

भारत की छाप

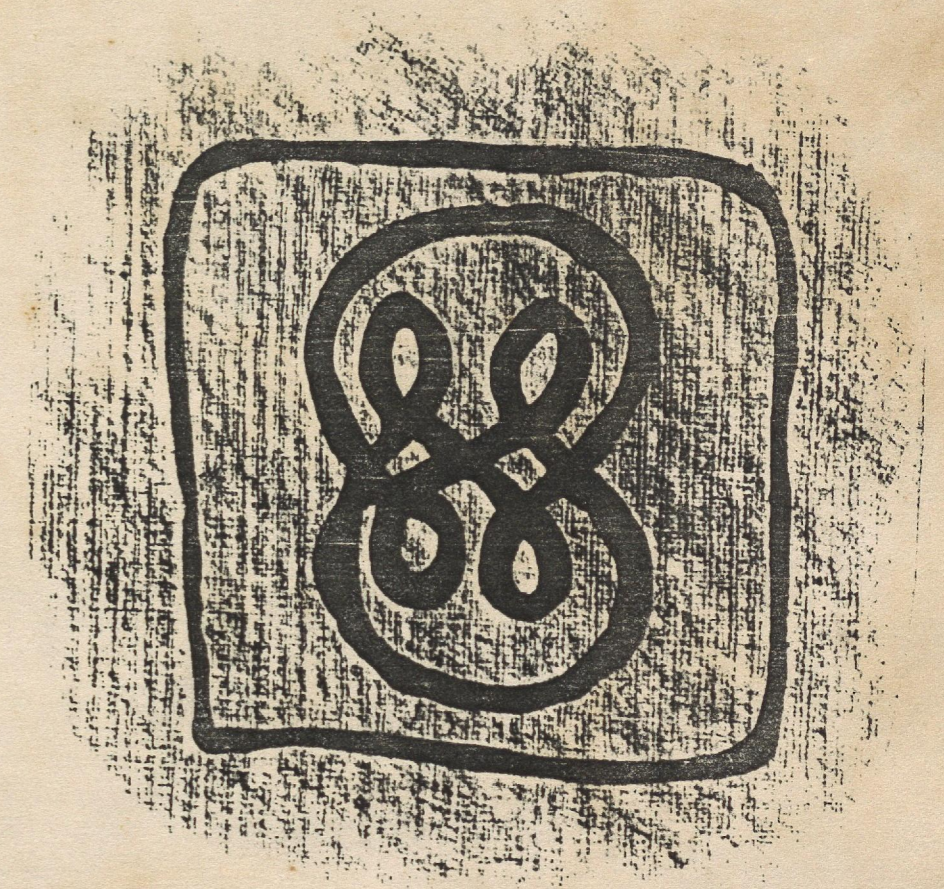
BHĀRAT KI CHHĀP

EPISODE 11

THE FREEDOM STRUGGLE &

THE SCIENTIFIC COMMUNITY

1900 TO 1947



A film series on the history of science and technology on the Indian subcontinent in thirteen episodes of fifty minutes each.

Presented by the National Council for Science and Technology Communication, Govt. of India.

Produced by Comet Project.

Translated by URMI JUVEKAR and annotated by SMRITI NEVATIA

1st Edition - May '91.

NOTES FOR ALL DUBBED LANGUAGE VERSION TEXT WRITERS

1. Whenever our reporters meet real experts or local people who talk in Hindi or any other language, we will not dub such conversations. We will keep the original sync. dialogue, but the dubbing artist for the reporter concerned will have to give a voiceover translating. An attempt must be made to keep these transactions a little shorter than the original, so that the actual words/voices in sync. get established at the beginning and again at the end, each time they speak. In the English guide translations such passages have already been written as necessary for voiceover.
2. Dubbing artists must be found **whose voices match** the original actors' voices as closely as possible, especially because in some places we are keeping the original Hindi sync. dialogues as a track along with voiceover.
3. At our discretion, we have made certain exceptions to point no. 1 above, in the interest of the total impact. For example, the Episode Two we are dubbing the guide in Bhimbaitka caves; in Episode Five we are dubbing the expert who shows Shehnaaz, our reporter, around Kanheri caves. **Each episode has its specific instructions about dubbing. So please refer constantly to those.**
4. Whenever a voiceover by the reporter or anchorpeople is superimposed on live (sync.) dialogue also spoken by themselves, this live (sync.) dialogue should also be dubbed in the language of each version, because some of it will be heard clearly on the final sound track. The Hindi transcripts and translations of all such dialogue are in the 'APPENDIX A' of each episode.
5. Whenever a word is used in Hindi and English, do the same (Bengali and English, Tamil and English, etc) but where only English has been used it is because the Hindi term may be too uncommon/difficult-in such cases use the English term or translate it, if there is a commonly understood equivalent in the language concerned.
6. Wherever we talk of "humans" or "the human race", do not say "men" but keep it general i.e. avoid a sex bias.
7. Translators knowing Hindi well should, of course, work from the Hindi text but in the English translation we have made improvements and additions sometimes. **So the English translation must be referred to always.**
8. Wherever there are title cards/written matter, these will be replaced by text in the languages of dubbing. Translators must give written matter for all such titles to artists doing fresh title cards. These are marked by ' - - - 'arrows in the scripts'.
9. All 'internal monologues/dialogues' indicated in the script, must be **written and spoken so that they seem like thoughts, not like commentary or normal conversation.**

