Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur

Department of Physics

REPORT

Undergraduate Course for Physics Students

"EXPLORATIONS IN ASTRONOMY"

Duration: (10 weeks) 30 Hours: 02 August 2019-05 October 2019

Total Students: 82

This 10-week add-on course provided B.Sc. Physics students with a comprehensive understanding of the "EXPLORATIONS IN ASTRONOMY". The course was conducted by Dr. G. L. Jadhav, Assistant Professor, Department of Physics SSES Amt's Science College Congress Nagar, Nagpur. Total 82 Students of B.Sc. I, II and III, year Physics were enrolled for the course.

The course covered theoretical principles and real-world applications. The students were evaluated through MCQ based final exam of 100 marks. All 82 students successfully completed the course.

The 10-week of "explorations in astronomy "course was a valuable addition to the undergraduate physics curriculum, equipping students with essential knowledge and skills in electronics. The course successfully combined theoretical foundations with, preparing the students for further studies and careers in Astronomy and related fields.

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To,
The Principal
SSES Amt's Science College,
Congress Nagar, Nagpur-12

Subject: For permission to conduct the add on courses in the Physics department

Respected Sir,

This is to request you that, the teachers of our Physics department have prepared the syllabus and modules of the 30 hours certificate courses for the session 2019-2020.

The details of the course module, syllabus and time table is submitted here with.

Hence please permit to run the add on courses and oblige me.

Thanking you

Yours sincerely

Date:- 21/06/2019

Dr. S. W. Anwane
Professor and Head
Department of Physics
Shri Shivaji Education Society Amravati's
SCIENCE COLLEGE
Congress Nagar, Nagpur.

Permitted

Shri Shivaji Education Society Amravati's

Science College

Congress Nagar, Nagpur

Department of Physics

Add-on Certificate Course
(2019-2020)
Certificate Course: Explorations in Astronomy

Notice

Date: 24/07/2019

The Department of Physics is conducting an Add-on **Certificate Course on Explorations in Astronomy** for the session **2019-20.** Interesting students of B.Sc. Part I, Part II & Part III should register themself in early and contact to the Course Coordinator Dr. S. W. Anwane immediately.

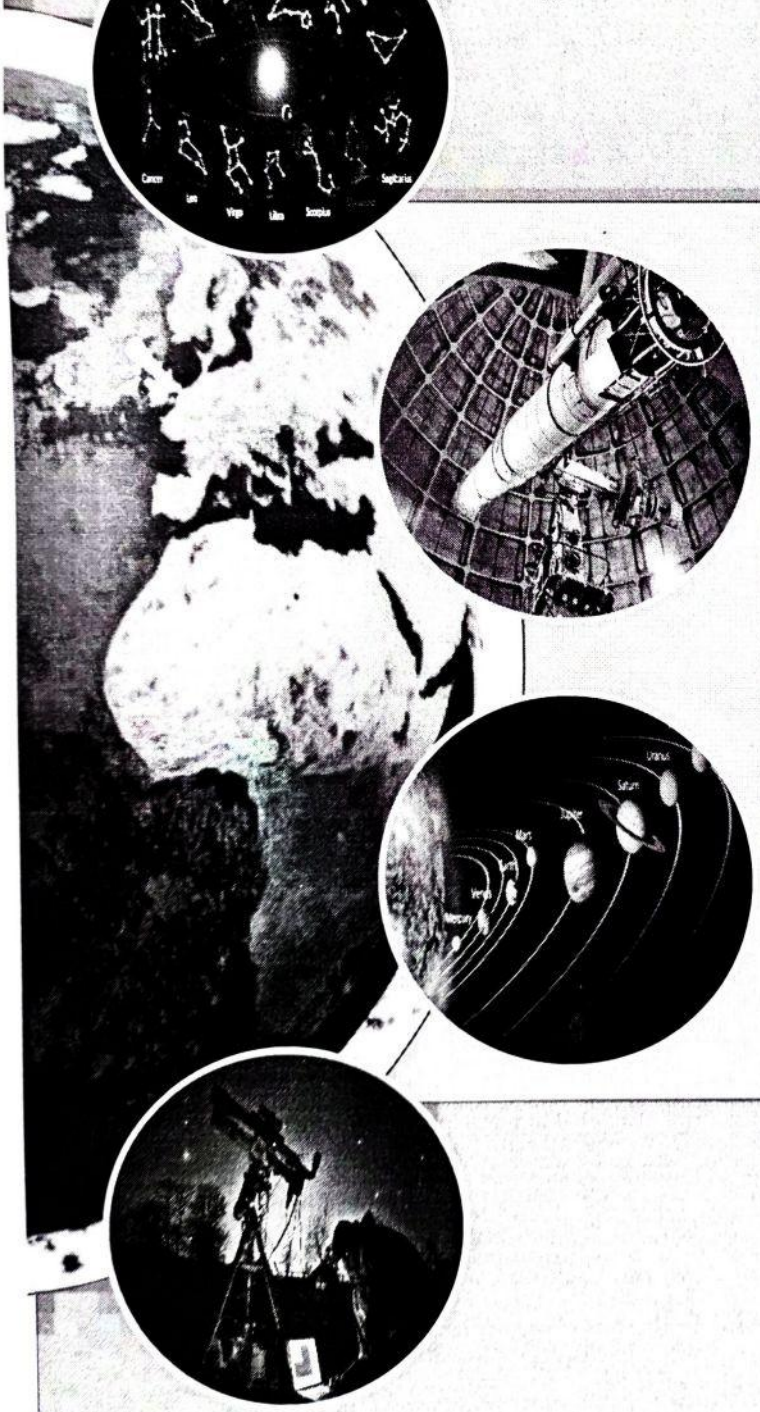
Course	Admission Fees
Certificate Course: Certificate Course: Explorations in Astronomy	Free

