigration fee (once in Academic Programme)	150.00
3.	Laboratory caution money (Refundable)	400.00
4.	Semester fees to be charged in each semester	
	(a) Admission fee	150.00
	(b) Tuition fee	1500.00
5.	Examination fee to be charged in each semester	300.00
6.	Library security money (Refundable)	1000.00
7.	Library fee (per semester)	200.00
8.	Medical fee (per semester)	150.00
9.	Athletic fee (per semester)	150.00
10.	Extra Co-curricular fee (per semester)	150.00
11.	Common Room fund (per student per semester)	50.00
12.	Hostel fund (per student per semester)	50.00
13.	Hostel charge	
	(a) Hostel Security money (Refundable)	500.00
	(b) Seat rent (per student per semester)	400.00
14.	Development fee/charges (Once in Academic Programme)	3000.00
15.	University Registration fee (Once in Academic Programme)	100.00
16.	Bihar State Inter University Sports & Cultural meet	10.00
	Total	**8385.00**

Fees to be charged semester-wise

First Semester

Category	M.Sc. Programme (Rs.)	Remarks
General	8385.00	
SC/ST	6585.00	Only tuition fee and exam fee will not be charged
EBC/BC-1*	6885.00	Tuition fee will not be charged from EBC/BC ï 1*

Note: * Those EBC/ BC - I students who are recipient of scholarship/fellowship/stipend shall be charged full fee as in case of general candidate.

Fee to be charged in Subsequent Semester:

Category	M.Sc. Programme (Rs.)	Remarks
General	3235.00	
SC/ST	1435.00	Only tuition fee and exam fee will not be charged
EBC/BC-1*	1735.00	Tuition fee will not be charged from EBC/BC ï 1*

Note: * Such EBC/BCï 1 students who are recipient of scholarships/fellowships/stipend shall be charged full fees as in the case of general category students.

PROSPECTUS FOR ADMISSION TO
Ph. D. DEGREE PROGRAMME, 2014 – 15

I. DEGREE PROGRAMME :

Ph. D. Admission during the academic session 2014ï 15 is opened in the following disciplines.

Sabour Campus: Agronomy, Extension Education, Horticulture (Olericulture), Horticulture (Pomology), Plant Breeding & Genetics and Soil Science & Agricultural Chemistry.

Patna Campus: Animal Genetics & Breeding; Animal Nutrition; Animal Reproduction, Gynecology and Obstetrics; Livestock production & Management and Veterinary Parasitology.

II. ADMISSION CRITERIA AND ENTRANCE EXAMINATION:

(1) Admission to the university implies acceptance without any modification by the candidate and his/her parents/guardians of all provisions given in the prospectus or any change in the University rules, regulation, fees, etc., that are made from time to time.

(2) The students who have been temporarily dismissed or permanently dropped from this/any University either on account of poor academic performance or on account of act(s) of indiscipline or those who have been debarred from seeking admission in this/any University shall not be eligible to apply for admission to any programme of this University.

(3) If any document submitted by the candidate is found to be false at any stage during his/her stay in this University, his/her admission will be cancelled.

(4) The information indicated in this prospectus is only for general guidance and could be modified/ changed from time to time by the University without giving any notice.

(5) For correspondence regarding admission, contact

REGISTRAR

Bihar Agricultural University, Sabour- 813 210, Bhagalpur

Phone: - 0641 ï 2452614, Fax: -0641 ï 2452614
Website: www.bausabour.ac.in
Email: registrarbau2013@gmail.com

(6) The Competitive Test for admission to Ph. D. Programme shall be conducted at BAU, Head Quarter, Sabour on **15.06.2014** from 11.00 AM to 01.00 PM.

(7) Candidate must affix or paste on the application form only the recent and clear photographs taken within last three months failing which the candidature would be rejected.

III. SALE OF APPLICATION FORM :

A.	The Application form shall be available for sale at the Office of the Registrar, BAU, Sabour only on payment of Rs. 700/- for General, EBC, BC & Others and Rs. 350/- for SC & ST category through Demand Draft.	15.04.2014 to 15.05.2014
B.	The application form may also be sent through Registered / Speed Post provided a demand draft of Rs. 700/- (for General / EBC / BC / RCG category) and Rs. 350/- (for SC / ST category) is enclosed along with request letter and a self addressed envelope (30 cm x 25 cm) with postal stamp of Rs. 70/- to the Office of the Registrar, BAU, Sabour.	
C.	The DD should be in favour of **Comptroller, Bihar Agricultural University, Sabour** payable at **State Bank of India, Sabour.** (*Cash, Cheque, Postal orders and money order shall not be accepted).*	
D.	Last Date for receipt of application form in the office of the Registrar through **Registered/Speed Post** only.	26.05.2014

E.	The Application form along with Prospectus can also be downloaded from University Website (www.bausabour.ac.in) Dully filled application form can be submitted along with requisite fee.	

IV. LAST DATE FOR SUBMISSION OF APPLICATION FORM :

The completed application form on the prescribed proforma along with self addressed envelop, bearing postage stamp of Rs. 27/- only for sending the admit card along with Acknowledgement Card must reach the **Registrar, Bihar Agricultural University, Sabour- 813210, Bhagalpur on or before the date i.e. 26.05.2014** by post only. Application received after this date shall not be entertained.

V. NUMER OF SEATS:

Number of seats for admission to Ph. D. Degree Programme for academic session 2014 ï 15 are as under:-

Sl. No.	Subjects	Total Seat
Agriculture Faculty		
1.	Agronomy	4
2.	Extension Education	2
3.	Horticulture (Olericulture)	4
4.	Horticulture (Pomology)	4
5.	Plant Breeding & Genetics	3
6.	Soil Science & Agricultural Chemistry	6
Veterinary Faculty		
1.	Animal Genetics & Breeding	3
2.	Animal Nutrition	2
3.	Animal Reproduction, Gynecology and Obstetrics	2
4.	Live Stock Production Management	2
5.	Veterinary Parasitology	2

The university reserves the right to make addition or deletion in number of seats without any notice.

VI. ELIGIBILITY CRITERIA:

Candidate should have following qualification for admission to respective Ph.D. Degree Programme.

Discipline	Qualification
All Discipline	Master Degree in subject concerned

Also they have to fulfill the following conditions and qualify in the test and secure a place in the merit list.

(a) Minimum 65% marks in Master Degree Programme for all Categories.

(b) Cut of marks for SC/ST candidate is 45% and 50% for all other Categories in the merit list of Entrance ï cum- Academic Performance.

VII. VERIFICATION OF ANTECEDENTS:

Each applicant who seeks admission to this University will be required to submit a *Character Certificate* from the Head of the Institution last attended certifying the following points:

(a) That the applicant has not taken part in any activity subversive of Rules, Regulations and Discipline of the Institution.

(b) That the applicant has never used unfair means in any examination of the Institution.

VIII. MODE OF ADMISSION:

(a) **Scheme of Examination :**

Candidates willing to secure admission in Agriculture (Code- A1 to A 6) and Veterinary (Code ï V 1 to V 5) streams will have to appear in Competitive Entrance Test.

The candidates will have to select only one subject mentioned in section (V) for admission to Ph.D. Programme. Admission would be allowed to the selected candidates in the subject applied for admission.

(b) Merit list:

The merit list shall be prepared on the basis of total marks obtained by the candidates in Entrance Test-cum-Academic Performance as mentioned below;

Entrance Test-cum-Academic Performance

(i)	Entrance	80%
(ii)	Master Degree	10%
(iii)	Bachelor Degree	10%

(c) Subject with code number for appearing in the Competitive Entrance Examination.

Sl. No.	Subject	Code No.
Agricultural Faculty		
1.	Agronomy	A 1
2.	Extension Education	A 2
3.	Horticulture (Olericulture)	A 3
4.	Horticulture (Pomology)	A 4
5.	Plant Breeding & Genetics	A 5
6.	Soil Science & Agricultural Chemistry	A 6
Veterinary Faculty		
1.	Animal Genetics & Breeding	V 1
2.	Animal Nutrition	V 2
3.	Animal Reproduction, Gynecology & Obstetrics	V 3
4.	Live Stock Production Management	V 4
5.	Veterinary Parasitology	V 5

(d) Choice of programme:

The selected candidate shall be allowed for admission in department concerned only for which he/she has appeared in the competitive examination based on merit, availability of seats and reservation policy of Bihar Govt. in the subject concerned, at the time of counseling.

(e) Breaking of tie:

For determining the merit of candidates in case of a tie, performance at Master Degree level examination will form the criteria. If performance at Master level is equal, then their age would determine the priority

IX. REFUSAL OF ADMISSION:

(a) The Vice-Chancellor reserves the right to refuse the admission of any candidate despite his/her fulfillment of the academic requirements for admission on the basis of Entrance Test-cum-Academic performance, for reasons to be recorded in writing whose admission in the opinion of the Vice-Chancellor shall not be in the best interest of the University. The decision of the Vice-Chancellor shall be final and legal binding on the candidate.

(b) The students who have been permanently dropped or temporarily dismissed from this/any University either on account of poor academic performance or on account of act of indiscipline or those who have been debarred from seeking admission in this University shall not be allowed to appear in the Competitive Test or will also not be allowed to seek admission as a sponsored candidate. Even if such a candidate has appeared in the competitive Test either by concealing the facts or due to oversight, shall not be eligible for admission.

(c) Candidates found using unfair means in Entrance Competitive Test of this University shall be permanently debarred from appearing in future in the Competitive Test of the University.

(d) It is the responsibility of the candidate to furnish full and correct information on the application form. Any admission made on the basis of wrong or concealed information, supplied by the candidates or due to any oversight or error in the Registrar office and detected subsequently to the admission, or joining of the candidate would be cancelled at the cost and risk of the candidate.

X. RESERVATION OF SEATS:

Code numbers of various reservation categories have been given below:

Category	Code number
General (General)	101
Scheduled Caste (SC)	102
Scheduled Tribe (ST)	103
Extremely Backward Class (EBC)	104
Backward Class (BC)	105
Reserve Category Girls (RCG)	106

Reservation of seats shall be given as per Bihar Govt. Rules.

Categories wise seats for Ph. D Degree (Agriculture Faculty)

SI. No.	SUBJECT	Seats	UR	EBC	SC	BC	RCG	ST	Roaster point
1.	Agronomy	4	2	1	-	1	-	-	19-22
2.	Extension Education	2	1	-	1	-	-	-	23-24
3.	Horticulture (Olericulture)	4	2	1	1	-	-	-	25-28
4.	Horticulture (Pomology)	4	2	1	-	1	-	-	29-32
5.	Plant Breeding & Genetics	3	2	-	1	-	-	-	33-35
6.	Soil Science & Agricultural Chemistry	6	3	1	1	1	-	-	36-41
	Grand Total	**23**	**12**	**4**	**4**	**3**	**-**	**-**	**19-41**

Categories wise seats for Ph. D Degree (Veterinary Faculty)

SI. No.	SUBJECT	Seats	UR	EBC	SC	BC	RCG	ST	Roaster point
1.	Animal Genetics & Breeding	3	1	1	-	1	-	-	12-14
2.	Animal Nutrition	2	1	-	1	-	-	-	15-16
3.	Animal Reproduction, Gynecology & Obstetrics	2	1	-	-	-	1	-	17-18
4.	Live Stock Production Management	2	1	1	-	-	-	-	19-20
5.	Veterinary Parasitology	2	1	-	-	1	-	-	21-22
	Total	**11**	**5**	**2**	**1**	**2**	**1**	**-**	**12-22**

XI. SUBJECT CODE:

A candidate has to clearly specify in the application form the subject code number given under section VIII-C.

XII. INSTRUCTION FOR FILLING THE APPLICATION FORM:

Instructions to the candidates for filling the application form are given in Appendix ï III.

XIII. FEE:

The details of the fee have been given in Appendix ï IV. Selected Candidates shall have to take admission by depositing the required fee.