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
→ 1.	000	00	Opening Titles		प्रस्तुतकर्ता राष्ट्रीय विज्ञान एवं प्रौद्योगिकी संघार परिषद्, विज्ञान और प्रौद्योगिकी विभाग		Fade in
2.				Presented by National Council for Science and Technology Communication Department of Science & Technology			
3.				BHĀRAT KI CHHĀP	भारत की छाप		
4.			Line of seals. In a series of 7 dissolves, camera zooms in to centre-most seal, depicting a symbol of the <u>charkha</u> , — the title graphic of this episode				
5.	016	24	MS Raghu sitting at table looking at books. Camera tracks backward, panning right to Amrita, and further tracks backwards to a long shot of all four reporters in a library.	Amrita (sync): ... Did you know — the first telephone exchange in India began operation in Calcutta in 1881, with only 50 lines. Ranjan (sync): Yes, and the first electric company was also set up in Calcutta, in 1899. Raghu (sync): And just within a year, electric trams started operating.	अमृता: - पता है - भारत में पहला टेलीफोन एक्सचेंज कलकत्ता में बना। 1881 में। बस - पचास लाइनें थीं। रंजन: - हाँ, और कलकत्ता में ही पहली इलेक्ट्रिक कंपनी आई - 1899 में। रघु: - और साल भर में इलेक्ट्रिक ट्रामें शुरू हुईं।		Fade out
6.	032	13	MS Shehnaaz. Camera tracks out as she sits on table, to include Amrita in an MLS of both.	Shehnaaz (sync): The first car came (to India) in 1892 — and in 1904 a car race was held in which sixty cars participated. Amrita (sync): The Wright brothers flew the first aeroplane in 1903, and by 1920 we had a regular flight service — Bombay to Karachi.	शहनाज़: - पहली कार 1892 में आई, और 1904 में तो साठ कारों की रेस भी हुई। अमृता: - राईट बंधुओं ने विमान उड़ा के दिखाया 1903 में। और 1920 तक हमारे यहाँ नियमित विमान सेवा शुरू हुई, बम्बई से कराची।		

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7.	042	19	MCU Raghu at books. Camera tracks back to include Ranjan in an MS of both.	<p>Raghu (sync): We first watched cinema in 1896, and in 1913 Dadasaheb Phalke made the first Indian feature film, 'Raja Harishchandra'.</p> <p>Ranjan (sync): Marconi sent radio signals across the Atlantic Ocean in 1901.</p>	<p>रघु :- हमने सिनेमा पहली बार देखा 1896 में, और 1913 में दादासाहेब फालके ने "राजा हरीशचंद्र" बनाई; पहली फीचर फिल्म।</p> <p>रंजन:- मार्कोनी ने अटलांटिक महासागर के पार रेडियो सिग्नल भेजे 1901 में।</p>		
8.	051	18	Low angle MS Shehnaaz.	Shehnaaz (sync): 1906 — the first radio programme.	शहनाज़:- 1906 में पहला रेडियो प्रोग्राम।		
9.	052	25	MS Amrita	Amrita (sync): 1928 — the first T.V. programme.	अमृता:- 1928, पहला टी.वी. प्रोग्राम।		
10.	054	03	Low angle MCU Ranjan.	Ranjan (sync): 1902 — Rutherford discovered the atomic structure.	रंजन:- 1902-रुदरफोर्ड ने अटॉमिक स्ट्रक्चर जाना।		
11.	055	31	MCU Raghu	Raghu (sync): 1930 — the atom was split to study its nucleus.	रघु:- 1930-अंम को तोड़कर उसके न्यूक्लियस को समझने का काम शुरू हुआ।		
12.	058	08	MS Amrita at table. Camera tracks backward to include all four in LS.	<p>Amrita (sync): Then we made computers and after that super computers too...</p> <p>Ranjan (sync): We (man) landed on the moon...</p> <p>Raghu (sync): ...made our own satellites...</p> <p>Shehnaaz: And more important than all this... in this century people understood the importance of freedom, democracy and peace in a much deeper sense.</p>	<p>अमृता:- फिर तो हमने कंप्यूटर बनाए और उसके बाद सुपर कंप्यूटर भी।</p> <p>रंजन:- हम चाँद पर पहुँच गए।</p> <p>रघु:- खुद के उपग्रह भी बना</p> <p>शहनाज़:- इन सबसे बढ़कर ये— इसी सदी में इन्सान ने आज़ादी, गणतंत्र और शान्ति के महत्व को और भी गहराई से समझा।</p>		

