



Sanjay Ghodawat University, Kolhapur

2018-19

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M.Sc. II

School of Science

Physics

PSS 604

Course Title: Ionosphere of the Earth

Semester – Even(IV)

Day and Date: Thursday
23rd May, 2019

End Semester Examination
(A)

Time: 30 min,
Max Marks:20
(2.30 to 3.00 pm)
Student Sign.

Seat No.

PRN No.

Invigilator Sign.

Examiner Sign

Marks Obtained

- Instructions:**
- 1) All Questions are compulsory.
 - 2) Mark \checkmark to the correct option. Do not circle.
 - 3) More than one option marked will not be considered for assessment.
 - 4) Rough calculations on paper are not allowed.
 - 5) Use non-programmable calculator is allowed.

Q.1	Attempt the following	Marks (20)	Blooms Level	CO
A)	Choose the correct alternative	(10)		
1	The temperature of the thermosphere increases by absorption of radiation from the sun. A) X-ray and Y-ray B) UV and EUV C) Visible and IR D) Microwave and Radio wave	1	L2	604.1
2	The D region ionization is compared to the E and F regions. A) High B) Low C) More D) Less	1	L1	604.1
3	The low-latitude thermosphere superrotates with net eastward average zonal flow of about m/s near 350km altitude. A) 50 B) 100 C) 150 D) 200	1	L1	604.2
4	During the daytime, the vertical field is controlled by the meridional electric field in equatorial region. A) D B) E C) F D) All of these	1	L2	604.2
5	The region referred to as the plasmasphere corresponds to	1	L2	604.3

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latitudes where the flux tubes

A) Rotate B) Corotate C) Antirotate D) None of these

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|----|---|---|----|-------|
| 6 | The most important feature for the nighttime ionosphere is that prior to midnight, the meridional wind is usually..... | 1 | L1 | 604.3 |
| | A) Eastward B) Westward | | | |
| | C) Southward D) Northward | | | |
| 7 | The magnetic dip angle increases very rapidly with increasing | 1 | L2 | 604.3 |
| | A) Longitude B) Latitude | | | |
| | C) Altitude D) Dip | | | |
| 8 | Gravity plays a role in high-latitude phenomena, since g is essentially parallel to B. | 1 | L1 | 604.4 |
| | A) Very little B) Very strong C) Little D) Strong | | | |
| 9 | The plasma is often in motion with velocities in the polar region have important consequences for thermospheric dynamics. | 1 | L1 | 604.4 |
| | A) Low B) High C) Slower D) Faster | | | |
| 10 | The diffuse aurora is characterized by a widespread, nearly particle influx from the plasma sheet. | 1 | L1 | 604.4 |
| | A) Uniform B) Non-uniform | | | |
| | C) Parallel D) Perpendicular | | | |

B) Fill in the blanks

- | | | Marks
(5) | Blooms
Level | CO |
|---|--|--------------|-----------------|-------|
| 1 | The maximum nighttime zonal drift wind of the thermosphere is about | 1 | L1 | 604.1 |
| 2 | The instability process driving Convection of Equatorial Ionospheric Storm (CEIS). | 1 | L2 | 604.2 |
| 3 | The chemical and diffusion time scale are balanced at | 1 | L1 | 604.3 |

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aroundkm altitude in the earth's atmosphere.

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|---|---|---|----|-------|
| 4 | The plasma content can affect by the electrical of the ionosphere and ion drag. | 1 | L2 | 604.3 |
| 5 | In the inner magnetosphere the field lines are closed and relatively in length. | 1 | L2 | 604.4 |

C)	State true or false	Marks	Blooms	CO
		(5)	Level	
1	Electric fields arise as a result of various forces when the ions and electrons respond differently to them.	1	L1	604.1
2	The peak eastward drift at night is twice as great as the peak westward drift during the day.	1	L1	604.2
3	In the postsunset period, the F-layer vertical field is enhanced due to the local F-layer dynamo.	1	L1	604.3
4	Charge exchange converts O^+ to H^+ and vice versa at the bottom of the ionosphere.	1	L1	604.4
5	In high latitude, the electron drift speed is well over 500 m/s, much higher than the typical sound speed.	1	L1	604.4

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Year and Program M.Sc. II

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Physics

Course Code: PSS 604

Course Title: Ionosphere of the Earth

Semester – Even (IV)

Day and Date: Thursday
23rd May, 2019

End Semester Examination
(B)

Time: 2.5 hrs,

Max Marks: 80

(3 to 5.30 pm)

Instructions:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Use of logarithmic table and calculator are allowed.

Q.2	Answer the following questions	Marks (16)	Blooms Level	CO
a)	Show that the gradient drift and curvature drift are proportional to the particle perpendicular and parallel energies respectively.	12	L3	604.1
b)	Illustrate the gyromotion of ions and electrons in the magnetic field.	4	L2	604.1
OR				
b)	Discuss the cooling current.	4	L2	604.1
Q.3	Answer the following questions	Marks (16)	Blooms Level	CO
a)	Explain the R-T instability process and hence the growth rate of R-T instability.	12	L5	604.2
b)	Write a note on CEIS.	4	L2	604.2
OR				
b)	Write a note on the Prereversal Enhancement.	4	L2	604.2
Q.4	Answer the following questions	Marks (24)	Blooms Level	CO
a)	How to determine the properties of the low latitude ionosphere, in the absence of wind and electric field?	12	L4	604.3

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|--|---|----|-------|
| b) Explain a method to calculate the height profile of the electron density. | 8 | L3 | 604.3 |
|--|---|----|-------|

OR

- | | | | |
|---|---|----|-------|
| b) Discuss the formation of the plasmasphere and corotation electric field. | 8 | L3 | 604.3 |
| c) Write a note on Appleton Anomaly. | 4 | L2 | 604.3 |

Q.5 Answer the following questions

- | | Marks
(24) | Blooms
Level | CO |
|---|-----------------------|-------------------------|-----------|
| a) Explain the general relationships between the Ionosphere, Magnetosphere, and Solar wind. | 12 | L3 | 604.4 |
| b) Discuss the Hydrodynamic theory of the polar wind | 8 | L2 | 604.4 |
| OR | | | |
| b) Review the observations of the ionospheric convection during Southward IMF. | 8 | L2 | 604.4 |
| c) How a finite parallel electric field is generated at high altitude. | 4 | L2 | 604.4 |

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