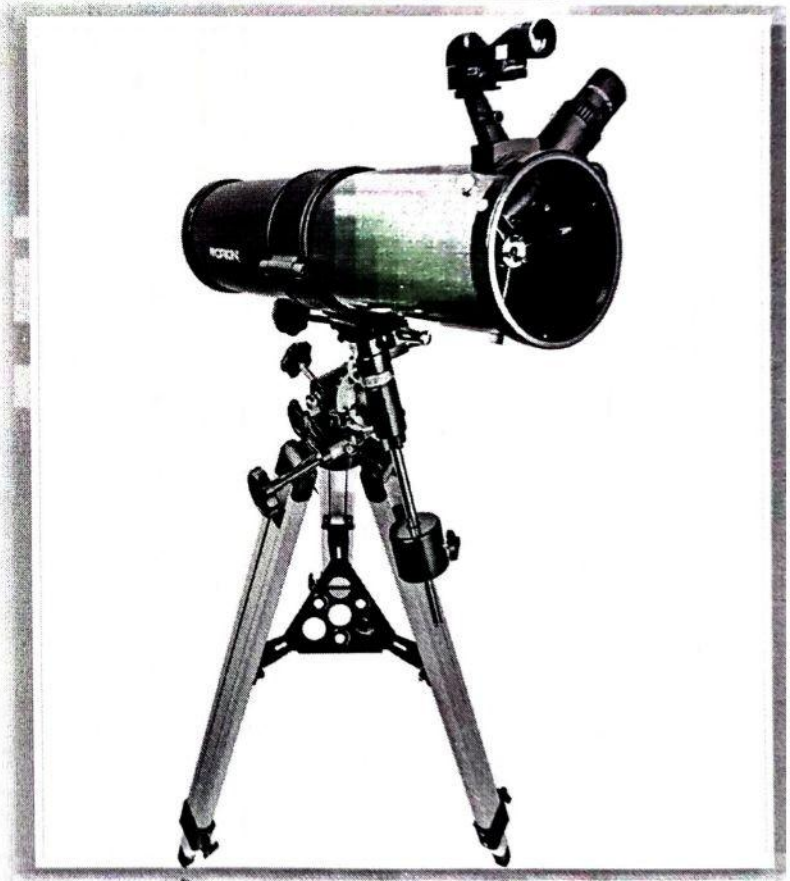
Dr. S. W. Anwane
Course Coordinator

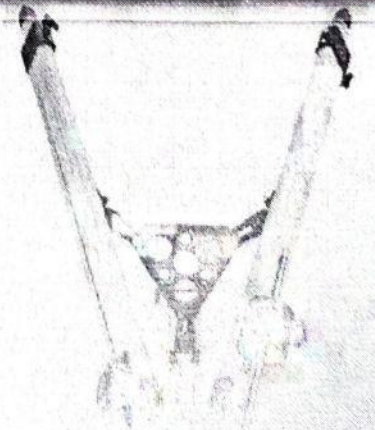
Shri Shivaji Education Society Amravati's

Science College, Nagpur

Certificate Course on
Explorations in Astronomy







Course Coordinator – Dr. S. W. Anwane

Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur.

Department of Physics

2019-2020

Certificate Course: Explorations in Astronomy

Course Overview: This addon course is designed to provide undergraduate students with a deeper understanding of astronomy beyond the introductory level. Through a combination of lectures, discussions, observation sessions, and hands-on activities, students will explore fundamental concepts, recent discoveries, and cutting-edge research in astronomy.

Course Duration: (10 weeks) 30 Hours

:02 August 2019-05 October 2019

Course Outline:

Chapter 1: Introduction to Astronomy

- Overview of the universe: scales and structures
- Historical development of astronomy
- Celestial coordinates and motions
- Observational techniques in astronomy
- Introduction to astronomical instruments

Chapter 2: Observational Astronomy

- Optical telescopes and observatories
- Radio, infrared, ultraviolet, X-ray, and gamma-ray astronomy
- Data analysis and image processing
- Stellar and planetary spectroscopy
- Hands-on observation sessions (if feasible)

Chapter 3: The Solar System

- Formation and evolution of the solar system
- Planetary atmospheres and surfaces
- Moons, asteroids, comets, and meteoroids
- Exploration of the solar system: robotic missions and human spaceflight
- Exoplanets and the search for life beyond Earth

Chapter 4: Stars and Stellar Evolution

- Properties of stars: luminosity, temperature, mass, and size
- Stellar classification and the Hertzsprung-Russell diagram
- Stellar formation and protostellar evolution
- Main sequence evolution, stellar structure, and nucleosynthesis
- Stellar remnants: white dwarfs, neutron stars, and black holes

Chapter 5: Galaxies and Cosmology

- Types and properties of galaxies
- Galaxy formation and evolution
- Large-scale structure of the universe
- Dark matter and dark energy
- Cosmological models: Big Bang theory and its implications

Chapter 6: Extragalactic Astronomy and Cosmology

- Galaxy clusters and superclusters
- Cosmological probes: cosmic microwave background radiation, baryon acoustic oscillations
- Dark matter and its effects on galaxy dynamics
- Cosmic evolution: from the early universe to the present
- Recent discoveries and open questions in cosmology

Assessment: Final Exam will be taken using MCQ type questions.

Resources:

- Textbooks: "An Introduction to Modern Astrophysics" by Bradley W. Carroll and Dale A. Ostlie, "Foundations of Astrophysics" by Barbara Ryden and Bradley M. Peterson, "Cosmology: The Science of the Universe" by Edward Harrison, etc.

The Structure of Syllabus and system of evaluation -

Course	Theory Paper	Total Marks
Certificate Course on Explorations in Astronomy	Theory paper- **Certificate Course on Explorations in Astronomy** *Theory examination will be of MCQ pattern having 50 questions each with equal marks.	**Theory** **100**

Internal Quality Assurance Cell
(IQAC)
S. S. E. S. A. Science College
Congress Nagar, Nagpur.

Science College, Congress Nagar, Nagpur. SEAL

Principal
S. S. E. S. Amravati's
Science College, Nagpur

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

Session 2019-2020

Certificate Course: Explorations in Astronomy (10 weeks)

Timetable

Sr. No.	Day	Theory
1	Friday	SWA (C6) Theory 4.00 PM – 5.00 PM
2	Saturday	SWA (C6) Theory, 4.00 PM – 5:00 PM
3		SWA (C6) Theory, 5.00 PM – 6.00 PM

Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur

Department of Physics

Session 2019-2020

Add-on Certificate Course on Explorations in Astronomy

THEORY EXAM

Max. Time: 2 Hour **Date: 08/10/2019**
Max. Marks: 100 **Marks Obtained:**

Student Name: ----------

Note: i) All questions are compulsory and carry equal marks
ii) Tick the correct option only

Sign. Of Invigilator:

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1. What is the primary component of the Sun?
A. Hydrogen
B. Helium
C. Oxygen
D. Carbon

2. What is the closest planet to the Sun?
A. Venus
B. Earth
C. Mercury
D. Mars

3. Which planet is known as the "Red Planet"?
A. Jupiter
B. Mars
C. Saturn
D. Neptune

4. What is the largest planet in our solar system?

A. Earth
B. Saturn
C. Jupiter
D. Uranus

5. Which planet has the most extensive ring system?
A. Jupiter
B. Saturn
C. Uranus
D. Neptune

6. What is the name of the galaxy that contains our Solar System?
A. Andromeda Galaxy
B. Milky Way Galaxy
C. Sombrero Galaxy
D. Whirlpool Galaxy

7. How long does it take for light from the Sun to reach Earth?
A. 8 minutes
B. 24 hours
C. 1 second
D. 12 minutes

8. What is the name of the second brightest object in the night sky?
A. Mars
B. Sirius
C. Venus
D. Betelgeuse

9. Which planet is known for its Great Red Spot?
A. Jupiter
B. Mars
C. Saturn
D. Neptune

10. Which celestial object was demoted from its planet status in 2006?
A. Eris
B. Ceres
C. Haumea
D. Pluto

11. What is the main difference between a comet and an asteroid?

A. Comets have tails
B. Asteroids are made of ice
C. Comets orbit the Earth
D. Asteroids are always larger

12. Which of the following is the closest star to Earth?
A. Proxima Centauri
B. Alpha Centauri A
C. Barnard's Star
D. Betelgeuse

13. What is the term for a star that has exhausted its nuclear fuel and collapsed?
A. Supernova
B. White Dwarf
C. Black Hole
D. Neutron Star

14. Which type of galaxy is the Milky Way?
A. Elliptical
B. Irregular
C. Spiral
D. Lenticular

15. What is the most common type of star found in the universe?
A. Red Giant
B. White Dwarf
C. Red Dwarf
D. Blue Giant

16. How old is the Universe estimated to be?
A. 4.5 billion years
B. 13.8 billion years
C. 20 billion years
D. 1 billion years