(Footnote: 5 - 12 : In this sequence the characters are reading from a book. Hence their sentences are not always complete. Also the feel of the people reading from books should be maintained.)

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	Ft.	Fr.					
13.	066	13	Low angle composition of newspapers rolling off the press. Camera pans right then tilts down, following newspapers.	(Song) <u>Ranjan</u> : Twentieth century, <u>Ranjan & Raghu</u> : Twentieth Century;	रंजन:- बीसवीं सदी, रंजन, रघु :- बीसवीं सदी,	Song	Printing machine
14.	071	08	MS a rotary press. Camera pans to MS Raghu in the printing press of 'The Times of India'.	<u>All</u> : Twentieth century, this is the Twentieth century. <u>Raghu</u> : The century which shook the world.	सब:- बीसवीं सदी, ये है बीसवीं सदी। रघु:- संसार को हिलाने वाली बातों की सदी।		
15.	075	32	MS Shehnaaz punching buttons on a control panel.	<u>Shehnaaz</u> : This era (the age) of science which will change everything,	शहेनाज़:- ये वक़्त है विज्ञान का जो बदल दे सब कुछ ;		
16.	078	00	MS Amrita looking at newspaper rolling. She turns to camera.	<u>Amrita</u> : The time to make our dreams come true. (This is a time of dreams/ When some things will come true).	अमृता:- ये समय है सपनों का जो साकार हों कुछ-कुछ।		
17.	080	16	Low angle composition of rollers and paper moving.	--	--		
18.	080	31	MS Shehnaaz and Amrita sitting on steps. Camera tilts up to MS Raghu & Ranjan.	<u>All</u> : Twentieth century, Twentieth century.	सब:- बीसवीं सदी, बीसवीं सदी।		
19.	083	00	LS paper rolling. Camera tilts up and pans left over rollers, opposite in direction to the moving paper.	--	--		
20.	088	03	Poster — silhouettes (in red) of a group of revolutionaries: cover of John Reed's book, "Ten Days That Shook the World". Camera pans right.	<u>Shehnaaz</u> : The Russian Revolution helped us to believe	शहेनाज़:- रूस की उस क्रांती से जागा ये विश्वास —		
21.	090	10	CU a Soviet poster — man with hammer and sickle in his hand, leading a group of marching workers.	<u>Amrita</u> : The world is in our hands;	अमृता:- अपने हाथों में संसार,		