XIV. SYLLABUS:

Syllabus for competitive Entrance Examination for admission to Ph. D. Degree Programme is appended (Appendix - V).

XV. COUNSELING:

Candidates called for counseling will be required to submit their relevant documents in original as given below with one set of attested photocopies of the certificates/mark sheet.

(a) High School/equivalent examination Mark sheet as well as certificate for proof of age.

(b) Intermediate/equivalent examination Mark sheet and certificate.

(c) Bachelor Degree Examination Mark sheet/Transcript and Provisional Degree Certificate or Degree Certificate.

(d) Master Degree Examination Mark sheet/Transcript and Provisional Degree Certificate or Degree certificate.

(e) Caste certificate issued by the C.O. /BDO (in case, candidate claiming for reservation).

(f) Two points Character Certificate from Head of the Institution last attended.

(g) Domicile Certificate issued by the Competent Authority.

Counseling does not guarantee admission. It depends on merit and availability of seats in a particular discipline. In case, candidates fail to attend the counseling on the prescribed date & time, his/her candidature shall automatically be rejected. University shall not bear any responsibility for any postal delay. .

XVI. RESIDENTIAL REQUIREMENT:

A minimum period of 6 semesters shall be the residential requirement for completing the courses in Ph. D. Degree Programme and the maximum period in which the regular student must obtain his/her degree shall be 10 semesters. It is compulsory for the students to stay in the University/College Hostel. The students may be required to move to other campuses also for one or more semesters for research work.

XVII. UNIVERSITY FELLOWSHIP:

The University Fellowship shall be awarded to 75% students admitted in a particular subject on the basis of their performance in First Semester result.

XVIII. PROCEDURE TO APPLY:

(a) A candidate can apply for admission to only one subject. No. change would be allowed thereafter.

(b) The application form along with Admit Card and Acknowledgement card (affixed with postal stamp), self-addressed envelope bearing postal stamps of Rs. 27/- only, and filled neatly and correctly by the applicant should be forwarded with necessary sets of attested copies of the documents viz, High School Certificate as a proof of date of birth, mark sheet of 10^{th}, 12^{th}, Bachelor and Master Degree Examination and caste certificate if applicable so as to reach **the Registrar, Bihar Agricultural University, Sabour-813 210 Bhagalpur on or before the last date i.e. 26.05.2014** by Registered/Speed Post only. Any application received after the last date shall not be entertained.

(c) The Candidate who is appearing in the Master Degree Examination is also eligible to apply provisionally for admission and appear in the Competitive Test for admission in Ph. D. Degree Programme. However, he/she must have completed the degree requirement on **or before 01.07.2014**.

(d) If a candidate furnishes wrong information or suppresses any relevant information, his/her admission will be cancelled.

(e) Candidate must enclose attested copies of the following certificate (whichever is applicable) and document in order as indicated below. The candidature of the candidate who fails to attach Xerox copies of certificates will not be considered. If selected, candidate has to submit original certificate at the time of counseling.

(1) Proof of date of birth

(2) Matriculation (Class X) or equivalent certificate and Mark sheet

(3) 10+2/Intermediate Examination certificate and Mark sheet

(4) Bachelor Degree Certificate and Transcript.

(5) Master Degree Certificate/ Provisional Degree Certificate and Transcript.

(6) Caste Certificate (if applicable) issued by C.O./B.D.O

(7) Self-addressed envelope bearing postage stamp worth Rs. 27/- only for sending admit card along with a postcard for acknowledgement

Admit card for the Competitive Test to be conducted on **15.06.2014** will be sent by Registered post well in advance to all eligible candidates who have submitted their application form complete in all respect by the due date. Those who do not get the Admit Card may approach to the office of the Registrar one day before the Examination i.e. on **14.06.2014** for issue of Duplicate Admit Card with payment of Rs. 50.00 only.

IMPORTANT DATES

1.	Sale of Application Form and Prospectus	:	15.04.2014 to 15.05.2014
2.	Last date of submission of Application Form	:	26.05.2014
3.	Issue of Admit Card	:	03.06.2014
4.	Issue of Duplicate Admit Card	:	14.06.2014
5.	Date, time and venue of Examination	:	15.06.2014 BAU, Sabour 11.00 AM to 1.00 PM
6.	Date of Publication of Merit List	:	09.07.2014
7.	Date, time and venue of Counseling	:	23.07.2014 :Examination Hall, BAC, Sabour 9.30 AM to 5.00 PM

(Candidate may have to stay for one more Day for counseling at his/her own cost)

8.	Date of Admission	:	25.07.2014

DIRECTIONS FOR CANDIDATE

1. The candidate shall be present at the centre 30 minutes before the commencement of the Examination.

2. Candidate will not be admitted to the Examination Hall after 30 minutes from the commencement of the Examination.

3. Candidate who does not produce the Admit Card shall not be allowed to sit in the examination hall by the Centre Superintendent/Invigilator.

4. Candidate must preserve the Admit Card till his/her admission in the institution/Department.

5. Candidates are not allowed to leave the Examination Hall before expiry of the time and handing over the answer sheet and Question paper (Test Booklet) to the concerned Invigilator.

6. The candidate shall not remove any page(s) from the Test Booklet and if any page(s) is/are found missing from his/her booklet, he/she will be prosecuted against and shall be liable for cancellation of his/her candidature and legal action.

7. The candidate must fill in the Box with **blue ballpoint pen** of good quality.

8. Candidates are not allowed to bring any **books, notes or calculator, cell phone** etc. in the Examination Hall.

9. Candidate must follow the instructions strictly as given by the invigilators in the examination hall.

10. No cutting or overwriting is allowed.

11. Impersonation in any form will lead to cancellation of candidature and legal action.

Appendix – III

INSTRUCTION FOR FILLING THE APPLICATION FORM

Please read the following instruction carefully before filling up the application form.

Application form must be filled by applicantôs own handwriting in English only.

All entries in the box provided in item 1 to 10 must be made in block letters only with a ball pen. Please ensure that three recent identical passport size photographs from same negative (showing the portion of body chest upward) are pasted at appropriate places. The photographs to be affixed must be attested by Head of the Institution last attended/attending.

Do not fill in the places meant for office use only.

1. The candidate is required to write his/her name in Capital letter in English in the same order as entered in his/her Matric examination/Mark sheet/certificate as below :

R	A	J		K	U	M	A	R		S	I	N	G	H								

2. Write the name of father :

3. Write the name of mother :

4. Write the name of Guardian (if father is not alive) :

5. Date of birth must be entered in Christian era as recorded in High School Certificate e.g. 8th September 1982 be entered as

0	8	0	9		1	9	8	2
Date		Month			Year		

6. Write complete address:

7. Sex (Write óMô for male and óFô for female)

8. Nationality :

9. Domicile of Bihar (Write óYesô or óNoô)

10. Reservation Category : As defined in item-X

11. Write your caste, if you sought reservation :

12. Subject code : As defined in item- VIII (C)

13. Percentage of marks secured: Enter the actual percentage of marks secured in Matric/10th, Inter/12th, Bachelorôs Degree and Masterôs degree up to two digits after decimal, for example 79.66.

14. Please write your full Mailing Address with PIN CODE

15. The details of the Bank Draft should be entered at the appropriate space provided in the application form.

16. Please ensure that the declaration is duly signed by the father/guardian (if father is not alive). Forged signature is liable to disqualify the candidate from counseling.

17. The candidate must ensure that the certificate of forwarding officer is duly signed by the Head of the Institution last attended/attending along with seal. The forwarding officer must be the same who has attested the photograph on the application form of the candidate.

18. The candidate who is appearing in the Master Degree Examination is also eligible to apply provisionally for admission and appear in the Competitive Test Examination. However, he/she must complete the degree requirement on or **before 01.07.2014**. Attested copy of transcript/ mark sheet must be submitted to the office of Registrar through email- registrarbau2013@gmail.com latest by **07.07.2014.**

19. Formula for conversion of OGPA into percentage of marks and vice-versa adopted by the University from where candidate has obtained degree certificate may be mentioned at appropriate place of Application form.

Appendix – IV

Ph.D. Degree Programme

Sl. No.	Item	Rs.
1.	Course Registration fee (per student per semester)	125.00
2.	Migration fee/Emigration fee (once in Academic Programme)	150.00
3.	Laboratory caution money (Refundable)	500.00
4.	Semester fees to be charged in each semester	
	(a) Admission fee	150.00
	(b) Tuition fee	2000.00
5.	Examination fee to be charged in each semester	400.00
6.	Library security money (Refundable)	1000.00
7.	Library fee (per semester)	200.00
8.	Medical fee (per semester)	150.00
9.	Athletic fee (per semester)	150.00
10.	Extra Co-curricular fee (per semester)	150.00
11.	Common Room fund (per student per semester)	50.00
12.	Hostel fund (per student per semester)	50.00
13.	Hostel charge	
	(a) Hostel Security money (Refundable)	500.00
	(b) Seat rent (per student per semester)	400.00
14.	Development fee/charges (once in Academic Programme)	3000.00
15.	University Registration fee (once in Academic Programme)	100.00
16.	Bihar State Inter University Sports & Cultural meet	10.00
	Total	**9085.00**

Fees to be charged semester-wise

First Semester

Category	Ph. D. Programme (Rs.)	Remarks
General	9085.00	
SC/ST	6685.00	Only tuition fee and exam fee will not be charged
EBC/BC-1*	7085.00	Tuition fee will not be charged from EBC/BC ï 1*

Note: * Such EBC/BC-I students who are recipient of scholarship/fellowship/stipend shall be charged full fee as in the case of general category students.

Fee to be charged in Subsequent Semester

Category	Ph. D. Programme (Rs.)	Remarks
General	3835.00	
SC/ST	1435.00	Only tuition fee and exam fee will not be charged
EBC/BC-1*	1835.00	Tuition fee will not be charged from EBC/BC ï 1*

Note: * Such EBC/BCï 1 students who are recipient of scholarship/fellowship/stipend shall be charged full fee as in the case of general category students.

Appendix – V

SYLLABUS FOR COMPETITIVE TEST FOR ADMISSION TO

Ph. D. DEGREE PROGREMME

AGRONOMY (CODE - A 1)

UNIT – I

Crop growth analysis in relation to environment; agro-ecological zones of India. Quantitative agro-biological principles and inverse yield nitrogen law; Mitscherlich yield equation, its interpretation and applicability; Baule unit. Effect of lodging in cereals; physiology of grain yield in cereals; optimization of plant population and planting geometry in relation to different resources, concept of ideal plant type and crop modeling for desired crop yield. Scientific principles of crop production; crop response production functions; concept of soil plant relations; yield and environmental stress. Integrated farming systems, organic farming, and resource conservation technology including modern concept of tillage; dry farming; determining the nutrient needs for yield potentiality of crop plants, concept of balance nutrition and integrated nutrient management; precision agriculture; crop residue recycling and management, sustainable agriculture and good agricultural practices.

UNIT – II

Soil fertility and productivity - factors affecting; features of good soil management; problems of supply and availability of nutrients; relation between nutrient supply and crop growth; organic farming - basic concepts and definitions. Criteria of essentiality of nutrients; Essential plant nutrients ï their functions, nutrient deficiency symptoms; transformation and dynamics of major plant nutrients. Preparation and use of farmyard manure, compost, green manures, vermicompost, biofertilizers and other organic concentrates their composition, availability and crop responses; recycling of organic wastes and residue management. Commercial fertilizers; composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades; agronomic, chemical and physiological methods of increasing fertilizer use efficiency; nutrient interactions. Time and methods of manures and fertilizers application; foliar application and its concept; relative performance of organic and inorganic manures; economics of fertilizer use; integrated nutrient management; use of vermin compost and residue wastes in crops.