17. What phenomenon explains the redshift of galaxies?
A. Doppler Effect
B. Gravitational Lensing
C. Parallax
D. Cosmic Inflation

18. What is the name of the first artificial satellite to orbit Earth?
A. Apollo 11
B. Sputnik 1

C. Explorer 1
D. Vostok 1

19. What is the term for the boundary around a black hole beyond which nothing can escape?
A. Event Horizon
B. Singularity
C. Schwarzschild Radius
D. Photon Sphere

20. Which planet in our solar system has the highest mountain?
A. Earth
B. Mars
C. Venus
D. Mercury

21. What is the name of the galaxy that is on a collision course with the Milky Way?
A. Triangulum Galaxy
B. Andromeda Galaxy
C. Whirlpool Galaxy
D. Large Magellanic Cloud

22. What is the term for the apparent backward motion of a planet as seen from Earth?
A. Retrograde Motion
B. Prograde Motion
C. Precession
D. Nutation

23. Who proposed the heliocentric model of the solar system?
A. Galileo Galilei
B. Isaac Newton
C. Nicolaus Copernicus
D. Johannes Kepler

24. What is the most abundant element in the universe?
A. Oxygen
B. Hydrogen
C. Helium
D. Carbon

25. Which spacecraft was the first to reach interstellar space?
A. Pioneer 10
B. Voyager 1

C. New Horizons
D. Cassini

26. What is the name of the effect that causes stars to twinkle?
A. Diffraction
B. Refraction
C. Scintillation
D. Dispersion

27. Which planet has the shortest day?
A. Earth
B. Jupiter
C. Mars
D. Venus

28. What is a pulsar?
A. A type of neutron star
B. A type of black hole
C. A type of white dwarf
D. A type of red giant

29. What is the name of our galaxy's supermassive black hole?
A. Andromeda A
B. Cygnus X-1
C. Sagittarius A*
D. M87*

30. What is the primary method used to detect exoplanets?
A. Direct Imaging
B. Gravitational Microlensing
C. Transit Method
D. Radio Signals

31. What is the term for the line dividing the day and night sides of a planetary body?
A. Equator
B. Meridian
C. Terminator
D. Prime Meridian

32. What is the main sequence stage of a star's life?
A. The initial formation
B. The longest phase of stable hydrogen burning
C. The final collapse into a white dwarf
D. The explosive supernova stage

33. What type of object is the Crab Nebula?
A. A planetary nebula
B. A supernova remnant
C. A star-forming region
D. A galaxy

34. What phenomenon occurs when the Moon passes directly between the Earth and the Sun?
A. Solar Eclipse
B. Lunar Eclipse
C. New Moon
D. Full Moon

35. Which planet has a day longer than its year?
A. Mercury
B. Venus
C. Mars
D. Neptune

36. What is the name of the first manned mission to land on the Moon?
A. Apollo 11
B. Apollo 13
C. Gemini 8
D. Mercury 7

37. What is the term for the path that an object follows as it moves around another object in space?
A. Axis
B. Orbit
C. Rotation
D. Revolution

38. What is the Kuiper Belt?
A. A region of the Sun's atmosphere
B. A region of the Earth's atmosphere
C. A region of the solar system beyond Neptune
D. A region between Mars and Jupiter

39. What is a light year?
A. The time it takes for light to travel around Earth
B. The distance light travels in one year
C. The time it takes for light to travel from the Sun to Earth
D. The time it takes for light to travel across the Milky Way

40. What causes the different phases of the Moon?

A. The Earth's rotation
B. The Moon's rotation on its axis
C. The relative positions of the Earth, Moon, and Sun
D. The Moon's distance from the Earth

41. **What is the primary purpose of a telescope in astronomy?**

A) To detect radio waves
B) To magnify distant objects
C) To analyze the chemical composition of stars
D) To observe the motion of planets

42) **Which planet in our solar system has the most extensive ring system?**

A) Earth
B) Jupiter
C) Saturn
D) Uranus

43) **What is a light-year?**

A) The time it takes for light to travel around the Earth
B) The distance light travels in one year
C) The average distance between the Earth and the Sun
D) The distance between the Earth and the Moon

44) **Which of the following celestial objects is the largest?**

A) Neutron star
B) Comet
C) Asteroid
D) Black hole

45) **What causes the phases of the Moon?**

A) The Earth's shadow on the Moon
B) The Moon's rotation on its axis
C) The relative positions of the Earth, Moon, and Sun
D) Changes in the Moon's shape

46) **What is the main factor that determines the lifecycle of a star?**

A) Its distance from Earth
B) Its mass
C) Its chemical composition
D) Its rotation speed

47) **Which galaxy is closest to the Milky Way?**

A) Andromeda Galaxy

B) Triangulum Galaxy
C) Large Magellanic Cloud
D) Small Magellanic Cloud

48) **What is a supernova?**

A) A newly formed star
B) The explosion of a dying star
C) A black hole forming event
D) A planet forming event

49) **Which of the following best describes a quasar?**

A) A small, icy body in the Kuiper belt
B) A distant, extremely luminous active galactic nucleus
C) A large planet with a strong magnetic field
D) A type of neutron star

50) **What is the name of the first artificial satellite launched into space?**

A) Apollo 11
B) Hubble Space Telescope
C) Sputnik 1
D) Voyager 1

Answer key

1. A. Hydrogen
2. C. Mercury
3. B. Mars
4. C. Jupiter
5. B. Saturn
6. B. Milky Way Galaxy
7. A. 8 minutes
8. C. Venus
9. A. Jupiter
10. D. Pluto
11. A. Comets have tails
12. A. Proxima Centauri
13. B. White Dwarf
14. C. Spiral
15. C. Red Dwarf
16. B. 13.8 billion years
17. A. Doppler Effect
18. B. Sputnik 1
19. A. Event Horizon
20. B. Mars

21. B. Andromeda Galaxy
22. A. Retrograde Motion
23. C. Nicolaus Copernicus
24. B. Hydrogen
25. B. Voyager 1
26. C. Scintillation
27. B. Jupiter
28. A. A type of neutron star
29. C. Sagittarius A*
30. C. Transit Method
31. C. Terminator
32. B. The longest phase of stable hydrogen burning
33. B. A supernova remnant
34. A. Solar Eclipse
35. B. Venus
36. A. Apollo 11
37. B. Orbit
38. C. A region of the solar system beyond Neptune
39. B. The distance light travels in one year
40. C. The relative positions of the Earth, Moon, and Sun
41. B. To magnify distant objects
42. C. Saturn
43. B. The distance light travels in one year
44. D. Black hole
45. C. The relative positions of the Earth, Moon, and Sun
46. B. Its mass
47. A. Andromeda Galaxy
48. B. The explosion of a dying star
49. B. A distant, extremely luminous active galactic nucleus
50. C. Sputnik 1

Shir Shivaji EducationSociety Amaravati's

Science College,Congress Nagar, Nagpur

Certificate Course: Explorations in Astronomy (10 Week)