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22.	091	17	Poster - marching crowd with sailors, soldiers, workers carrying banners.	We can change the course of events (We can chart our own destinies).	अमृता:- अपने वस्त्र में हैं इतिहास।		
23.	092	26	B&W photograph - Congress meeting at Allahabad Fort, 1929.	Ranjan: Here in India too, our hopes surged; (New feelings pirations were born);	रंजन:- यहाँ हिन्दुस्तान में भी नए भाव जगे -		
24.	095	03	B&W photograph - Civil Disobedience. Tilt up from group of demonstrators squatting on ground, to police led by an Englishman, preparing to arrest them.	Ranjan: Long live the revolution!	रंजन:- इन्कलाब जिन्दाबाद!		
25.	096	20	B&W photograph - Pandit Nehru addressing a public meeting in London in the 1930s.	Long live the revolution!	रंजन:- इन्कलाब जिन्दाबाद!		
26.	097	26	B&W photograph - CU Bhagat Singh.	Long live the revolution...	रंजन:- इन्कलाब जिन्दाबाद		
27.	098	31	B&W photograph - <u>satyagrahis</u> in Dandi March, 1918.	That became our slogan.	रंजन:- के नारे लगे।		
28.	100	05	MS Raghu with handful of cotton rags. He tosses them, catches them 2-3 times, then begins wiping machines in TOI press. Camera tracks left (swivelling around), to include all four in MLS, polishing & wiping the machines of the press.	All: Twentieth Century, Twentieth Century.	सब:- बीसवीं सदी, बीसवीं सदी।		
29.	104	36	Poster (WWI) - for German recruitment.	Ranjan: A bullet	रंजन:- बन्दूक की		
30.	105	20	CU of above poster.	Ranjan: from a gun	रंजन:- एक गोली ने		
31.	106	03	Poster (WWI) - German, showing 2 soldiers engaged in hand-to-hand combat.	Ranjan: spread its havoc,	रंजन:- ज़हर ऐसा घोला -		
32.	107	07	Poster (WWI) - German propaganda.	Ranjan: triggered off a war...	रंजन:- छिड़ गई वो जंग के		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
33.	108	10	Poster (WWI) - French, showing mother reassuring frightened child.	<u>Ranjan</u> : that shook the world.	रंजन:- सारा जहान डोला !		
34.	109	28	MS Amrita, through rollers of the press.	<u>Amrita</u> : Now people were listening to the news on the radio.	अमृता:- अब रेडियो पर लोग सुन रहे थे खबर ,		
35.	111	36	Low angle composition of rollers and moving paper: Shehnaaz enters in foreground.	<u>Shehnaaz</u> : When the war was over, everybody hoped to live in peace —	शहनाज़:- जब जंग हुई खत्म किया सब ने सबर— कि अब अमन से रहेंगे।		
36.	115	30	MCU Raghu. He looks to right, behind. Camera tracks forward to MCU Ranjan.	<u>Ranjan</u> : But a war broke out again ,	रंजन:- हुई फिर से जंग मगर !		
37.	117	38	B&W photograph (WWII) - soldiers on the offensive, with rifles, running down slope.	--	--		
38.	119	07	B&W photograph (WWII) - German soldier helping wounded companion in trench.	<u>Shehnaaz</u> : Of a kind that had never taken place	शहनाज़:- थी हुई न कभी		
39.	120	11	B&W photograph (WWII) American soldiers in sandbag bunker.	on this earth , before.	शहनाज़:- जैसी इस ज़मीन पर ।		
40.	121	33	B&W photograph (WWII) - Hiroshima: mushroom cloud.	--	--		Explosion of bomb
41.	122	36	B&W photograph (WWII) - fighter- planes in formation.	<u>Ranjan</u> : Once again the sky became a battlefield —	रंजन:- युद्ध का मैदान आसमों को फिर बनाया —		
42.	125	20	B&W photograph (WWII) - the gutted Prefecture Hall in Hiroshima.	<u>Raghu</u> : Hiroshima... The name "Hiroshima"	रघु:- हिरोशिमा । "हिरोशिमा" नाम		
43.	127	34	B&W photograph (WWII) - people walking through devastation of Hiroshima.	Was etched on our minds for ever.	रघु:- ज़हन पे छाया ।		

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44.	129	06	Tilt up B&W photograph (WWII)-of mushroom cloud.	All: Twentieth century, Twentieth century.	बीसवीं सदी, बीसवीं सदी।		
45.	131	22	B&W photograph (WWII)-soldiers running down slope with rifles.	--	--		
46.	132	30	B&W aerial photo (WWII)-fighter-planes in formation.	--	--		
47.	134	03	B&W photograph (WWII)-the gutted Prefecture Hall in Hiroshima.	--	--		
48.	135	13	Top angle, Amrita climbing up staircase in newspaper press, towards camera. Camera pulls back as she comes up, tilts up and pans right to Ranjan and Raghu in MLS, then tracks in to Raghu.	Amrita: If we choose, science can be used for destruction; Ranjan: We hoped to use it for the development of our country. Raghu: We had so many dreams / When we won our freedom —	अमृता:- चाहें तो विज्ञान से कर सकते हैं विनाश, रंजन:- देश के विकास की हमने की थी इससे आस। रघु:- देखे कितने सारे सपने जब आज़ादी हमने जीती,		
49.	143	27	MS Shehnaaz.	Shehnaaz: But let about the times before that. (Let's talk about all we went through before that).	शहेनाज़:- पर उस घड़ी से पहले की सुनाएँ आप-बीती।		
50.	146	10	Amrita in MS, Ranjan in background in LS. Amrita exits right, camera pans left to Ranjan, tracks back left as Raghu and Shehnaaz also enter frame in LS.	All: Twentieth century, Twentieth century.	सब:- बीसवीं सदी, बीसवीं सदी। बीसवीं सदी, बीसवीं सदी।		
51.	150	34	LS Gateway of India, taken from sea, on boat. Shehnaaz enters frame from right, in MS, looking at Gateway and the Taj Hotel. She turns to face camera.	Twentieth century, Twentieth century. (End of Song)	बीसवीं सदी, बीसवीं सदी। बीसवीं सदी, बीसवीं सदी।	Fade out Song	Sea, ship's horn