UNIT - III

Weed biology and ecology, crop-weed competition including allelopathy; principles and methods of weed control and classification; weed indices. Herbicides introduction and history of their development; classification based on chemical, physiological application and selectivity; mode and mechanism of action of herbicides. Herbicide structure - activity relationship; factors affecting the efficiency of herbicides; herbicide formulations, herbicide mixtures; herbicide resistance and management; weed control through bio-herbicides, myco-herbicides and allelochemicals; Degradation of herbicides in soil and plants; herbicide resistance in weeds and crops; herbicide rotation. Weed management in major crops and cropping systems; parasitic weeds; weed shifts in cropping systems; aquatic and perennial weed control. Integrated weed management; cost: benefit analysis of weed management.

UNIT - IV

Water and its role in plants; water resources of India and Bihar, major irrigation projects of India and Bihar, extent of area and crops irrigated in India and different states. Irrigation and irrigation management- definition, objectives and limitations. Soil water movement in soil and plants; transpiration; soil-water-plant relationships; water absorption by plants; plant response to water stress, crop plant adaptation to moisture stress condition. water requirement of crops. Soil, plant and meteorological factors determining water needs of crops; scheduling, depth and methods of irrigation; micro irrigation system; fertigation; management of water in controlled environments and poly houses. Concept of of ET, CU, PET, ETc, Epan, and their importance in assessing WR, IW/ CPE ratio and its importance. Water management of the crops and cropping systems; quality of irrigation water and management of saline water for irrigation; leaching requirement , irrigation efficiencies and methods of increasing field water efficiency, Excess of soil water and plant growth; water management in problem soils; drainage requirement of crops , drainage coefficient and methods of field drainage, their layout and spacing.

EXTENSION EDUCATION (CODE – A 2)

UNIT- I

Approaches of Agricultural Extension: A critical analysis of different approaches of agricultural extension. Importance and relevance of indigenous knowledge system, identification and documentation of ITK, Integration of ITK system in research formulation, Concept of Agricultural Knowledge and Information System, Training of Stakeholders of AKIS. Cyber Extension - Concept of cyber extension, national and international cases of extension projects using ICT and their impact of agricultural extension, alternative methods of financing agricultural extension - Scope, limitations and experience and cases. Research - Extension -Farmer - Market linkage: Importance, Scope, Implications etc., Market - Led Extension, Farmer - Led Extension, Concept

of Farm Field School, Farm School, Public - Private Partnership: Meaning, Models, Identification of various areas for partnership. Stakeholderôs analysis in Extension.Main streaming gender in Extension - Issues and Prospects. Implications of WTO - AOA for extension services, re-orientation of extension services for agri-business and marketing activities, GOI-NGO collaboration to improve efficiency of extension. Extension and contemporary issues: Extension and issues related to rural poverty. Privatization of Extension. Intellectual Property Rights (IPRs). Extension Reforms in India - Decentralized decision making, Bottom up planning, Farming System and Situation based Extension Delivery System, Extension delivery through Commodity Interest Groups. Organization innovations in Extension - ATIC, IVLP, Kisan Call Centres.

UNIT- II

Scaling technique - meaning, types, principles, steps and quality, techniques of attitude scale construction - Paired comparison, Equal appearing intervals, Successive Intervals, Summated ratings, Scalogram analysis, Scale discrimination technique, Reliability and Validity of Scales. Sociometrics, content analysis, case studies, Q-sort techniques, Semantic different technique.

Projective and Semi projective techniques, Critical incident techniques, Computer packages for analysis - usage in Extension Research. Knowledge scale measurement. Participatory tools and techniques in behaviour Research - Data collection and Evaluation. Impact analysis, e-data collection and information analysis.

UNIT- III

Paradigm shift in training - learning scenario, Training Approaches - Experiential learning - laboratory - organization development (system) approaches; Training Design, Designing an effective training programme, Harmonizing training needs, Course Objective, content and methods. Designing an effective training session - the semantics involved, Designing experiential training sessions, simulation exercises, and openness in training transaction - managing dilemmas, ambivalence and conflicts and confusion (for both trainers and trainees).Recent Training Techniques for understanding and facilitation team building, group dynamics, motivation and empowerment, laboratory methods: micro-lab process work, and sensitivity training, Psychological instruments as training tools: TAT, Inventories, Cases, etc. Participatory Training Techniques - Lecture, Brainstorming, Group discussion and Training Games. Role Play, Psycho-drama, Coaching, Counseling, etc., Trainerôs roles and dilemmas, Factors Effecting Training Effectiveness and Training Evaluation.

UNIT- IV

Introduction to organizations: Concept and Characteristics of organizations, Organizational Behvaiour - Context and concept - levels of organizations - formal and informal organizations, Theories of organizations: Nature of organizational theory - classical theories - features of Bureaucracy - administrative theory and Scientific management - Neo-classical theories - the human relations movement - modern theory. Systems approach to study organization needs and motives - Attitude, values and ethical behaviour - alienation and work - work motivation - communication and interpersonal behaviour - organization communication - leadership behaviour -decision making, problem solving techniques - organizational climate - change proneness and resistance to change, Organizational change, Organizational structure - Process in organizing - Dimension of Motivation Climate. Departmentation - Span of Management - Delegation of authority ï Centralizationand decentralization - line and staff organization - functional organization- divisonalisation - Project organization - Matrix organization - free formorganization - top management structure. Individual behaviour in organization. Fundamentals of Human relations andOrganizational behaviour, Groups and teams - Organisational culture and performance. Dynamics of Organization behaviour - leadership conflict situationsand inter group behavior- Organisational Development - Factors effecting organization effectiveness. Creativity, leadership, motivation and organization development.

UNIT- V

Concepts in Instructional Technology, Scope of Instructional Technology. History of agricultural education in India. Guidelines for curriculum development in Agricultural Universities. Curriculum design development. Course outline, Lesson plans for theory and practicals. Teaching and learning styles.Theories of learning.Cognitive levels.Instructional Course Objective. Motivation of students.Instructional Methods.Experiential learning cycle.Innovative Instructional Aids.Computer Assisted Instruction. Programmed instruction technique. Team Teaching. E-Learning, Art of Effective Communication. Distance education. Student evaluation - Question Bank.Appraisal of Teacher Performance. Review of research in Instructional Technology.

Introduction to organizations: Concept and Characteristics of organizations, Organizational Behvaiour- Context and concept - levels of organizations - formal and informal organizations, Theories of organizations: Nature of organizational theory - classical theories - features of Bureaucracy - administrative theory and Scientific management - Neo-classical theories - the human relations movement - modern theory. Systems approach to study organization needs and motives - Attitude, values and ethical behaviour - alienation and work - work motivation - communication and interpersonal behaviour - organization communication - leadership behaviour -decision making, problem solving techniques - organizational climate - change proneness and resistance to change, Organizational change, Organizational structure - Process in organizing - Dimension of Motivation Climate. Departmentation - Span of Management - Delegation of authority ï Centralizationand decentralization- line and staff organization - functional organization-divisonalisation - Project organization- Matrix organization-free formorganization - top management structure. Individual behaviour in organization. Fundamentals of Human relations andOrganizational behaviour, Groups and teams - Organisational culture and performance. Dynamics of Organization behaviour - leadership conflict situationsand inter group behavior- Organisational Development - Factors effecting organization effectiveness. Creativity, leadership, motivation and organization development.

HORT. OLERICULTURE (CODE- A 3):

UNIT - I

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/ hybrids, sowing/ planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post-harvest management, plant protection measures and seed production of cool season vegetables: Potato, cabbage, cauliflower, knoll kohl, sprouting broccoli, Brussels, sprout, Root crops: carrot, radish, turnip, beetroot, Bulb, onion, garlic, Peas, broad bean, green leafy vegetables.

UNIT – II

Introduction, botany and taxonomy, climatic and soil requirements, commercial varieties/ hybrids, sowing/ planting times and methods, seed rate and seed treatment, nutritional and irrigation requirements, intercultural operations, weed control, mulching, physiological disorders, harvesting, post harvest management, plant protection measures, and economics of crop production and seed production of Warm Season Vegetables: Tomato, Eggplant, Hot and Sweet Peppers, Okra, Beans, Cowpea and Cluster Bean, Cucurbitaceous Crops, Tapioca and Sweet Potato, Green Leafy vegetables.

UNIT – III

Classification of vegetables, Principles of breeding of vegetable crops; Heterosis, mutation breeding, polyploidy, male sterility system, self incompatibility: mechanisms favoring self and cross pollination; origin, botany, taxonomy, floral biology, cytogenetics, genetics, breeding objectives; Various breeding methods: introduction, selection, hybridization, mutation), varieties and varietal characterization, resistance breeding for biotic and abiotic stress, quality improvement, molecular marker, genomics, marker assisted breeding and QTLs, biotechnology and their use in breeding in vegetable crops-Issue of patenting, PPVFR Act for the crops *viz*. Potato, Tomato, Eggplant, Hot Pepper, Sweet Pepper, Okra, Peas & Beans, Amaranth, Chenopods, Lettuce, Gourds, Melons, Pumpkins & Squashes, Cabbage, Cauliflower, Carrot, Beetroot, Radish, Sweet Potato and Tapioca.

UNIT – IV

Cellular structures and their functions; definition of growth and development, growth analysis and its importance in vegetable production; Physiology of dormancy and germination of vegetable seeds, tubers and bulbs; Role of auxins, gibberellins, cytokinins, ethylene and abscissic acid; Application of synthetic hormones, plant growth retardants and inhibitors for various purposes in vegetable crops; Role and mode of action of morphactins, antitranspirants, anti-auxin, ripening retardant and plant stimulants in vegetable crop production; Role of light, temperature and photoperiod on growth, development of underground parts, flowering and sex expression in vegetable crops; apical dominance; Physiology of fruit set, fruit development, fruit growth, flower and fruit drop; parthenocarpy in vegetable crops; phototropism, ethylene inhibitors, senescence and abscission; fruit ripening and physiological changes associated with ripening; Plant growth regulators in relation to vegetable production; morphogenesis and tissue culture techniques in vegetable crops.

UNIT – V

Definition of seed and its quality, new seed policies; DUS test, scope of vegetable seed industry in India. Genetical and agronomical principles of seed production; methods of seed production; use of growth regulators and chemicals in vegetable seed production; floral biology, pollination, breeding behaviour, seed development and maturation; methods of hybrid seed production; Categories of seed; maintenance of nucleus, foundation and

certified seed; seed certification, seed standards; seed act and law enforcement, plant quarantine and quality control; Physiological maturity, seed harvesting, extraction, curing, drying, grading, seed processing, seed coating and pelleting, packaging (containers/ packets), storage and cryopreservation of seeds, synthetic seed technology; Agro-techniques for seed production in solanaceous vegetables, cucurbits, leguminous vegetables, cole crops, bulb crops, leafy vegetables, okra and vegetatively propagated vegetable crops.

HORT. POMOLOGY (CODE- A 4)

UNIT – I

Area, production and productivity, nutritional values, commercial varieties of regional, national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, planting systems, cropping systems, root zone and canopy management, nutrient management, critical satges of water management, fertigation, role of bioregulators, abiotic factors limiting fruit production, physiology of flowering, pollination fruit set and development, honeybees in cross pollination, physiological disorders- causes and remedies, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; industrial and export potential, Agri. Export Zones(AEZ) and industrial supports. Intellectual property rights, regulatory horticulture. Detection of genetic. Constitution of germplasm and maintenance of core group. Origin and distribution, taxonomical status - species and cultivars, cytogenetics, genetic resources, blossom biology, breeding systems, breeding objectives, ideotypes, approaches for crop improvement - introduction, selection, hybridization, mutation breeding, polyploidy breeding, rootstock breeding, improvement of quality traits,resistance breeding for biotic and abiotic stresses,biotechnological interventions, achievements and future thrust in the following selected fruit crops.
Mango, banana, citrus, papaya, guava, sapota, jackfruit, pineapple, annonas, avocado, aonla, pomegranate, phalsa, ber, apple, pear, quince, grapes, Plums, peach, apricot, cherries, hazelnut Litchi, loquat, persimmon, kiwifruit, strawberry, Nuts- walnut, almond, pistachio, pecan, Minor fruits- mangosteen, carambola, bael, wood apple, fig, jamun, rambutan, pomegranate, custard apple, carambola, and Plantation crops-coconut, arecanut, tea, coffee and cocoa.