2019-2020

Registration Sheet

Sr. No.	Full Name of Student
1	Himanshu P Badwaik
2	Nikhil U Balpane
3	Samiksha H Bhusari
4	Yash S Chaube
5	Darshan N Changole
6	Shreya K Chichghare
7	Vasuki S Dabhane
8	Sakshi S Dhadwe
9	Kshitija R Dhekale
10	Nikita H Deshmukh
11	Shruti R Gajbe
12	Nehal V Gaurkar
13	Harshad S Giratkar
14	Yuganti V Hatwar
15	Prachi J Hatwar
16	Trupti R Mahale
17	Prachi H Meharkule
18	Tanmay G Mirashe
19	Zayan H Mohammed
20	Aaishwarya S Nagrare
21	Rudali T Nirgulkar
22	Ritika K Nirwan
23	Shweta U Pakhmode
24	Himasnshu A Parihar
25	Prajwal S Parshuramkar
26	Gunjan G Pawar
27	Sahil R Punekar
28	Vaibhav B Puri
29	Gangotri L Rahangdale
30	Sanket S Rangari
31	Prerna A Ambade
32	Vivek S Baghel
33	Bharti - Bopche
34	Shantanu P Chavan
35	Lokesh D Gupta
36	Viplav V Kamble
37	Anuj M Khapekar
38	Priyanka S Kirtiwar
39	Suraj R Mandhare

40	Sanket S Masram
41	Isha K Meshram
42	Manshree P Mendhulkar
43	Ganesh A More
44	Janavi C Nimkar
45	Khushi M Panjawni
46	Trupti A Akhare
47	Aniruddha S Anasane
48	Rashmi P Balki
49	Pragati U Bhagat
50	Prutha S Bhake
51	Rutuja V Bhandarkar
52	Dhanashri S Binekar
53	Pratyush P Borkar
54	Ashish O Chandekar
55	Ujjwala R Chaple
56	Bharat S Kurve
57	Vrushali D Lokhande
58	Tapas T Mallik
59	Hema P Maske
60	Arpit R Meshram
61	Aditi P Mohatkar
62	Akash B Mujbaile
63	Ashwini S Naik
64	Rohit L Nakhate
65	Roini C Patre
66	Pallavi S Agalawe
67	Krutik S Bhongade
68	Sunayan D Bondre
69	Bhavana A Chandekar
70	Saurabh S Choudhari
71	Shruti M Chuhan
72	Kanchan A Digambare
73	Anjali A Fulkar
74	Deena R Gautam
75	Anuj C Ghatate
76	Namisha U Badwaik
77	Purva P Bharati
78	Om P Buddeker
79	Vedang V Chatte
80	Aniket G Dhande
81	Rutuja N Gharat
82	Shruti V Ingle

40	Sanket S Masram
41	Isha K Meshram
42	Manshree P Mendhulkar
43	Ganesh A More
44	Janavi C Nimkar
45	Khushi M Panjawni
46	Trupti A Akhare
47	Aniruddha S Anasane
48	Rashmi P Balki
49	Pragati U Bhagat
50	Prutha S Bhake
51	Rutuja V Bhandarkar
52	Dhanashri S Binekar
53	Pratyush P Borkar
54	Ashish O Chandekar
55	Ujjwala R Chaple
56	Bharat S Kurve
57	Vrushali D Lokhande
58	Tapas T Mallik
59	Hema P Maske
60	Arpit R Meshram
61	Aditi P Mohatkar
62	Akash B Mujbaile
63	Ashwini S Naik
64	Rohit L Nakhate
65	Roini C Patre
66	Pallavi S Agalawe
67	Krutik S Bhongade
68	Sunayan D Bondre
69	Bhavana A Chandekar
70	Saurabh S Choudhari
71	Shruti M Chuhan
72	Kanchan A Digambare
73	Anjali A Fulkar
74	Deena R Gautam
75	Anuj C Ghatate
76	Namisha U Badwaik
77	Purva P Bharati
78	Om P Buddeker
79	Vedang V Chatte
80	Aniket G Dhande
81	Rutuja N Gharat
82	Shruti V Ingle

Answer key

Shri Shivaji Education Society, Amravati's

SCIENCE COLLEGE

Congress Nagar, Nagpur-12 (M.S.), India

Accredited with CGPA of 3.51 at 'A+' grade by NAAC, Bangalore
A "College with Potential for Excellence" identified by UGC New Delhi.
Institutional Member of APQN
Recognized Centre for Higher Learning and Research
Mentor College under 'PARAMARSH Scheme', UGC, New Delhi

Add-on Course

Course Exam Name: Explorations in Astronomy

Name of Student: .....

Roll No.: | **Session: 2019-2020**

Test Date: 08/10/2019 | **Max. Marks: 100**

Invigilator Signature | **Obtained Marks:** ☐

INSTRUCTIONS FOR FILLING THE SHEET

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3. Use of pencil is strictly prohibited.
4. Circles should be darkened completely and properly.
5. Cutting and erasing on this sheet is not allowed.
6. Do not use any stray marks on the sheet.
7. Do not use marker or white fluid to hide the mark.

WRONG METHODS ⊗ ◉ ▰ ✓ **CORRECT METHOD** ○ ○ ○ ●

	A	B	C	D
1	●	○	○	○
2	○	○	●	○
3	○	●	○	○
4	○	○	●	○
5	○	●	○	○
6	○	●	○	○
7	●	○	○	○
8	○	○	●	○
9	●	○	○	○
10	○	○	○	●
11	●	○	○	○
12	●	○	○	○
13	○	●	○	○
14	○	○	●	○
15	○	○	●	○
16	○	●	○	○
17	●	○	○	○
18	○	●	○	○
19	●	○	○	○
20	○	●	○	○
21	◉	●	○	○
22	●	○	○	○
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24	○	●	○	○
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41	○	●	○	○
42	○	○	●	○
43	○	●	○	○
44	○	○	○	●
45	○	○	●	○
46	○	●	○	○
47	●	○	○	○
48	○	●	○	○
49	○	●	○	○
50	○	○	●	○

Shri Shivaji Education Society, Amravati's

SCIENCE COLLEGE

Congress Nagar, Nagpur-12 (M.S.), India

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Add-on Course

Course Exam Name: Explorations in Astronomy

Name of Student: Aishwarya S. Nagarare

Roll No.: -

Session: 2019-2020

Test Date: 08/10/2019

Max. Marks: 100

Invigilator Signature

Obtained Marks: 64

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6. Do not use any stray marks on the sheet.
7. Do not use marker or white fluid to hide the mark.

WRONG METHODS **CORRECT METHOD**

	A	B	C	D
1	○	●	○	○
2	○	○	●	○
3	○	●	○	○
4	○	○	●	○
5	○	○	●	○
6	○	●	○	○
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9	○	○	●	○
10	○	○	○	●
11	●	○	○	○
12	●	○	○	○
13	○	●	○	○
14	●	○	○	○
15	○	○	●	○
16	○	●	○	○
17	○	●	○	○
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19	●	○	○	○
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24	○	○	○	●
25	○	●	○	○
26	○	●	○	○
27	○	○	○	●
28	●	○	○	○
29	○	○	●	○
30	○	○	●	○
31	○	○	●	○
32	○	●	○	○
33	○	●	○	○
34	●	○	○	○
35	○	●	○	○
36	○	●	○	○
37	○	○	●	○
38	○	○	○	●
39	○	○	●	○
40	○	○	○	●
41	○	●	○	○
42	○	○	●	○
43	○	●	○	○
44	○	●	○	○
45	○	○	○	●
46	○	○	○	●
47	●	○	○	○
48	○	●	○	○
49	○	●	○	○
50	○	○	●	○

Shri Shivaji Education Society Amravati's

Science College

Congress Nagar, Nagpur

Department of Physics

Add-on Certificate Course
(2019-2020)
Certificate Course: Explorations in Astronomy

NOTICE

Date: 05/10/2019

All the registered students of add-on Course on **Explorations in Astronomy** under Department of Physics for the session 2019-20 are hereby informed that the theory examination is to be scheduled on **08/10/2019** at **10:30 am to 12:30 am** in Physics Laboratory at our college Centre. All Students should be present in the laboratory before 10 mins. of scheduled time of examination.