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51.	contd...			Shehnaaz (sync): On the sea shore there stood a British fort.	शहनाज़:- समुन्द्र के किनारे अंग्रेजों का एक किला था।		
52.	160	25	Aquatint of British Factory House at Fort, Bombay, with harbour in foreground.	Shehnaaz (V.O.): It was used to store goods that were meant for export.	शहनाज़:- इसमें वो सामान रखते थे, जो विदेश भेजते थे।		Sea
53.	163	12	MS Shehnaaz, Gateway of India & Taj Hotel in background.	A city started coming up around the fort.	शहनाज़:- इस किले के आसपास एक शहर बसने लगा।		Sea
54.	165	06	B&W photograph - 19th century view of Girgaum, Bombay.	--	--		Birds, people
55.	166	18	B&W photograph - 19th century view of Apollo Street, Bombay.	--	--		Birds, people
56.	167	30	B&W photograph - 19th century view of the crossing at Pydhonie, Bombay.	--	--		Birds, people
57.	169	02	B&W photograph - early 20th century view of a horse-drawn tram at Fort, Bombay.	--	--		Birds, people
58.	170	14	B&W photograph - 19th century view of a street in Fort, Bombay.	--	--		Birds, people
59.	171	26	B&W photograph - 19th century view of street outside Kanch Masjid, Bombay.	--	--		Birds, people
60.	172	38	Top angle LS, similar crowded street today.	Bombay!	शहनाज़:- बम्बई!		Traffic, crowds
61.	176	08	Engraving - 18th century, English Factory House and Fort at Bombay.	The large and deep port here was	शहनाज़:- यहाँ के बड़े और गहरे बन्दरगाह का		
62.	178	36	Engraving - 18th century view of Bombay Harbour.	developed by the British.	शहनाज़:- अंग्रेजों ने विकास किया।		

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63.	180	08	MS-ship "Bharatendu" sailing in harbour, camera moves back to LS, as it sails away.	With the coming of steam power, the ships too became larger, thus creating a need for such ports.	शहनाज़:- स्टीम पावर के आने से बड़े-बड़े जहाज़ बनने लगे और ऐसे बंदर-गाहों की ज़रूरत पड़ी।		Ship's horn
64.	188	13	Composition of ships & cranes in harbour.	And when the Suez Canal was constructed, it increased the importance of this port.	शहनाज़:- और जब सुज़ेज़ कनाल बना, तब इसका महत्व और बढ़ा।		Water, birds
65.	194	23	MLS Shehnaaz in docks, walking right and towards camera. Camera tracks back and pans right to sea and ships in LS.	Shehnaaz (sync): Now this became the nearest Indian port from England. On the east coast of Bombay, many more docks were built. And thus Bombay became the main trading centre.	शहनाज़:- अब ये इंग्लैण्ड से भारत तक का सबसे नज़दीकी बन्दरगाह था। बम्बई के पूर्वी तट पर कई गोदियाँ बनीं। ये बम्बई व्यापार का मुख्य केंद्र बन गया।		Footsteps
66.	204	20	Low angle MS cargo being unloaded. Camera tilts down as it is brought down by a crane, and workers surround it.	--	--		Incidental conversation
67.	211	38	MLS 2 workers rolling a package of newsprint into godown.	--	--		Incidental conversation
68.	213	34	MS crane-clamps, released from cargo, being lifted up-camera follows them.	Shehnaaz (V.O.): A similar thing happened with many other small hamlets.	शहनाज़:- कई और छोटे कस्बों के साथ ऐसा ही हुआ।		Incidental conversation
69.	218	22	Colour lithograph - "Custom, House Wharf", Calcutta, by Charles D'Oyly, 1833.	Calcutta,	शहनाज़:- कलकत्ता,		Waves
70.	220	15	Aquatint - "South-East view of Fort St. George, Madras" from "Oriental Scenery" by Thomas & William Daniells, late 18th century.	Madras, developed in a similar manner. (experienced a similar growth pattern).	शहनाज़:- मद्रास इसी तरह बढ़े।		Waves lapping on shore
71.	222	08	Aquatint - Indian merchant & palanquin bearers on a corner of the Bombay Green, early 19th century.	These cities attracted...	शहनाज़:- इन शहरों ने		Waves, voices