UNIT – II

Introduction, life cycles in plants, cellular basis for propagation, sexual propagation, apomixis, polyembryony, chimeras, Bud sport. Principles factors influencing seed germination of horticultural crops, dormancy, hormonal regulation of germination and seedling growth. Seed quality, treatment, packing, storage, certification, testing. Asexual propagation ï rooting of soft and hard wood cutting under mist by growth regulators. Rooting of cuttings in hotbeds. Physiological, anatomical and biochemical aspects of root induction in cuttings. Layering ï principle and methods. Budding and grafting ï selection of elite mother plants, methods. Establishment of bud wood bank, stock, scion and inter stock, relationship ï Graft Incompatibility. Rejuvenation through top working ï Progeny orchard and scion bank. Micro-propagation ï principles and concepts, commercial exploitation in horticultural crops. Techniques - *in vitro* clonal propagation, direct organogenesis, embryogenesis, micrografting, meristem culture. Hardening, packing and transport of micro-propagules.Physiological disorder of national importance.

UNIT – III

Growth and development- definition, parameters of growth and development, growth dynamics, morphogenesis. Annual, semi-perennial and perennial horticultural crops, environmental impact on growth and development, effect of light, photosynthesis and photoperiodismernalisation, teffect of temperature, heat units, thermoperiodism. Assimilate partitioning during growth and development, influence of water and mineral nutrition during growth and development, biosynthesis of auxins, gibberellins, cytokinins, abscissic acid, ethylene, brasssinosteroids, growth inhibitors, morphactins, role of plant growth promoters and inhibitors. Developmental physiology and biochemistry during dormancy, bud break, juvenility, vegetative to reproductive interphase, flowering, pollination, fertilization and fruit set, fruit drop, fruit growth, ripening and seed development. Growth and developmental process during stress - manipulation of growth and development, impact of pruning and training, chemical manipulations in horticultural crops, molecular and genetic approaches in plant growth development. Analytical technique in horticulture research.

PLANT BREEDING & GENETICS (CODE- A 5)

UNIT - I

Beginning of genetics; Cell structure and cell division; Early concepts of inheritance, Mendel's laws; Discussion on Mendelôs paper, Chromosomal theory of inheritance. Multiple alleles, Gene interactions. Sex determination, differentiation and sex-linkage, Sex-influenced and sex-limited traits; Linkage-detection, estimation; Recombination and genetic mapping in eukaryotes, Somatic cell genetics, Extra chromosomal inheritance. Population - Mendelian population ï Random mating population - Frequencies of genes and genotypes-Causes of change: Hardy-Weinberg equilibrium. Structural and numerical changes in chromosomes; Nature, structure and replication of the genetic material; Organization of DNA in chromosomes, Genetic code; Protein biosynthesis. Genetic fine structure analysis, Allelic complementation, Split genes, Transposable genetic elements, Overlapping genes, Pseudogenes, Oncogenes, Gene families and clusters. Regulation of gene activity in prokaryotes; Molecular mechanisms of mutation, repair and suppression; Bacterial plasmids, insertion (IS) and transposable (Tn) elements; Molecular chaperones and gene expression. Gene regulation in eukaryotes, RNA editing. Gene isolation, synthesis and cloning, genomic and cDNA libraries, PCR based cloning, positional cloning; Nucleic acid hybridization and immunochemical detection; DNA sequencing; DNA restriction and modification, Anti-

sense RNA and ribozymes; Micro-RNAs (miRNAs). Genomics and proteomics; Functional and pharmacogenomics; Metagenomics. Methods of studying polymorphism at biochemical and DNA level; Transgenic bacteria and bioethics; Gene silencing; genetics of mitochondria and chloroplasts. Concepts of Eugenics, Epigenetics, Genetic disorders and Behavioural genetics.

UNIT - II

Architecture of chromosome in prokaryotes and eukaryotes; Chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; Artificial chromosome construction and its uses; Special types of chromosomes. Chromosomal theory of inheritance ï Cell Cycle and cell division ï mitosis and meiosis; Differences, significance and deviations ï Synapsis, structure and function of synaptonemal complex and spindle apparatus, anaphase movement of chromosomes and crossing over-mechanisms and theories of crossing over-recombination models, cytological basis, - Variation in chromosome structure: Evolutionary significance - Introduction to techniques for karyotyping; Chromosome banding and painting - in situ hybridization and various applications. Structural and Numerical variations of chromosomes and their implications - Symbols and terminologies for chromosome numbers - euploidy - haploids, diploids and polyploids ; Utilization of aneuploids in gene location - Variation in chromosome behaviour - somatic segregation and chimeras ï endomitosis and somatic reduction ; Evolutionary significance of chromosomal aberrations - balanced lethals and chromosome complexes. Inter-varietal chromosome substitutions; Polyploidy and role of polyploids in crop breeding; Evolutionary advantages of autopolyploids vs allopolyploids ï - Role of aneuploids in basic and applied aspects of crop breeding, their maintenance and utilization in gene mapping and gene blocks transfer ï Alien addition and substitution lines ï creation and utilization; Apomixis - Evolutionary and genetic problems in crops with apomixes. Reversion of autopolyploids to diploids; Genome mapping in polyploids - Interspecific hybridization and allopolyploids; Synthesis of new crops (wheat, triticale and brassica) ï Hybrids between species with same chromosome number, alien translocations - Hybrids between species with different chromosome number; Gene transfer using amphidiploids ï Bridge species. Fertilization barriers in crop plants at pre-and post fertilization levels- In vitro techniques to overcome the fertilization barriers in crops; Chromosome manipulations in wide hybridization; case studies ï Production and use of haploids, dihaploids and doubled haploids in genetics and breeding.

UNIT - III

History of Plant Breeding (Pre and post-Mendelian era); Objectives of plant breeding, characteristics improved by plant breeding; Patterns of Evolution in Crop Plants- Centres of Origin-biodiversity and its significance. Genetic basis of breeding self- and cross - pollinated crops including mating systems and response to selection - nature of variability, components of variation; Heritability and genetic advance, genotype environment interaction; General and specific combining ability; Types of gene actions and implications in plant breeding; Plant introduction and role of plant genetic resources in plant breeding. Self-incompatibility and male sterility in crop plants and their commercial exploitation. Pure line theory, pure line selection and mass selection methods; Line breeding, pedigree, bulk, backcross, single seed descent and multiline method; Population breeding in self-pollinated crops (diallel selective mating approach). Breeding methods in cross pollinated crops; Population breeding-mass selection and ear-to-row methods; S1 and S2 progeny testing, progeny selection schemes, recurrent selection schemes for intra and inter-population improvement and development of synthetics and composites; Hybrid breeding - genetical and physiological basis of heterosis and inbreeding, production of inbreds, breeding approaches for improvement of inbreds, predicting hybrid performance; seed production of hybrid and their parent varieties/inbreds. Breeding methods in asexually/clonally propagated crops, clonal selection apomixes, clonal selection. Self-incompatibility and male sterility in crop plants and their commercial exploitation; Concept of plant ideotype and its role in crop improvement; Transgressive breeding. Special breeding techniques- Mutation breeding; Breeding for abiotic and biotic stresses. Cultivar development- testing, release and notification, maintenance breeding, Participatory Plant Breeding, Plant breedersô rights and regulations for plant variety protection and farmers rights.

UNIT - IV

Mendelian traits vs polygenic traits - nature of quantitative traits and its inheritance - Multiple factor hypothesis - analysis of continuous variation; Variations associated with polygenic traits - phenotypic, genotypic and environmental - non-allelic interactions; Nature of gene action - additive, dominance, epistatic and linkage effects. Principles of Anaylis of Variance (ANOVA) - Expected variance components, random and fixed models; MANOVA, biplot analysis; Comparison of means and variances for significance. Designs for plant breeding experiments ï principles and applications; Genetic diversity analysis ï metroglyph, cluster and D2 analyses - Association analysis - phenotypic and genotypic correlations; Path analysis and Parent - progeny regression analysis; Discriminant function and principal component analyses; Selection indices - selection of parents; Simultaneous selection models- concepts of selection - heritability and genetic advance. Generation mean analysis; Mating designs- Diallel, partial diallel, line x tester analysis, NCDs and TTC; Concepts of combining ability and gene action; Analysis of genotype x environment interaction - adaptability and stability; Models for GxE analysis and stability parameters; AMMI analysis ï principles and interpretation. QTL mapping; Strategies for QTL mapping - desired populations for QTL mapping - statistical methods in QTL mapping - QTL mapping in Genetic analysis; Marker assisted selection (MAS) - Approaches to apply MAS in Plant breeding - selection based on marker - simultaneous selection based on marker and phenotype - factors influencing MAS.

UNIT - V

Mutation and its history - Nature and classification of mutations: spontaneous and induced mutations, micro and macro mutations, pre and post adaptive mutations - Detection of mutations in lower and higher organisms ï paramutations. Mutagenic agents: physical -- Radiation types and sources: Ionising and non-ionizing radiations viz., X rays, ɔ rays, , and ɓ particles, protons, neutrons and UV rays - Radiobiology: mechanism of action of various radiations (, photoelectric absorption, Compton scattering and pair production) and their biological effects ï RBE and LET relationships. Effect of mutations on DNA - Repair mechanisms operating at DNA, chromosome, cell and organism level to counteract the mutation effects - Dosimetry - Objects and methods of treatment - Factors influencing mutation: dose rate, acute vs chronic irradiation, recurrent irradiation, enhancement of thermal neutron effects - Radiation sensitivity and modifying factors: External and internal sources- Oxygen, water content, temperature and nuclear volume.

UNIT - VI

Historical aspect of heterosis - Nomenclature and definitions of heterosis - Heterosis in natural population and inbred population; Evolutionary aspects - Genetic consequences of selfing and crossing in self-and cross-pollinated and asexually propagated crops crops. Pre Mendelian and Post-Mendelian ideas - Genetic theories of heterosis ï Physiological, Biochemical and molecular factors underlining heterosis; theories and their estimation; - Evolutionary concepts of heterosis.

Prediction of heterosis from various crosses- Inbreeding depression, frequency of inbreeding and residual heterosis in F_2 and segregating populations, importance of inbreeding in exploitation of heterosis ï case studies. - Relationship between genetic distance and expression of heterosis ï case studies; Divergence and Genetic Distance analyses-morphological and molecular genetic distance in predicting heterosis, Development of heterotic pools in germplasm/genetic stocks and inbreds, their improvement for increasing heterosis. Types of male sterility and use in heterosis breeding; Maintenance, transfer and restoration of different types of male sterility; Use of self incompatibility in development of hybrids; Hybrid seed production system: 3-line, 2-line and 1-line system; Development of inbreds and parental lines- A, B and R lines ï functional male sterility; Commercial exploitation of heterosis- maintenance breeding of parental lines in hybrids. Fixation of heterosis in self, cross and often cross pollinated crops, asexually/clonally propagated crops; Male sterile line creation and diversification in self pollinated, cross pollinated and asexually propagated crops; problems and prospects; Apomixis in fixing heterosis-concept of single line hybrid. Organellar heterosis and complementation - Creation of male sterility through genetic engineering and its exploitation in heterosis. Heterosis breeding in wheat, rice, cotton, maize, pearl millet, sorghum and oilseed crops.