Dr. S. W. Anwane
Course Coordinator
Department of Physics

Shri Shivaji EducationSociety Amaravati's

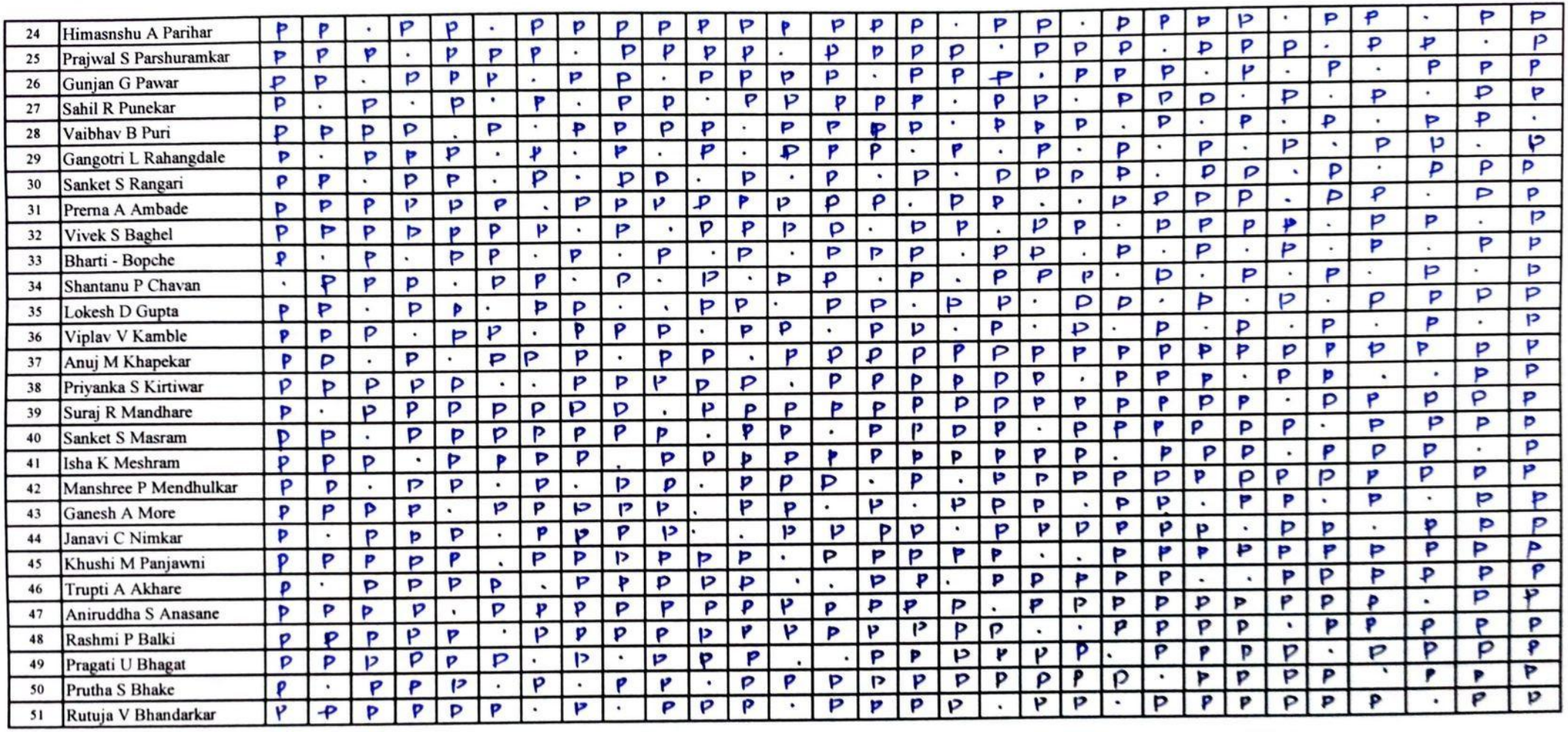
Science College,Congress Nagar, Nagpur

Certificate Course: Explorations in Astronomy (10 Week)

Theory Class Attendance Sheet

2019-2020

Sr. No	Student Full Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	Himanshu P Badwaik	P	·	P	P	·	P	P	·	P	P	P	P	P	·	P	P	P	·	P	·	P	P	P	P	P	P	P	P	·	P
2	Nikhil U Balpane	·	P	·	P	P	P	P	P	P	P	·	P	P	P	·	P	·	·	P	P	P	P	·	P	P	P	P	·	P	P
3	Samiksha H Bhusari	P	P	P	P	·	·	P	P	P	P	P	·	·	P	P	P	P	P	·	P	·	P	P	P	P	P	P	·	P	P
4	Yash S Chaube	·	P	P	P	P	P	·	P	P	P	P	P	·	P	P	P	P	·	P	P	P	·	·	P	P	P	·	P	P	P
5	Darshan N Changole	P	·	P	P	P	P	P	P	·	·	P	P	P	P	P	P	·	·	P	P	P	P	P	·	P	·	P	P	P	P
6	Shreya K Chichghare	P	P	·	P	P	P	P	P	P	P	P	P	·	P	·	·	P	P	P	P	P	P	P	P	P	P	P	·	P	P
7	Vasuki S Dabhane	·	·	P	·	P	P	P	P	·	P	P	P	P	P	P	P	·	P	P	P	·	P	P	P	·	P	P	P	P	P
8	Sakshi S Dhadwe	P	·	P	P	·	·	P	P	P	P	·	·	P	P	P	P	P	P	P	·	P	·	·	P	P	P	P	P	P	P
9	Kshitija R Dhekale	P	P	P	·	·	P	P	P	P	P	P	·	P	P	P	P	P	P	·	·	P	P	P	P	P	P	P	·	·	P
10	Nikita H Deshmukh	P	P	P	P	·	P	P	·	·	P	P	P	P	P	P	P	P	P	·	·	·	·	P	P	P	·	·	P	P	P
11	Shruti R Gajbe	·	P	P	P	P	·	·	P	P	P	P	P	P	P	P	P	·	·	P	P	·	P	P	P	P	P	P	P	·	·
12	Nehal V Gaurkar	P	P	P	·	·	P	·	P	P	P	P	·	·	P	P	P	P	P	P	·	·	·	P	P	P	·	·	P	·	P
13	Harshad S Giratkar	P	P	P	P	P	P	·	P	P	P	P	P	·	P	P	P	P	P	P	P	P	P	P	P	P	·	·	P	P	P
14	Yuganti V Hatwar	P	P	P	P	P	P	P	P	P	P	P	P	P	·	·	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
15	Prachi J Hatwar	P	P	·	·	P	P	P	·	P	P	P	P	P	·	P	P	·	P	P	P	·	·	P	P	P	·	·	P	P	P
16	Trupti R Mahale	P	P	P	P	·	·	P	P	P	P	P	P	·	P	P	P	P	P	P	P	P	P	·	·	P	P	P	·	·	P
17	Prachi H Meharkule	·	·	P	P	P	P	·	P	P	P	P	·	P	P	P	P	·	·	P	P	P	P	P	P	·	·	P	·	P	P
18	Tanmay G Mirashe	P	P	P	·	·	P	P	P	P	P	P	P	P	P	P	P	P	·	P	P	·	P	P	P	P	P	P	·	P	P
19	Zayan H Mohammed	P	P	P	P	P	·	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	·	·	P	P
20	Aaishwarya S Nagrare	P	P	P	·	P	·	P	P	P	P	·	P	P	P	P	P	P	P	P	P	·	P	·	·	P	P	P	·	P	P
21	Rudali T Nirgulkar	·	P	P	P	P	P	·	·	P	P	P	P	P	P	·	P	P	·	P	P	P	P	P	P	P	P	·	P	P	P
22	Ritika K Nirwan	·	P	P	·	P	P	P	P	·	P	P	P	·	P	P	P	P	P	·	P	P	·	P	P	P	·	P	P	P	P
23	Shweta U Pakhmode	P	·	P	P	·	P	P	·	P	P	P	·	P	P	P	P	·	P	P	P	·	P	P	·	P	P	P	P	P	·