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72.	224	21	Watercolour — Bombay street scene by unidentified British Artist, early 20th century.	many people.	शहनाज़:- बहुत से लोगों को आकर्षित किया।		Murmur of voices
73.	226	35	Pen & ink sketch of Koli couple.	--	--		
74.	228	07	Pen & ink sketch of two Maratha women pounding masala.	People with varied skills came to settle here.	शहनाज़:- हर हुनर के लोग यहाँ आकर बसे।		
75.	229	19	CU hands of a worker hammering out a sheet of silver foil between pieces of leather.	--	--		Hammering
76.	230	19	Top angle MLS group doing same work.	Many kinds of craftsmen....	शहनाज़:- हर तरह के काशीगर।...		Hammering
77.	233	00	Top angle MCU pile of utensils. Camera pans left over them to utensil-makers in MLS, making utensils.	--	--		Hammering
78.	228	38	Top angle MCU worker's hands hammering at silver foil between 2 pieces of leather.	--	--		Hammering
79.	240	11	MS group of foil-makers.	--	--		Hammering
80.	241	27	MCU worker's hand making brass-letter fonts; completed fonts in background.	--	--		Hammering
81.	242	16	MLS the worker & fonts.	--	--		Hammering
82.	242	34	MCU the worker working.	--	--		Hammering
83.	243	18	MCU a man with red turban.	--	--		Hammering
84.	244	02	MCU an oil seller measuring oil into a vial.	--	--		Hammering
85.	244	22	MS a jeweller, necklaces in cases in background.	also traders and money-lenders.	शहनाज़:- सेठ - साहूकार भी।		Hammering
86.	245	32	MCU a trader talking.	Now, there existed many opportunities for earning money in these cities.	शहनाज़:- अब शहर में पैसे कमाने के काफ़ी मौके थे।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
87.	249	03	Pen&ink sketch of a Parsi couple.	--	--		
88.	250	11	Pen&ink sketch of a Marwari couple.	--	--		
89.	251	32	CU page of an advertisement for "YATES&THOM steam engines". Camera tilts down to show Bombay agents name.	By the middle of the 19th century, the British found it profitable	शहनाज़:- उन्नीसवीं सदी के मध्य तक अंग्रेजों के लिए तैयार माल ही नहीं,		Looms
90.	255	37	CU page of an advertisement for "Hutchinson Hollingworth Co. Ltd." power looms.	not only to export ready-made goods,	शहनाज़:- बल्कि मशीनों का निर्यात करना भी		Looms
91.	257	11	CU page of an advertisement for "Schweizer" winders.	but to export machinery as well.	शहनाज़:- लाभदायक होने लगा ।		Looms
92.	258	10	B&W sketch of a mill area in Bombay, with salt pans in foreground.	And thus	शहनाज़:- और यूँ		Factory siren
93.	259	14	B&W photograph of an early mill, 19th century.	in India	शहनाज़:- हिन्दुस्तान में		Factory siren
94.	260	06	B&W photograph - top angle view of a mill area, 19th century.	the age of factories began.	शहनाज़:- कारखानों का दौर शुरू हुआ ।		Factory siren
95.	261	22	CU shuttle movement on a power loom.	--	--		Factory siren, loom
96.	263	38	Angular MCU - up and down movement of warp of loom.	--	--		Loom
97.	266	04	Top angle MS - back and forth movement of part of the loom.	--	--		Loom
98.	267	22	Slightly top angle- textile factory floor, with looms in operation. Shehnaaz walks between the machines from left to right, then up.	Traders and money-lenders who earlier worked as commission agents now started investing in these factories.	शहनाज़:- कमिशन स्पेंट का काम करने वाले सेठ-साहूकारों ने इन कारखानों में पूँजी लगाई ।		Loom