UNIT - VII

Ultra-structure of the cell; Differences between eukaryotic and prokaryotic cells, macromolecules; Structure and function of cell wall, nuclear membrane and plasma membrane; Cellular Organelles ï nucleus, plastids chloro/chromoplast, mitochondria endoplasmic reticulum, Golgi complex, lysosomes, peroxisomes. Bioenergetics; Ultra-structure and function of mitochondria and biological membranes; Chloroplast and other photosynthetic organelles; Interphase nucleus- Structure and chemical composition; Cell division and physiology of cell division. Historical background of molecular genetics; Genetic material in organisms; Structure and properties of nucleic acid, DNA transcription and its regulation ï Transcription factors and their role; Genetic code, regulation of protein synthesis in prokaryotes and eukaryotes ï ribosomes, t-RNAs and translational factors. Transposable elements; Mechanisms of recombination in prokaryote; DNA organization in eukaryotic chromosomes ï DNA content variation, types of DNA sequences ï Unique and repetitive sequences; organelle genomes;

Gene amplification and its significance; Proteomics and protein-protein interaction; Signal transduction; Genes in development; Cancer and cell aging.

UNIT – VIII

Biotechnology and its relevance in agriculture; Definitions, terminologies and scope in plant breeding. Tissue culture- History, callus, suspension cultures, cloning; Regeneration; Somatic embryogenesis; Anther culture; somatic hybridization techniques; Meristem, ovary and embryo culture; cryopreservation. Techniques of DNA isolation, quantification and analysis; Genotyping; Sequencing techniques; Vectors, vector preparation and cloning, Biochemical and Molecular markers: morphological, biochemical and DNA-based markers (RFLP, RAPD, AFLP, SSR,SNPs, ESTs etc.), mapping populations (F2s, back crosses, RILs, NILs and DH). Molecular mapping and tagging of agronomically important traits. Statistical tools in marker analysis, Robotics; Marker-assisted selection for qualitative and quantitative traits; QTLs analysis in crop plants, Gene pyramiding. Marker assisted selection and molecular breeding; Genomics and genoinformatics for crop improvement; Integrating functional genomics information on agronomically/economically important traits in plant breeding; Marker-assisted backcross breeding for rapid introgression, Generation of EDVs. Recombinant DNA technology, transgenes, method of transformation, selectable markers and clean transformation techniques, vector-mediated gene transfer, physical methods of gene transfer. Production of transgenic plants in various field crops: cotton, wheat, maize, rice, soybean, oilseeds, sugarcane etc. Commercial releases. Biotechnology applications in male sterility/hybrid breeding, molecular farming. MOs and related issues (risk and regulations); GMO; International regulations, biosafety issues of GMOs; Regulatory procedures in major countries including India, ethical, legal and social issues; Intellectual property rights Bioinformatics & Bioinformatics tools. Nanotechnology and its applications in crop improvement programmes.

UNIT – IX

Importance of plant breeding with special reference to biotic and abiotic stress resistance; Classification of biotic stresses ï major pests and diseases of economically important crops - Concepts in insect and pathogen resistance; Analysis and inheritance of resistance variation; Host defense responses to pathogen invasions- Biochemical and molecular mechanisms; Acquired and induced immunity and systemic acquired resistance (SAR); Host-pathogen interaction, gene-for-gene hypothesis, molecular evidence for its operation and exceptions; Concept of signal transduction and other host-defense mechanisms against viruses and bacteria.
Types and genetic mechanisms of resistance to biotic stresses ï Horizontal and vertical resistance in crop plants. Quantitative resistance/Adult plant resistance and Slow rusting resistance - Classical and molecular breeding methods - Measuring plant resistance using plant fitness; Behavioural, physiological and insect gain studies. Phenotypic screening methods for major pests and diseases; Recording of observations; Correlating the observations using marker data ï Gene pyramiding methods and their implications. Classification of abiotic stresses - Stress inducing factors ï moisture stress/drought and water logging & submergence; Acidity, salinity/alkalinity/sodicity; High/low temperature, wind, etc. Stress due to soil factors and mineral toxicity; Physiological and Phenological responses; Emphasis of abiotic stresses in developing breeding methodologies. Genetics of abiotic stress resistance; Genes and genomics in breeding cultivars suitable to low water regimes and water logging & submergence, high and low/freezing temperatures; Utilizing MAS procedures for identifying resistant types in important crops like rice, sorghum, wheat, cotton etc; Breeding for resistance to stresses caused by toxicity, deficiency and pollutants/contaminants in soil, water and environment. Exploitation of wild relatives as a source of resistance to biotic and abiotic factors in major field crops - Transgenics in management of biotic and abiotic stresses, use of toxins, protease inhibitors, lectins, chitnases and Bt for diseases and insect pest management- Achievements.

SOIL SCIENCE AND AGRICULTURAL CHEMISTRY (CODE- A 6)

UNIT – I

Soil as a three phase system. Soil texture, textural classes, mechanical analysis, specific surface. Soil consistence; dispersion and workability of soils; Soil structure - genesis, types and management soil structure; soil aggregation, and stability; soil tilth, characteristics of good soil tilth; Soil water: potential, soil water retention, soil-water constants, measurement of soil water content, energy state of soil water, soil water potential, soil-moisture characteristic curve; hysteresis, measurement of soil-moisture potential.
Water flow in saturated and unsaturated soils, Poiseuilleôs law, Darcyôs law; hydraulic conductivity, permeability; measurement of hydraulic conductivity in saturated and unsaturated soils. Infiltration; internal drainage and redistribution; evaporation; hydrologic cycle, field water balance; soil-plant-atmosphere continuum. Composition of soil air; renewal of soil air - convective flow and diffusion; measurement of soil aeration; aeration requirement for plant growth; soil air management. Energy balance; thermal properties of soil; measurement of soil temperature.
Soil Consistency, Atterbergsô limits and its practical significance, Plasticity ; Soil crusting : types, measurement and management.
Soil erosion: Wind and water erosion, factors, types . Soil conservation measures
Watershed : concepts and its implication in modern context
Water Use Efficiency: Concept

UNIT – II

Soil fertility and soil productivity; nutrient sources ï fertilizers and manures; essential plant nutrients - functions and deficiency symptoms. Nutrient interactions and plant growth. Soil and fertilizer nitrogen ï sources, forms, immobilization and mineralization, nitrification, denitrification; biological nitrogen fixation - types, mechanism, microorganisms and factors affecting; nitrogenous fertilizers and their fate in soils; fertilizer use efficiency. Soil and fertilizer phosphorus - forms, immobilization, mineralization, reactions in acid and alkali soils; factors affecting phosphorus availability in soils; phosphatic fertilizers - behavior in soils and management under field conditions. Potassium - forms, equilibrium in soils and its agricultural significance; potassium fixation; management of potassium fertilizers under field conditions. Sulphur - source, forms, fertilizers and their behavior in soils; calcium and magnesiumï factors affecting their availability in soils; management of sulphur, calcium and magnesium fertilizers. Micronutrients ï critical limits in soils and plants; factors affecting their availability and correction of their deficiencies in plants; role of chelates in nutrient availability. Common soil test methods for fertilizer recommendations; quantityï intensity relationships; soil test crop response correlations and response functions. Fertilizer use efficiency; blanket fertilizer recommendations ï usefulness and limitations; site-specific nutrient management; integrated nutrient management. Soil fertility evaluation - biological methods, soil, plant and tissue tests; soil quality in relation to sustainable agriculture.
Fertlizer control order (FCO), Specifications, Methods of fertilizers and manures analysis, Fertilizer dose calculation.

UNIT – III

Composition of the earthôs crust and soils. Elements of equilibrium thermodynamics, chemical equilibria, electrochemistry and chemical kinetics. Soil colloids: inorganic and organic colloids - origin of charge, concept of point of zero-charge (PZC) and its dependence on variable-charge surface charge characteristics of soils; diffuse double layer theories of soil colloids, zeta potential, sorption properties of soil colloids; soil organic matter - fractionation of soil organic matter, clay-organic interactions. Ion exchange processes in soil; cataion exchange-

theories based on law of mass action, adsorption isotherms, donnan-membrane equilibrium concept, clay-membrane electrodes and ionic activity measurement, Schofieldsô ratio law and its implication in plant nutrition ; Suspension effect

Thermodynamics, statistical mechanics; anion and ligand exchange, fixation of oxyanions, hysteresis in sorption-desorption of oxy-anions and anions, shift of PZC on ligand exchange, AEC, CEC; Potassium, phosphate and ammonium fixation in soils covering specific and non-specific sorption; Problem soils (Acid Soils, Acid sulphate soils, Saline soils, Saline alkali SOils, Alkali soils etc), their characteristics and their management strategies. Chemistry of acid soils; active and potential acidity; lime potential, salt-affected soils and amendments; soil pH, ECe, ESP, SAR and important relations; soil management and amendments, submerged soils. Quality of irrigation water, different parameters and its measurement. D value and its practical implication.

UNIT – IV

Crystallography, space lattice, coordination theory, structure, chemical composition and properties of clay minerals; genesis and transformation of crystalline and non-crystalline clay minerals. Rocks and minerals : origin, Classification and its implication in soil genesis. Factors of soil formation, soil forming processes; weathering of rocks and mineral; soil profile; weathering sequences of minerals. Concept of soil individual; soil classification systems - soil survey and its types; soil survey techniques - conventional and modern; soil series ï characterization and procedure for establishing soil series; benchmark soils and soil correlations; soil survey interpretations; soil mapping, thematic soil maps. Landform ï soil relationship; major soil groups of India with special reference to respective states; land capability classification and land irrigability classification; land evaluation and land use type (LUT) ï concept and application.

UNIT – V

Soil microbial ecology, types of organisms in different soils; biochemistry of root-soil interface; soil enzymes, origin, activities and importance; soil characteristics influencing growth and activity of microflora. Microbial transformations of nitrogen, phosphorus, sulphur, iron and manganese in soil; biochemical composition and biodegradation of soil organic matter and crop residues, humus formation; cycles of important organic nutrients. Biodegradation of pesticides, organic wastes and their use for production of biogas and manures; biotic factors in soil development; microbial toxins in the soil. Preparation and preservation of farmyard manure, animal manures, rural and urban composts and vermicompost. Biofertilizers ï definition, classification, specifications, method of production and role in crop production. Concept of Soil Quality and Soil health. Soil Quality assessment techniques. Biological degradation of soils and its implication in crop production

UNIT – VI

Soil, water and air pollution problems. Nature and sources of pollutants ï agricultural, industrial, urban wastes, fertilizers and pesticides, acid rains, oil spills etc. Sewage and industrial effluents ï their composition and effect on soil properties/health, and plant growth and human beings; soil as a sink for waste disposal. Pesticides ï their classification, behavior in soil and effect on soil microorganisms. Toxic elements ï their sources, behavior in soils, effect on nutrients availability, effect on plant and human health. Pollution of water resources due to leaching of nutrients and pesticides from soil; emission of greenhouse gases ï carbon dioxide, methane and nitrous oxide. Carbon sequestration-Concepts, approaches and potential Remediation/amelioration of contaminated soil and water; remote sensing applications in monitoring and management of soil and water pollution. Soil degradation: types, Physical, Chemical and Biological, factors of degradation, management option.

ANIMAL GENETICS & BREEDING [CODE –V 1]

Development in animal cytogenetics and immunogenetics of farm animals. Immunoglobulins and their types: antigen-antibody interactions, Immune response, ELISA. Major histocompatibility complex; genetics of biochemical variants and their applications; Ir-genes and concepts of disease resistance including major genes; hybridoma and its significance; concept of immuno-fertility, BoLA, BuLA, TLRs, Interleukins. Chromatin structure of eukaryotes; chromosome number and morphology in farm animals banding and karyotyping; chromosomal and genetic syndromes, DNA packing in chromosomes, Z+B DNA, FISH chromosome painting and PRINS. RH Panel Mapping. Mutation and assays of mutagenesis; sister chromatid exchanges; recombinant DNA technique and its application in animal improvement programme.