52	Dhanashri S Binekar	P	-	P	P	P	P	.	P	P	P	P	.	P	P	.	P	P	P	.	P	P	P	P	P	P	.	P	P	.	P
53	Pratyush P Borkar	P	P	P	P	.	P	P	P	.	P	P	P	P	.	P	P	.	P	P	P	.	P	P	P	.	P	.	P	P	P	P
54	Ashish O Chandekar	P	.	P	P	P	.	P	P	P	.	P	P	P	P	P	.	P	P	.	P	P	P	.	P	.	P	P	P	P	P	.
55	Ujjwala R Chaple	P	P	.	P	P	P	.	P	.	P	.	P	P	P	P	P	.	P	P	.	P	P	P	.	P	P	.	.	P	P	P
56	Bharat S Kurve	P	.	P	P	P	.	P	P	P	.	P	P	P	.	P	P	P	P	.	P	P	P	.	P	.	P	P	P	.	P	P
57	Vrushali D Lokhande	P	P	.	P	P	P	.	P	P	P	P	.	P	P	.	P	.	P	P	P	P	P	P	P	.	P	P	P	.	P	P
58	Tapas T Mallik	P	P	P	P	.	P	.	.	P	P	P	P	P	P	P	.	P	P	P	.	P	P	.	P	P	P	.	P	P	P	P
59	Hema P Maske	P	.	P	P	P	.	P	P	P	.	P	P	.	P	P	P	P	.	P	P	.	P	P	P	P	.	P	P	.	P	P
60	Arpit R Meshram	P	P	.	P	P	P	.	P	P	P	P	P	P	.	P	.	P	P	P	P	P	P	.	P	P	P	.	.	P	P	P
61	Aditi P Mohatkar	P	P	P	.	P	P	P	.	P	P	P	P	.	P	P	.	.	P	P	.	P	.	P	P	.	.	P	P	P	P	P
62	Akash B Mujbaile	P	P	P	P	P	.	P	P	P	P	.	P	P	.	P	P	P	P	.	P	.	P	P	.	P	P	P	P	.	P	P
63	Ashwini S Naik	P	P	P	.	P	P	.	P	P	.	P	P	P	P	.	P	P	P	P	.	P	P	.	P	P	.	P	.	P	P	P
64	Rohit L Nakhate	P	.	P	P	P	.	P	.	P	P	P	.	P	P	P	P	.	P	P	P	.	P	P	.	P	P	P	.	P	P	P
65	Roini C Patre	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	.	P	P	.	P	P	P	.	P	P	.	P	P	P	P	P
66	Pallavi S Agalawe	P	P	P	P	.	P	P	.	P	P	.	P	P	.	P	P	P	P	P	P	.	P	P	P	P	P	.	P	P	P	P
67	Krutik S Bhongade	P	P	.	P	P	.	P	P	.	P	P	P	P	P	.	P	P	.	P	P	P	.	P	P	.	P	P	.	P	P	P
68	Sunayan D Bondre	P	P	P	.	P	P	P	.	P	.	P	P	.	P	P	P	.	P	.	P	P	P	.	P	P	.	P	P	P	P	P
69	Bhavana A Chandekar	P	.	P	P	.	P	P	.	P	P	P	P	P	P	P	P	P	P	P	P	.	P	P	.	P	P	P	.	P	P	P
70	Saurabh S Choudhari	.	P	P	.	P	P	.	P	P	.	P	P	P	P	P	P	.	P	P	P	.	P	P	.	.	P	P	P	.	P	P
71	Shruti M Chuhan	P	P	.	P	.	.	P	.	P	P	.	P	P	.	P	P	P	P	.	P	P	P	.	P	P	.	P	P	P	P	.
72	Kanchan A Digambare	P	P	P	P	P	P	.	P	P	P	P	.	P	P	.	P	.	P	P	.	P	.	P	P	P	P	.	.	P	P	P
73	Anjali A Fulkar	P	.	P	.	P	P	P	P	.	.	P	P	P	P	P	.	P	P	P	P	P	P	-	P	P	P	.	P	.	P	P
74	Deena R Gautam	.	P	P	P	.	P	P	.	P	P	P	P	.	P	P	P	P	.	.	.	P	P	P	P	P	P	P	P	P	P	P
75	Anuj C Ghatate	P	P	.	P	P	P	.	P	P	P	.	P	P	.	P	P	.	P	P	P	P	P	P	P	P	P	P	P	.	P	P
76	Namisha U Badwaik	P	.	P	P	P	P	P	P	.	P	P	.	P	P	.	P	P	.	.	P	.	P	.	P	.	P	P	P	P	P	P
77	Purva P Bharati	P	P	P	.	P	.	.	P	P	.	P	P	P	P	P	P	P	P	P	.	P	P	P	P	P	.	.	P	P	.	
78	Om P Buddeker	.	P	P	P	.	P	P	.	P	P	.	P	.	P	P	P	.	P	.	P	P	P	P	P	P	P	.	P	P		
79	Vedang V Chatte	P	P	.	P	P	P	.	P	.	P	P	.	P	.	.	P	P	.	P	P	P	P	P	.	.	P	.	P	.	P	
80	Aniket G Dhande	P	.	P	P	.	P	P	P	P	.	.	P	P	P	P	.	P	P	P	P	.	P	.	P	P	P	P	P	P	P	
81	Rutuja N Gharat	P	P	P	.	P	P	.	.	P	.	P	P	.	P	.	P	.	P	P	P	P	P	P	P	P	P	P	P	P	.	
82	Shruti V Ingle	P	P	P	P	P	P	P	P		P	P	.	P	P	P	P	P	P	.	P	.	P	P	.	P	P	P	P	P	P	