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
99.	272	16	MCU a line of spindles spooling the yarn. Camera pans left to Shehnaaz walking down the line away from camera.	Here in Bombay many factories were set up. In the beginning these were mostly textile mills.	शहनाज़:- यहाँ, बम्बई में कई कारखाने खुले। शुरु में तो ज़्यादातर कपड़ा मिलें ही थीं।	Fade in	
100.	278	37	Top angle MCS Shehnaaz walking between rows of spinning machines towards camera. Camera tracks right to another row of spinning machines.	--	--	Fade out	
101.	287	11	MLS the <u>dabbawala's</u> handcart arriving outside a godown. Workers enter from left, pick up their tiffins and exit left.	For the first time, people from different castes,	शहनाज़:- पहली बार अब गाँव की परंपरा से हटकर		Incidental conversation
102.	292	02	Top angle MLS two workers eating lunch.	religions and regions left behind their village traditions and	शहनाज़:- अलग-अलग जाति, धर्म और इलाके के लोग		Murmur of voices
103.	294	00	MLS the group of workers, eating lunch, sitting in a circle.	started living (here) together.	शहनाज़:- एक साथ रहने लगे।		Murmur of voices
104.	296	15	LS workers eating lunch outside the factory.	--	--		
105.	298	16	B&W photograph of workers at a tea shop, 19th century.	These people developed their own identity —	शहनाज़:- इन लोगों की अपनी एक पहचान बनी—		
106.	300	39	B&W photograph - a group of workers, 19th century.	the working class.	शहनाज़:- मज़दूर वर्ग।		
107.	303	02	B&W photograph - a worker at spinning machine, 19th century.	They united amongst themselves	शहनाज़:- सारे एक साथ आए।		
108.	304	14	B&W photograph - row of workers at spinning machine, 19th century.	and a new kind of organization was formed —	शहनाज़:- एक नए किस्म का संगठन बना—		
109.	306	28	B&W photograph - women workers at spinning machine, 19th century.	the trade unions.	शहनाज़:- ट्रेड यूनियन।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
110.	308	15	B&W photograph - workers at a labour rally, 20th century.	This class fought not only for their economic demands, but also for the freedom of the country.	शहनाज़:- न सिर्फ अपनी आर्थिक मांगों के लिए, बल्कि अपने देश की गुलामी के विरोध में भी इस वर्ग ने आंदोलन किए।		Workers' song
111.	312	23	Newspaper cutting (TOI, 25 July 1908) - "Bombay disturbances."	Like the workers' strike of 1908,	शहनाज़:- जैसे 1908 की मज़दूर हड़ताल,		Workers' song
112.	314	16	B&W drawing of Tilak defending himself during his trial in 1908.	demanding the release of Tilak (from jail).	शहनाज़:- तिलक की रिहाई के नारे पर।		Workers' song
113.	317	07	LS a group of people on the roadside - listening to group singing workers' song. Bus passes by in foreground.	--	--		Workers' song, traffic
114.	320	37	LS a street/road in mill area, Bombay.	There was so much happening in these cities. By the middle of the 19th century,	शहनाज़:- कितना कुछ हो रहा था इन शहरों में। उन्नीसवीं सदी के मध्य तक।		Traffic
115.	325	23	Low angle MLS High Court, Bombay. A bus passes in front of it from right to left.	These cities had become centres of trade and administration.	शहनाज़:- ये शहर व्यापार और प्रशासन के केन्द्र बन गए थे।		Traffic
116.	328	12	LS the Victoria Terminus, traffic in front.	The railways and telegraph linked the country together.	शहनाज़:- रेलवे और टेलिग्राफ ने सारे देश को जोड़ दिया।		Traffic
117.	331	21	MLS well in front of the High Court, Bombay. Shehnaaz enters from right and leans against well. Camera tracks right, in circle, and pans left.	Shehnaaz (sync): Along with uniform administration, the economic system also became centralised. Now a famine or drought in any one part of the country affected the entire country. But another result was that we started perceiving ourselves as one country.	शहनाज़:- समान शासन-व्यवस्था आई और साथ-साथ अर्थ-व्यवस्था भी केंद्रित हुई। अब अगर कहीं अकाल पड़ा या बाढ़ आई, तो इसका असर पूरे देश पे पड़ने लगा, लेकिन इसका ये भी परिणाम हुआ कि हम अपने आप को एक देश के रूप में देखने लगे।		Traffic