Basic concept: Genesis and importance of molecular techniques; Genome organization – physical and genetic map, current status of genome maps of livestock. Molecular markers and their application; RFLP, RAPD, Microsatellite/ Minisatellite markers, SNP marker, DNA fingerprinting. DNA sequencing, Genome sequencing, Genomic Library, Polymerase Chain Reaction (PCR), its types (PCR-RFLP, AS-PCR etc.) and applications; Transgenesis and methods of gene transfer. Statistical techniques for analyzing molecular genetic data, Quantitative Trait Loci (QTL) mapping and its application in animal breeding, Genome scan, Candidate gene approach, Genomic selection, Marker Assisted Selection- basic concept. Individual verses population. Genetic Structure of population. Factors affecting changes in gene and genotypic frequencies and their effect on genetic structure of animal popultions. Approach to equalibrium under differnet situations: Viz: Single autosomal locus with two alleles, single sex-linked locus, two pairs of autosomal linked and unlinked loci;

Small population: random genetic drift, effective popultion size, pedigreed populations, regular and irregular inbreeding systems. Quantitative genetics-gene effects, population mean and variance and its partitioning, biometric relations between relatives. Genetic and phenotypic parameters-their methods of estimation, uses, possible biases and precision. Scale effects and threshold traits. Problems relating to gene and genotypic frequencies under different conditions. Estimation orf inbreeding in regular and irregular systems. Estimation of effective population size. Computation of quantiatative genetic effects. Estimation of variance components. Computation of heritability, repeatability, genetic, environmental and phenotypic correlations and their standard errors.Type of selection and their genetic consequences. Response to selection and its prediction and improvement of response to selection.Theoretical aspects of accuracy and efficiency of different base of selection. Prediction of breeding value using different criteria. Combined Selection. Correlated response to selection and efficiency of indirect selection. Selection of several traits. Evaluation of short term and long term selection experiments viz: bidirectional selection and asymmetry of response, selection plateux and limit. Genetic aspects and consequences of various mating systems. Effects of mating systems on mean and variance. Application of various mating system in animal improvement. Selection for general and specific combining ability. Genetic polymorphysim and its application in genetic improvement.

Review of basic concepts in statistical inference and balanced experimental designs. Nature of structure of animal breeding data and sources of variation. Introduction to matrix algebra, types of matrices and matrix operations. Determinants and their properties, methods of finding inverse of a matrix and their application. ANOVA, Regression and Correlations, Henderson's methods for estimation of variance components, Basic concepts of linear models, Least-squares analysis, maximum likelihood; Method of estimation; Generalized LS and weighted LS. Fisher's discriminant function and its application, D2 - Statistics in divergent analysis.

Linear models in animal breeding, Methods of analysis of unbalanced animal breeding data. Adjustment of data. Data base management and use of software packages in animal breeding.

Matrix applications, determinant and inverse of matrices; Building of models for various types of data; Estimation of variance components; Least squares method for analysis of research data; Collection, compilation, coding, transformation and analysis of animal breeding data by using above biometrical techniques with computer application.

Domestic Animal Diversity in India, its origin, history and utilization. Present status and flow of Animal Genetic Resources and its contribution to livelihood security. Methodology for genotypic characterization of livestock and poultry breeds through systematic surveys. Fodder availability; management of breed; physical, biochemical and performance traits and uniqueness of animals of a breed; social, cultural and economic aspects of their owners/communities rearing the breed.

Methodology for molecular genetic characterization, diversity analysis and relationship among the breeds. Concept of conservation, *In-situ* and *ex-situ* (*invivo* and *in-vitro*); models of conservation; prioritization of breeds for conservation. National and international strategies for conservation of Animal Genetic Resources.

Status, opportunities and challenges in conservation of AnGR. IPR issues pertaining to animal genetic resources/animal products or by-products. Registration of livestock breeds and protection of livestock owner's rights in India.

History of dairy cattle and buffalo breeding. Breeds of cattle and buffallo and their Characterisation.Inheritance of important economic traits. Recording and handeling of breeding data. Standardization of records. Computation of correction factors for the adjustment of the data. Estimation of breeding values of the cows and bulls.

Sire evaluation methods using single trait and multiple traits: construction of Sire indices, Sire evaluation under animal model, sire mode; and maternal grand sire model. Open nucleus breeding systems with MOET.

Methods of cross breeding.Breeding of type, milk quality and production efficency. Plans for developing new breeds of dairy cattle. History of development of important breeds of dairy cattle.

Considerations in the import of exotic germplasm for breeding cattle in the tropics. Appraisal of buffalo and cattle breeding programme. Role of breed assocaitions in dairy improvement.

Performance recording – milk recording - Estimation of economic traits –Standardization of records – Index cards – Sire evaluation –Comparison of latest methods - Computation of genetic parameters – Genetic

gain –Estimation of heterosis – Culling and replacement. Breeds–Economic traits–Prolificacy-Breeding records and standardization. Genetic parameters – Selection of males and females – Breeding systems. Development of new breeds. Breeding policy – Breeding research – Conservation of breeds. Culling and replacement – EADR.

ANIMAL NUTRITION (CODE- V 2)

Basic terminology and classification of carbohydrates, fats and proteins. Fundamental concepts of Digestion and metabolism of Carbohydrate Fat and Protein in different species of animals. Gluconeogenesis, Recent advances in glucogenic precursors on acetate utilization. NPN metabolism, urea fermentation potential and metabolizable protein. Amino acids imbalance, antagonism and toxicity. Measures of feed energy. Partitioning of feed energy. Efficiency of energy and Protein utilization. Feeding standards- comparative appraisal and limitations. Rumen degradable Protein (RDP), and rumen undegradable protein (UDN) and Kinetics. Energetics of protein synthesis and turn over. Quantification of microbial protein synthesis. Protein quality determination in monogastrics and utility. Energy balance, Fasting catabolism. Direct and indirect calorimetry.Determination of energy and protein requirements. Energy and protein requirement for maintenance, growth, pregnancy and lactation in ruminants, companion animals and poultry.

Essential minerals, general role of minerals, soil-plant-animal-human relationship, requirement of minerals, factors affecting requirements. Macro elements and micro elements, their distribution, metabolism, physiological functions, deficiencies and excesses, requirements and sources. Probable essential minerals. Toxic minerals. Definition, history, classification, chemistry, functions, deficiencies and excesses, requirements and sources of water soluble and fat-soluble vitamins. Critical minerals for ruminants and non-ruminants, chelates and chelated minerals. Inter-relationship of minerals with other nutrients. Impact of minerals arising from industrial affluent on animal health and production. Critical limits of minerals in edible herbages. Bioavailability studies in minerals. Impact of minerals on reproduction. Area specific minerals. Relationship of vitamins with other nutrients. Critical vitamins for ruminants and non-ruminants.Feed additives including probiotics Prebiotics, Symbiotics and feed enzymes. Research techniques in nutrition.

Importance of feed technology in relation to animal productivity. The integrated biological, chemical and physical basis for evaluating the inherent nutritional quality of feed ingredients and feeds. Familiarization of various feed mill equipments, layout and operations. Problems of feed manufacturing units and control measures. Quarantine measures. Introduction to the formula feed manufacturing including principles of material handling, grinding, mixing, pelleting and other major processing operations. Crumbling, Flaking, Popping, Extrusion. Principles of instrumentation and analysis, with emphasis on application to quality control and research in the feed industry. The formulation of concentrate mixtures, premixes and rations using computer. Automated feed mill. Personal management in feed plants, laws and regulation of feed manufacturing industry. Codex alimentarius, HACCP. Organizational charts for small, medium and large feed plants, labour standard, planning and production programme, handling of plant equipment. Merits and demerits of automated feed plant.

Principles of feed and fodder processing and preservation techniques, their merits and demerits.Procurement, planning and purchase procedures; traditional and modern farm level storage structures. Feed storage and godown management, estimation of storage capacity and stack plan. Evaluation of processed and preserved feeds and forages. Role of moisture, temperature and relative humidity during storage of feedstuffs and their effect on biotic factors. Handling and storage of liquid feed Ingredients.Physical and chemical changes in feeds during storage; storage losses; insect pests and rodents in feed stores and their control; Role of fungi, tolerance limits and measures to check them in stored products. Factors affecting the quality of feed and feedstuffs on preservation. Microbiological evaluation of processed and preserved feeds, Effect of preservation on nutritional value of feed. Properties and mode of action of pesticides and fumigants; principles of good sanitation and hygiene of godowns. Proximate composition, Limitations of various systems of analysis, Partitioning of forage fibre by Van Soest method, Quality control of fed ingredients, Specifications of feed ingredients and finished feeds, BIS standard., Pesticide and insecticide residues in feeds.

Nutrients and their metabolism with special reference to milk, meat and wool production. Feeding standards, their history, comparative appraisal and limitations. Classification of feedstuffs. Nutrient requirements for calves, heifers, dry, pregnant and lactating cows, buffaloes, sheep and goat. Introduction to rumen microflora and fauna. Development of rumen. Role of milk replacers and calf starters. Feed formulation of large and small ruminants for different physiological stages. Concept of complete feed. Limiting nutrients and strategic feeding of high yielding ruminants. Concept of by-pass nutrients and their impact on production, reproduction and immune status.Importance of CLA, omega fatty acids, Scope for value addition in milk, Different systems of feeding buffalo for beef production.. Feeding during natural calamities, feeding in various agro-climatic zones of India.

Nutrients, their metabolism and requirements for poultry and swine during different stages of growth and production. Limiting amino acids-lysine and methionine. Feeding systems and feed additives, feed formulations for different purposes including least cost rations. Quality control of poultry and swine rations for efficient egg and meat production. Nutrition in relation to disease and stress. Nutritional factors affecting quality of the

products. Hind gut fermentation and its importance, Nutrient requirements of rabbits and equines, Nutritional manipulation for producing value added egg, meat / pork.

Feed habbits, food patterns, digestive structure and functions companion, laboratory, wild and zoo animals. Natural dietary habits. Nutritional requirements of various species of animals. Feeding standards and feeding habits of companion / laboratory animals. Importance of colostrum and feeding of neonates and growing animals. Feeding and care of nursing mothers. Feeding of sick and old animals. Post Surgical nutrition. Ration formulation for captive animals. Artificial feeding and feeding during emergency. Nutritive characteristics of forages for wild animals. Adequacy of forage plants for wild and zoo animals. Diets used in captivity. Raising orphans. Nutritional melodies. Nutrition of semi wild and semi domestic animals like mithun and yak under special topography. Composition, presentation, sterilization, palatability, assessment and storage of companion/laboratory animal diets. companion food tables and their nutritional assessment. Mistakes and misleading information on companion food labels and labeling. Nutraceuticals in companion / laboratory foods and animal foods. Nutritional deficiency diseases. Geriatric nutrition ï corrective measures.

Principles of animal experimentation. Specialized feed compounding. Introduction and principle of GLC, HPLC, AAS, tracer technique, flame photometer, NIR, SF6, amino acid analyzer. Importance and principle of various techniques in estimating chemical and biochemical constituents and toxic principles in feeds, fodders. Importance, principles and procedures for estimating chemical and biochemical constituents in blood, milk, rumen liquor, meat, wool etc.

Present and future feed requirements and current availability for livestock and poultry. Use of non-traditional feeds ï by-products of agricultural, industrial, food processing units and forest by-products. Evaluation by chemical and biological methods. Formulation of economical rations. Level of inclusion of various non conventional feeds in livestock ration. Classification of toxic principles in animal feedstuffs. Chemico-physical properties of various toxins. Effect of toxins on biological system and nutrients utilization in different species of livestock. Detoxification of toxin principles by various physical, chemical and biological techniques. Insecticide and pesticide residue detection.