Shri Shivaji Education Society Amaravati's

Science College, Congress Nagar Nagpur

Department of Physics

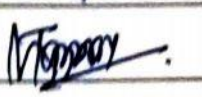
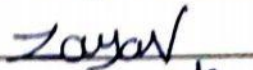
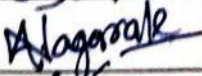
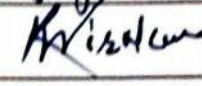
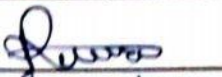
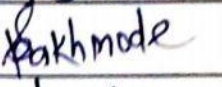
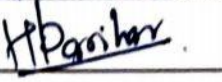
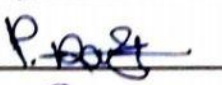
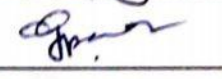
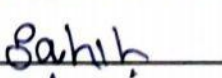
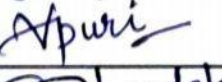
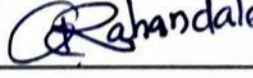
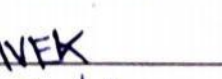
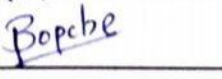
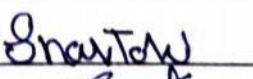
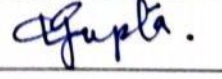
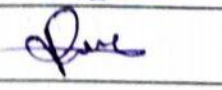
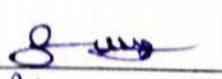
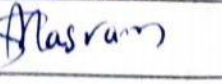
Certificate Course on: Explorations in Astronomy (10 Week)

2019-2020

Attendance Sheet

Theory/P~~ractical~~

Sr. No.	Name of Student	Signature
1	HIMANSHU P BADWAIK	
2	NIKHIL U BALPANE	
3	SAMIKSHA H BHUSARI	
4	YASH S CHAUBE	
5	DARSHAN N CHANGOLE	
6	SHREYA K CHICHGHARE	
7	VASUKI S DABHANE	
8	SAKSHI S DHADWE	
9	KSHITIJA R DHEKALE	
10	NIKITA H DESHMUKH	
11	SHRUTI R GAJBE	
12	NEHAL V GAURKAR	
13	HARSHAD S GIRATKAR	
14	YUGANTI V HATWAR	
15	PRACHI J HATWAR	
16	TRUPTI R MAHALE	

17	PRACHI H MEHARKULE	
18	TANMAY G MIRASHE	
19	ZAYAN H MOHAMMED	
20	AAISHWARYA S NAGRARE	
21	RUDALI T NIRGULKAR	
22	RITIKA K NIRWAN	
23	SHWETA U PAKHMODE	
24	HIMASNSHU A PARIHAR	
25	PRAJWAL S PARSHURAMKAR	
26	GUNJAN G PAWAR	
27	SAHIL R PUNEKAR	
28	VAIBHAV B PURI	
29	GANGOTRI L RAHANGDALE	
30	SANKET S RANGARI	
31	PRERNA A AMBADE	
32	VIVEK S BAGHEL	
33	BHARTI - BOPCHE	
34	SHANTANU P CHAVAN	
35	LOKESH D GUPTA	
36	VIPLAV V KAMBLE	
37	ANUJ M KHAPEKAR	
38	PRIYANKA S KIRTIWAR	
39	SURAJ R MANDHARE	
40	SANKET S MASRAM	

41	ISHA K MESHRAM	Isha
42	MANSHREE P MENDHULKAR	Mendhulkar.
43	GANESH A MORE	
44	JANAVI C NIMKAR	JA. Nimkar
45	KHUSHI M PANJAWNI	Khushi
46	TRUPTI A AKHARE	Trupti
47	ANIRUDDHA S ANASANE	A.S. Insane
48	RASHMI P BALKI	
49	PRAGATI U BHAGAT	Bhagat.
50	PRUTHA S BHAKE	Pruthas
51	RUTUJA V BHANDARKAR	Rbhandarkar
52	DHANASHRI S BINEKAR	
53	PRATYUSH P BORKAR	Porkar
54	ASHISH O CHANDEKAR	
55	UJJWALA R CHAPLE	U.R. chaple
56	BHARAT S KURVE	Bharat
57	VRUSHALI D LOKHANDE	Vakhande.
58	TAPAS T MALLIK	
59	HEMA P MASKE	Aayush
60	ARPIT R MESHRAM	ADITI P.
61	ADITI P MOHATKAR	Mohtale
62	AKASH B MUJBAILE	Amujbaile
63	ASHWINI S NAIK	ASHWIN
64	ROHIT L NAKHATE	R. lakhate

65	ROINI C PATRE	
66	PALLAVI S AGALAWE	
67	KRUTIK S BHONGADE	
68	SUNAYAN D BONDRE	
69	BHAVANA A CHANDEKAR	
70	SAURABH S CHOUDHARI	
71	SHRUTI M CHUHAN	
72	KANCHAN A DIGAMBARE	
73	ANJALI A FULKAR	
74	DEENA R GAUTAM	
75	ANUJ C GHATATE	
76	NAMISHA U BADWAIK	
77	PURVA P BHARATI	
78	OM P BUDDEKER	
79	VEDANG V CHATTE	
80	ANIKET G DHANDE	
81	RUTUJA N GHARAT	
82	SHRUTI V INGLE	

Dr. S. W. Anwane
Course Coordinator
Department of Physics

Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur

2019-2020

Certificate Course: Explorations in Astronomy (10 Week)

Marksheet

Sr. No.	Full Name of Student	Total Marks (100)	Grade obtained
1	HIMANSHU P BADWAIK	66	B
2	NIKHIL U BALPANE	54	C
3	SAMIKSHA H BHUSARI	44	C
4	YASH S CHAUBE	58	C
5	DARSHAN N CHANGOLE	68	B
6	SHREYA K CHICHGHARE	50	C
7	VASUKI S DABHANE	58	C
8	SAKSHI S DHADWE	58	C
9	KSHITIJA R DHEKALE	62	B
10	NIKITA H DESHMUKH	62	B
11	SHRUTI R GAJBE	69	B
12	NEHAL V GAURKAR	44	C
13	HARSHAD S GIRATKAR	72	B
14	YUGANTI V HATWAR	62	B
15	PRACHI J HATWAR	50	C
16	TRUPTI R MAHALE	92	A+
17	PRACHI H MEHARKULE	60	B
18	TANMAY G MIRASHE	62	B
19	ZAYAN H MOHAMMED	66	B
20	AAISHWARYA S NAGRARE	64	B
21	RUDALI T NIRGULKAR	82	A
22	RITIKA K NIRWAN	80	A
23	SHWETA U PAKHMODE	80	A
24	HIMASNSHU A PARIHAR	70	B
25	PRAJWAL S PARSHURAMKAR	58	C
26	GUNJAN G PAWAR	62	B

27	SAHIL R PUNEKAR	62	B
28	VAIBHAV B PURI	66	B
29	GANGOTRI L RAHANGDALE	68	B
30	SANKET S RANGARI	70	B
31	PRERNA A AMBADE	94	A+
32	VIVEK S BAGHEL	62	B
33	BHARTI - BOPCHE	52	C
34	SHANTANU P CHAVAN	72	B
35	LOKESH D GUPTA	72	B
36	VIPLAV V KAMBLE	70	B
37	ANUJ M KHAPEKAR	72	B
38	PRIYANKA S KIRTIWAR	60	B
39	SURAJ R MANDHARE	76	A
40	SANKET S MASRAM	54	C
41	ISHA K MESHRAM	60	B
42	MANSHREE P MENDHULKAR	74	B
43	GANESH A MORE	70	B
44	JANAVI C NIMKAR	94	A+
45	KHUSHI M PANJAWNI	90	A+
46	TRUPTI A AKHARE	62	B
47	ANIRUDDHA S ANASANE	70	B
48	RASHMI P BALKI	72	B
49	PRAGATI U BHAGAT	88	A
50	PRUTHA S BHAKE	62	B
51	RUTUJA V BHANDARKAR	78	A
52	DHANASHRI S BINEKAR	66	B
53	PRATYUSH P BORKAR	82	A
54	ASHISH O CHANDEKAR	62	B
55	UJJWALA R CHAPLE	84	A
56	BHARAT S KURVE	72	B
57	VRUSHALI D LOKHANDE	76	A
58	TAPAS T MALLIK	80	A
59	HEMA P MASKE	78	A
60	ARPIT R MESHRAM	72	B
61	ADITI P MOHATKAR	80	A
62	AKASH B MUJBAILE	68	B
63	ASHWINI S NAIK	64	B
64	ROHIT L NAKHATE	66	B
65	ROINI C PATRE	76	A