ANIMAL REPRODUCTION, GYNECOLOGY & OBSTETRICS (CODE- V 3)

UNIT – I

Puberty and sexual maturity, role of hypothalamic-pituitary-gonadal axis in attainment of puberty and sexual maturity, onset of postpartum ovarian activity, Endocrine regulation of estrous cycle. Folliculogenesis, oogenesis and ovulation and associated endocrine pattern, manipulation of follicular waves, synchronization of estrus and ovulation and induction of ovarian activity. Gamete transport, fertilization, implantation and maternal recognition of pregnancy. Embryonic and fetal development, placentation, fetal circulation and gestation, position of fetus in the uterus, age characteristics of fetus. Pregnancy diagnosis: clinical, ultrasonographic, endocrinological and other diagnostic laboratory tests. Pseudo-pregnancy and its treatment. Factors affecting reproduction ï seasonality, nutrition, stress, environment, management, suckling and diseases. Lactation and artificial induction of lactation.

UNIT – II

Introduction to infertility, classification, economic impact. Anatomical causes of infertility, congenital and hereditary causes and acquired defects. Nutritional causes of infertility. Importance of body condition score. Managemental and environmental causes of infertility. Out of season breeding. Infectious causes of female infertility, specific and non-specific infections.

Ovarian dysfunction: anoestrus, cystic ovarian degeneration, anovulation, delayed ovulation and luteal insufficiency. Repeat breeding: its causes, diagnosis and treatment. Early embryonic death (EED): causes, diagnosis and therapeutic management. Abortion: infectious and non-infectious causes, diagnosis and prevention of abortion. Interactions in Immunological mechanisms and infertility.

UNIT - III

Parturition: stages of parturition, mechanism of initiation of parturition, hormonal profiles associated with parturition. Principles of handling of dystocia, obstetrical procedures: mutations, fetotomy, caesarean section. Obstetrical anesthesia and analgesia, epidural anesthesia. Fetal and maternal dystocia: causes, diagnosis and management. Uterine torsion: causes, diagnosis and its correction. Diseases and accidents during gestation and around parturition. Etiology, diagnosis and treatment of ante-partum and post-partum uterine and vaginal prolapse. Induction of parturition and elective termination of pregnancy. Involution of uterus following normal and abnormal parturition. Care of dam and the newborn.

UNIT – IV

Structure and function of reproductive tract of male. Sexual behavior and examination of bulls for breeding soundness. Spermatogenesis, (formation, migration, maturation and ejaculation of
semen), fine structure of spermatozoa, semen and its composition. Diseases transmitted through semen. Factors affecting semen quality, semen culture, tests for assessment of sperm motility, sperm survival and fertilizing capacity of spermatozoa. Causes of infertility: hereditary, congenital, infectious, nutritional and hormonal. Pathological and functional disturbances of epididymis, vas deferens and accessory sex glands. Impotentia

cocundi and impotentia generandi. Testicular hypoplasia and degeneration: causes and affect on semen and fertility. Coital injuries and vices of male animals.

UNIT - V

History of artificial insemination. Methods of semen collection. Semen evaluation: macroscopic, microscopic, biochemical and microbiological tests, Computer assisted semen analysis (CASA).
Semen preservation. Extenders for preservation of semen at different temperatures. Semen additives for enhancement of motility and fertilizing capacity of spermatozoa. Cryopreservation of semen. Effects of cryopreservation on spermatozoa, semen quality and fertility. Thawing protocols of frozen semen. Factors affecting post-thaw semen quality. Ideal protocol for AI in different species of animals. Factors affecting success of AI.

UNIT – VI

Embryo transfer technology: selection of donors and recipients. Synchronization, super-ovulation, surgical and non-surgical collection of embryos and evaluation of embryos. Cryopreservation of embryos, transfer of embryos to donors. In vitro fertilization, in vitro maturation, micromanipulation of embryos. Sexing of sperm and embryos. Transgenic animals. Chimeras. Stem cell biotechnology Immuno-neutralization of hormones. Immunomodulation of fertility.

LIVESTOCK PRODUCTION MANAGEMENT (CODE- V 4)

Cattle and Buffalo: Future prospects of livestock development in India. Important breeds of cattle and buffalo, traits of economic importance and their inter-relationships - Selection of high quality animals - Role of management in improving the reproduction efficiency in farm animals. - Housing and rearing systems. Breeding Management: System of breeding Economic traits. Methods of Breeding - Prenatal and postnatal care and management of cattle and buffalo - Care of neonate and young calves - Management strategies for reducing mortality in calves, age at first calving and calving interval in cattle and buffaloes. Management of labour, Milking management, Machine milking and hand milking, Different laws governing the livestock sectors to produce quality products on par with international standards - Technique of harvesting clean and hygienic livestock products, transportation of animals, health management. Wallowing in buffaloes- Management of draught animals and summer management. Feed and fodder resources used for feeding of cattle and buffaloesï Scientific technique of feeding, watering ï Computation of practical and economical ration, supply of green fodder around the year and enrichment of poor quality roughages.
Sheep and Goat : Population structure and importance- Advantages and disadvantages of sheep farming under different systems of management ï type of housing and equipments- Important sheep and goat breeds- Advantages and disadvantages of sheep and goat farming. : Breeding Management: Breeding seasons - fitness of purchase for first breeding - methods of detection of heat - Natural Service and artificial insemination - Care of the pregnant Animals - Breeding stock - Use of teaser - Culling. Feeding Management: Feeding methods - Principles to be followed in feeding and watering- feeder space, waterer space, Designing feeders and waterers. Range management - Stocking rate and pasture improvement and utilization; management under stall fed conditions, Transportation of sheep and goat. Disease Management: Role of management in the prevention and control of diseases. Special Management: Deworming - Dipping and spraying- shearing -Avoidance of goatry odour in milk, Tupping. Wool: Importance of wool - Fiber structure- Fleece characters - Goat fibers -Characters of mohair and pashmina, fur and Angora - Marketing of goat fibers / wool.- Planning of sheep and goat farm of various sizes - Economics of sheep and goat farming.
Swine: Population and importance - Economic contribution of pigs -Advantages and disadvantages of swine keeping - Systems of management -Problems in pig farming. Breeds of pigs - Selection of breeding stock - Breeding seasons - Age and weight at first services - Methods for detection of heat ï Natural service and artificial insemination - Care of pregnant sows, piglets and growers - Care of breeding boar. Housing, sanitation and hygiene, disease prevention measures - Housing and equipment ï Wallowing - Sanitation and hygiene - Role of management in the prevention and the control of diseases. Feeding and management of new born, weaner and finishers, dry, pregnant and farrowing sows - Feeding principles to be followed - Methods of watering ï Feeder space ï Water space, etc - Marketing: Methods of marketing in swine production - Record keeping.
Laboratoray Animals: Importance of rabbit for meat and fur production, rats, mice and guinea pigs, - Common breeds and strains. System of housing ï Common diseases and their control measure. Management of specific pathogen free and gnotobiotic animals, concepts to related to welfare of laboratory animals. Breeding - Age at maturity, litter size - Weaning ï Feeding of growers ï Selection of replacement stock, transportation of rabbit. Transportation of Laboratory animals ï marketing of meat and fur.
Shelter Management: General principles in planning animal houses- farmstead and animal houses -Selection of site and planning; layouts for livestock farm of different sizes in different climatic zones in India - Farm structures - General principles of construction of enclosures, floor and road. Housing requirements of different classes of Livestock - Preparation of layouts, plans, arrangement of alleys- Fitting and facilities in the houses for horses,

dairy cattle, calves, bulls, work cattle, dogs, pigs, sheep, goats, and poultry. Improvement of existing buildings; water supply; feed and fodder delivery systems - Economics of Livestock housing. Housing - Disease control measures and sanitation of all classes of livestock

Environmental Hygiene and Waste Management: Animal air hygiene: Definition - Composition of air - Air pollution ï Factors affecting outdoor and indoor pollution - Assessment of these factors on animal health and production - Methods to control these factors. Water Hygiene: Importance of water - Impurities and inclusions ï Sterilization - Examination of water and water supplies - Collection of samples- Topographical physical, chemical, bacteriological and microscopic examination of water - Hygienic requirements and standards for drinking water - Quantity of water required by domestic animals - Methods of watering. Manure - Quantity of manure voided by domestic animals - Animal excreta a factor in spread of disease - Hygienic and economic disposal of farm waste - Modern techniques used in automation / semi-automation in disposal of farm waste. Environmental protection act, Air (Prevention and control of pollution) act and water (Prevention and control of pollution) act ï Bio-security measures to be adapted for efficient and healthy production. Effect of environmental pollution on livestock and its products directly and indirectly - Controlling environmental pollution - Different factors affecting the quality of livestock and its products meant for human consumption.

Climatology and Animal Production: Definition of climate -Classification of climatic regions - Climatic factors-Assessment of climate - Study of climatic factors in relation to animal production. Light, natural and artificial light-mechanism of light action-photo period and light responses ï Applications - Importance of light in production of animals and birds. Introduction of breeds into different climatic regions - Agro meteorology and weather forecasting for Animal Husbandry activities - Micro climate modification in animal houses. Estimation of microclimatic conditions in Animal house - Measurement of Temperature, Relative humidity, Air Velocity and Mean temperature of the surrounding, measurement of intensity of light in animal houses ï Construction of climographs and hythergraphs -Estimation of cooling power of atmosphere heat tolerance test in bovines.

Poultry: Management: Poultry housing systems Cage Vs floor system, litter management and lights for poultry, rearing turkey, duck and quails. Management of chicks, growing, laying and breeding flocks, broiler production, selection and culling of laying flocks. Procuring, care and pre-incubation storage of hatching eggs - Method of incubation, sanitation disinfection and management of hatchery. Embryonic development and factors effecting fertility and hatchability of eggs. Chick sexing, packing and hatchery business - Transporting management of farm and hatchery waste.

Farm Animal Behavior: Introduction to Animal behaviour - Importance of animal behaviour studies -Patterns of behaviour - Daily and seasonal cycles of behaviour ï Physiological basis of behaviour. Environmental modification of behaviour - Developmental changes in behaviour - Genetic differences in behaviour - Behavioural disorders. Group formation - Social relationship, process of socialisation locality and behaviour - Practical application - Behavioural character for managemental practices - Favourable and unfavourable behaviour for domestication -Behavioural adaptations under domestication. Physical environment and behaviour - Common vices and their remedial measures - Analysis of behaviour in relation to location - Analysis of behaviour in relation to climatic environment - Analysis of social behaviour.

Integrated Livestock Farming: Scope and limitation of integrated farming systems - Sustainability of integrated Livestock Farming Systems and their economic importance. Integration of fish, arable farming and different livestock enterprises vis-à-vis gobar gas plant, FYM, solar and wind energy utilization, cattle, buffalo sheep, goat, pig, poultry, rabbit, silk worm, bee keeping etc. New approach for changing farming systems in present energy crises. Project formulation and evaluation of various livestock enterprises.

Equine: Equine population in India - Breeds of native and exotic horses - Types and classes of light and work horses. Housing and routine management practices ï Hygiene and maintenance of stable. Color and markings, Dentition and ageing selecting and judging horses- unsoundness and stable vices. Feeding and breeding of horses donkey and Mules, foaling, care of foal. Foot care and shoeing care, Stud farms - Race clubs - Race horses and their care - Horse behaviour and training - Exercising - Basic Horsemanship. Health management & diseases control. Control of internal and external parasites of horse- Colic and its prevention. Mode of transport - Facilities requirement - Cleaning, disinfection and preparation of vehicles Transport stress - Management during transport - Regulatory acts of states and centre in animal disease control and welfare. Precautions and requirements before, during and after transport ï Laws governing the import and export of livestock and its products- - Horse passport and trading.