66	PALLAVI S AGALAWE	74	B
67	KRUTIK S BHONGADE	82	A
68	SUNAYAN D BONDRE	76	A
69	BHAVANA A CHANDEKAR	65	B
70	SAURABH S CHOUDHARI	50	C
71	SHRUTI M CHAUHAN	48	C
72	KANCHAN A DIGAMBARE	54	C
73	ANJALI A FULKAR	78	A
74	DEENA R GAUTAM	44	C
75	ANUJ C GHATATE	78	A
76	NAMISHA U BADWAIK	72	B
77	PURVA P BHARATI	76	A
78	OM P BUDDEKER	68	B
79	VEDANG V CHATTE	72	B
80	ANIKET G DHANDE	84	A
81	RUTUJA N GHARAT	96	A+
82	SHRUTI V INGLE	76	A

A+ Grade => Marks=90 and above,

A Grade =>Marks=75 and <90

B Grade =>Marks=60 and <75,

C Grade =>Marks=40 and <60,

Fail Grade =>Marks<40

Dr. S. W. Anwane
Course Coordinator

Action Taken Report

A thorough comprehension of fundamental astronomical ideas, such as the universe's magnitude and structure, has been supplied by this course. The explanation of solar system dynamics is provided in this course. describes the Sun, planets, moons, and smaller bodies as well as the dynamics of the solar system. Understanding stellar processes is necessary to explain the mechanisms involved in star creation, stellar evolution, and star death. The main ideas of cosmology, including the Big Bang theory, dark matter, dark energy, and the fate of the universe, are also explored and discussed. It involves the learner in current astronomical research and keeps them up to date on new findings and ongoing studies.

Shri Shivaji Education Society Amaravati's

Science College Congress Nagar, Nagpur

Department of Physics

"Explorations in Astronomy"

Duration: 02/08/2019- 05/10/2019

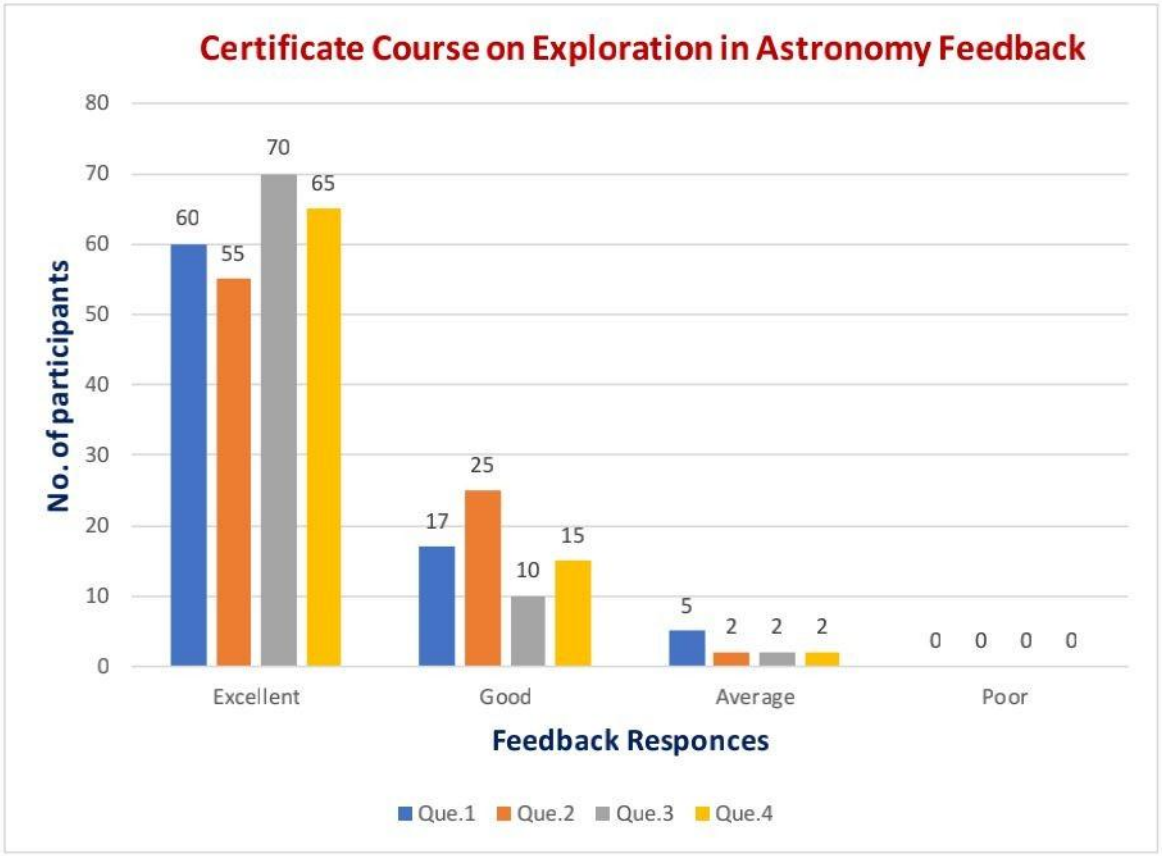
Course Coordinator: Dr. S. W. Anwane

Feedback form

Explorations in Astronomy Course Feedback Questionnaire

Name (optional):

1) How would you rate the overall quality of the course content?
   - ☐ Excellent
   - ☐Good
   - ☐Average
   - ☐Poor
2) How relevant was the course content to your professional or academic goals?
   - ☐Excellent
   - ☐Good
   - ☐Average
   - ☐Poor
3) How would you rate the course with its importance in today's Modern world?
   - ☐Excellent
   - ☐Good
   - ☐Average
   - ☐Poor
4) How would you rate the availability and quality of resources (e.g., textbooks, online materials)?
   - ☐Excellent
   - ☐Good
   - ☐Average
   - ☐Poor



Course Coordinator
Dr. S. W. Anwane

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Professor & Head
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Science College
Congress Nagar, Nagpur 440012

Dr. S. W. Anwane

Coordinator

Shri Shivaji Education Society Amravati's

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

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CERTIFICATE

Mr./Ku. AISWARYA S. NAGRARE is awarded with certificate on successful completion of the course entitled, Certificate course in **"Explorations in Astronomy"**.

Session 2019-20 under Add-on course conducted for **30 hours from 02/08/2019 to 05/10/2019** by Department of Physics, SSESA's, Science College, congress Nagar, Nagpur 440012.

He/She has passed the Examination with 'B' Grade.

Prof. S. W. Anwane
Coordinator, Department of Physics

Prof. M. P. Dhore
Principal, Science College, Nag