Wildlife: Zoo and captive wild animals - Principles and concepts ï Ecology of wild life sanctuaries and National parks- wild life legislation in India - Status of forest in India - Biological and ecological basis of management of wild life. Voluntary organization on wild life - Rules and regulations of zoo authority of India -Wild life protection act - Zoological classification of wild animals -Funding agencies for wild life research and preparation of project. -Conservation of wild animals. Wild life health control - Reproduction in zoos - Population analysis - Population manipulation - Habit analysis and design - The resources and its management - Distribution of important Indian animals - Zoo animals and birds - Breeding characteristics ï Movements - Cover requirements -

Food -Population density ï Mortality - Nesting losses caused by predators, predator and prey relationship - Human interference - Refuge rehabilitation. Restraints - Maps - Survey and plans of management systems - Principles, protective measures - Development and conservation of water supply- puberty - Breeding seasons - pregnancy - Parturition - Lactation postnatal survival of the young - Social factors among various species - Miscellaneous management procedures.

Livestock Business Management: Management principles - Planning - Techniques, strategic planning, organization structure, co-ordination and controlling techniques ï Approaches to management. SWOT analysis, financial accounting - Accounting records - Balance sheet, fund flow statement - Cost and analysis for managerial decisions ï Budgeting and control . Tools of financial analysis, working capital financing - Long term financial management - Investment analysis - Capital markets - Corporate risk management - Venture capital. Marketing - Objectives, strategies - Selecting and managing marketing channels - Pricing strategies - Sales promotion - Legislation relating licensing -Company law.

VETERINARY PARASITOLOGY (CODE- V 5)

UNIT – I

Introduction, history, classification, general account and economic importance of platyhelminths. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Dicrocoeliidae, Opisthorchiidae, Strigeidae and Fasciolidae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Echinostomatidae, Heterophyidae, Plagiorchiidae, Troglotrematidae, Prosthogonimidae, Nanophyetidae and Paragonimidae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of trematodes belonging to families: Notocotylidae, Brachylemidae, Cyclocoelidae, Paramphistomatidae and Schistosomatidae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to families: Mesocestoididae, Anoplocephalidae, Thysanosomidae, Dipylidiidae and Dilepididae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of cestodes belonging to families: Davaineidae, Hymenolepididae, Taeniidae and Diphyllobothriidae.

UNIT - II

Introduction, history, classification, general account and economic importance of nematodes and thorny-headed worms. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Ascarididae, Anisakidae, Oxyuridae, Heterakidae and Subuluridae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Rhabditidae, Strongyloididae and Strongylidae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Trichonematidae, Amidostomidae, Stephanuridae, Syngamidae and Ancylostomatidae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Metastrongylidae, Protostrongylidae, Filaroididae, Trichostrongylidae, Ollulanidae, Crenosomatidae and Dictyocaulidae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Spiruridae, Thelaziidae, Acuariidae, Tetrameridae, Physalopteridae, Gnathostomatidae, Filariidae, Setariidae, Onchocercidae and Dracunculidae. Morphology, epidemiology, life cycle, pathogenesis, clinical signs, diagnosis and control measures of nematodes belonging to families: Trichinellidae, Trichuridae, Capillariidae, Dioctophymatidae, Polymorphidae, Oligacanthorhynchidae and Gnathobdellidae.

UNIT – III

Introduction, history, classification and economic importance. Distribution, life cycle, seasonal pattern, pathogenesis, economic significance and control of arthropods belonging to the families: Culicidae, Ceratopogonidae, Simuliidae and Psychodidae. Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Tabanidae, Gasterophilidae, Muscidae, and Glossinidae. Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Oestridae, Sarcophagidae, Calliphoridae and Hippoboscidae.

Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Pediculidae, Haematopinidae, Linognathidae, Menoponidae, Philopteridae and Trichodectidae. Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Siphonapteridae, Cimicidae and Reduviidae, Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Dermanyssidae, Argasidae and Ixodidae. Distribution, life cycle, seasonal pattern, pathogenesis, diagnosis, economic significance and control of arthropods belonging to the families: Sarcoptidae, Psoroptidae, Demodicidae, Trombiculidae, Cytoditidae and Linguatulidae. Strategic control measures of arthropods with special emphasis on improved versions of chemical, biological and immunological control and integrated pest management.

UNIT – IV

Introduction, history, classification, general account, economic importance of protozoan parasites. Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the families: Trypanosomatidae, Monocercomonadidae, Trichomonadidae, Hexamitidae and Endamoebidae. Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the families: Eimeriidae, Cryptosporidiidae and Sarcocystidae. Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of protozoan parasites belonging to the families: Plasmodiidae, Babesiidae, Theileriidae, Haemogregarinidae and Balantidiidae. Morphology, epidemiology, pathogenesis, clinical signs, diagnosis and control measures of Rickettsiales like Anaplasma, Ehrlichia and Haemobartonell. A

UNIT – V

History, clinical signs, gross and microscopic examination of secretions and excretions of clinical cases. Collection and dispatch of material to laboratory for diagnosis. Animal sub-inoculation tests; blood and biopsy smear examination; histopathology of affected organs.

UNIT – VI

Conventional and novel methods of control of helminth ï anthelmintics, their mode of action, characteristic of an ideal anthelmintic, anthelmintic resistance, spectrum of activity, delivery devices, integrated control method and immunological control Formulation of deworming schedule. Snail and other intermediate host control. Conventional and novel methods of control of protozoan parasites ï antiprotozoan drugs, their mode of action, integrated control method and immunological control. Conventional and novel methods of control of insects ï Insecticides /acaricides - methods of application, their mode of action, insecticide resistance , integrated control method and immunological control.

UNIT – VII

Introduction, types of parasitic antigens and their characterization. Types of immunity in parasitic infections. Cellular and humoral immunity to parasites, hypersensitivity, regulation of the immune response. Evasion of immunity, immumomodulations and their uses.
Immune responses in helminths, arthropods and protozoa of veterinary importance. Immunodiagnostic tests and their techniques; application of biotechnological tools in the diagnosis and control of parasitic diseases. Vaccines and vaccination against parasitic infections. Genetic control of parasites.

UNIT – VIII

Introduction to the concept of zoonotic infections, definitions, various classifications of zoonoses, host-parasite relationships, modes of infections, factors influencing prevalence of zoonoses. A detailed study of transmission, epidemiology, diagnosis and control of major protozoa of zoonotic importance. A detailed study of transmission, epidemiology, diagnosis and control of major helminths of zoonotic importance. A detailed study of transmission, epidemiology, diagnosis and control of major arthropods of zoonotic importance.

UNIT - IX

A detailed study of major protozoa of zoo and wild animals with particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management. A detailed study of major arthropod parasites of zoo and wild animals with particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management. A detailed study of major helminth parasites of zoo and wild animals with particular emphasis on morphological features, geographical distribution, epidemiology, diagnosis and management.

APPLICATION FORM

FOR ENTRANCE EXAMINATION AND ADMISSION TO
MASTER DEGREE/Ph.D. DEGREE PROGRAMME, 2014-15
BIHAR AGRICULTURAL UNIVERSITY, SABOUR – 813 210, BHAGALPUR (BIHAR)

FOR OFFICE USE ONLY
Reservation Category _____ Roll No.: _____ Centre: Bihar Agricultural University, Sabour Signature (Scrutiny In-Charge)

Affix recent Passport size photograph

TO BE FILLED IN BY THE CANDIDATE (In Capital Letters) IN HIS/HER OWN HANDWRITING

1. Name of the Candidate (In English)

   In Hindi

2. Fatherôs Name

3. Motherôs Name

4. Guardianôs Name (If father is not alive)

5. Date of Birth (Date) (Month) (Year)

6. (a) Permanent Address

   PIN
   State

   (b) Mailing Address

   PIN
   State

7. Phone / Mobile No.

8. E- mail ID

9. Sex (M/F)

10. Nationality

11. Are you domicile of Bihar Yes/No

12. (a) Reservation Category Code | | | | (b) Caste | |

13 (a) Stream (For Masterøs Degree) | | (b) Stream code | |

(c) Subject (For Ph. D) | | (d) Subject Code | |

14. Details of Bank Draft

(a) Bank Draft No. | | (b) Date | |

(c) Issuing Bank & Branch. | | (d) Amount | |

15. Particulars of Qualifying Examinations Passed/Appearing (enter percentage of marks up to two digits after decimal)

Examination	University/ Board	Name of Institution	Marks Obtained / Total Marks	Division	Percentage of Marks	Year of Passing	Subject
Master Degree*							
Bachelor Degree*							
12th standard							
10th standard							

* Conversion formula for OGPA to percentage:

DECLARATION

I, the undersigned, hereby declare that the statements made above are true to the best of my knowledge and belief. I fully understand that any wrong statement made in this application may result in cancellation of my candidature or termination of my admission at any stage at my cost, risk and responsibility.

Countersigned

Signature of Father
(or Guardian, if father is not alive)

Signature of the Candidate (in Hindi & English)

Date
Place

CERTIFICATE OF THE FORWARDING OFFICER

This is to certify that Sri Smt./Km. é is a student of this Institution during the period from é é é é é é é é é to é é é é é é é é é é é .. and has passed/appearing in the é é é é é é é Examination of é é é é é é é é é é é é é é . University.

According to the records of this Institution, the information at items 1, 5 and 15 are correct and to the best of my knowledge his/her conduct has been satisfactory.

Date:
Place:

Signature of the Head of Institution
Seal of the College last attended/attending

FOR OFFICE USE ONLY
Checked
Verified & DD detailed if any

COMPETITIVE ENTRANCE EXAMINATION FOR ADMISSION TO
MASTER DEGREE / Ph.D. DEGREE PROGRAMME, 2014 – 15
BIHAR AGRICULTURAL UNIVERSITY, SABOUR, BHAGALPUR

ADMIT CARD

This Card should be produced on demand during the Examination.

(To be filled in by the candidate)

Name - : ____
(In Capital letters)

Fatherôs name - : ____

Stream & Code- : ____
(for Masterôs Degree)

Subject & Code : ____
(for Ph. D)

Reservation Category & Code -: ____

Signature of Candidate (In Hindi) : ____

Signature of Candidate (In English): ____

Affix Passport size photograph

(For Office use only)

Roll No.______________________________ **Date of Examination: 15.06.2014**

Examination Centre: **Bihar Agricultural University, Sabour, Bhagalpur**

Signature of Registrar with seal _____________ Signature of Invigilator ___________________

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

VERIFICATION CARD (2014-15)

(To be filled in by the candidate)

Name : ____
(In Capital letters)

Fatherôs name : ____

Stream & Code : ____
(For Masterôs Degree)

Subject & Code : ____
(For Ph. D)

Reservation Category & code -: ____

Signature of Candidate (In Hindi) : ____

Signature of Candidate (In English): ____

Affix Passport size photograph

(For Office use only)

Roll No.______________________________ **Date of Examination: 15.06.2014**

Examination Centre: **Bihar Agricultural University, Sabour, Bhagalpur**

Signature of Registrar ___________________ Signature of Invigilator __________________

EXAMINATION SCHEDULE	
DATE / DAY	**TIME**
15.06.2014 (SUNDAY)	**11.00 A.M. TO 01.00 P.M.**

NOTE 1 : Candidate should occupy his/her seat in the examination hall ten Minutes before the commencement of the examination.

2 : A duplicate copy of Admit card will be issued by the Registrar one day before the examination on payment of Rs. 50.00 if the original is lost by the candidate for which two photographs duly attested by the head of the Institution last attended and proof of application submission will have to be provided by the candidate himself/herself.

RECORD OF ATTENDANCE			
DATE / DAY	**TIME**	**SIGNATURE OF CANDIDATE**	**SIGNATURE OF INVIGILATOR**
15.06.2014 (SUNDAY)	**11.00 A.M. TO 01.00 P.M.**		

NOTE: Invigilator(s) should please check the Photograph with candidate present and should take his/her signature in the space provide for. The word **ABSENT** should be written on the form of the applicant, if the candidate concerned is not present and then signed by the Invigilator.