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
118.	343	09	B&W photograph - Bombay Municipal Building, 19th century.	The spread of modern education in these cities	शहनाज़:- इन शहरों में हो रहा आधुनिक शिक्षा का प्रसार भी		
119.	345	23	B&W photograph - St. Xavier's College, Bombay, 19th century.	also brought people from different parts of the country together.	शहनाज़:- देश भर के लोगों को एक साथ लाया।		
120.	347	15	B&W photograph - the High Court, Bombay, 19th century.	Gradually, the number of people acquiring higher education began to increase.	शहनाज़:- धीरे-धीरे उच्च शिक्षा पाने वालों की संख्या बढ़ रही थी।		
121.	350	04	Archway of pillared porch of Bombay University Library, Shehnaaz walking through, towards camera, then left into drive. Camera tracks with her.	Shehnaaz (sync): Thus a new intellectual class began to emerge, which knew English. (These people) were becoming aware of events taking place in the rest of the world. They recognised their colonial status and raised their voice against the British Raj, thus spreading the spirit of nationalism.	शहनाज़:- इनसे एक नया बुद्धिजीवी वर्ग तैयार हुआ जो अंग्रेज़ी जानता था। लोग दुनिया की घटनाओं से वाकिफ हुए। उन्हें अपनी गुलामी का अहसास हुआ। अंग्रेज़ी राज के खिलाफ उन्होंने आवाज़ उठाई। राष्ट्र भावना का प्रसार किया।		
122.	361	08	B&W photograph - Bal Gengadhar Tilak.	Shehnaaz (voiceover): These people wanted	शहनाज़:- सारे देश भर में		Traffic
123.	362	30	B&W photograph - Dinshaw Vacha.	to propagate their thinking throughout the country.	शहनाज़:- अपने विचारों को फैलाना चाहता।		Traffic
124.	364	12	B&W photograph - Phirozeshah Mehta.	Such like-minded people	शहनाज़:- इस दिशा में सोचने वाले लोग एक		
125.	365	25	B&W photograph - Badruddin Tayebji.	came together from every region,	शहनाज़:- साथ आए। हर जगह।		
126.	366	26	B&W photograph - Dadabhai Neoroji.	every city.	शहनाज़:- हर शहर से।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
127.	367	38	B&W photograph - group outside Tejpal Hall : first Congress meeting, Bombay, December 1885.	Here, in Bombay, they founded the Indian National Congress, in December 1885.	शहनाज़:- उन्होंने यहाँ बम्बई में दिसम्बर 1885 में इंडियन नेशनल कांग्रेस की स्थापना की।		
128.	372	15	B&W photograph - Congress demonstration at Azad Maidan, in the 1930s.	The importance of this Congress was to be realised	शहनाज़:- इस कांग्रेस का महत्व सामने आने वाला था।		Murmur of voices
129.	374	28	B&W photograph - Civil Disobedience, Bombay: police breaking up a demonstration.	in the events of the next century.	शहनाज़:- अगली सदी की घटनाओं से।		Gunshots, cries of victims
130.	377	04	MS Shehnaaz on balcony, city of Bombay in background. Pan left to city.	Shehnaaz (sync): The new thinking/new ideas and opinions originated in these cities. Nissim (voiceover): No other century experienced changes like the 20th century did. The world was undergoing rapid changes in every direction.	शहनाज़:- इस नए सोच-विचार की शुरुआत हुई इन शहरों में। निस्सिम:- बीसवीं सदी ने जो बदलाव देखे, किसी दूसरी सदी ने नहीं। सारी दुनिया सब तरफ तेज़ी से बदल रही थी।	Fade in	
131.	390	04	MS Nissim in anchor room.	Nissim (sync): Science, political thought, economic systems, society — everything. What was happening in India at that time?	निस्सिम:- विज्ञान, राजनैतिक विचार-धारा, अर्थव्यवस्था और समाज, सब कुछ। ऐसे में हमारे यहाँ क्या हो रहा था ?		Fade out
132.	395	27	MS Maitreyi. Camera pulls out to include Nissim, ending on MLS both.	Maitreyi: As Shehnaaz was saying, quite apart from the existing feudal traditions (of <u>rajās</u> and <u>nawabs</u>), a new city culture was emerging in cities like Bombay, Madras, Calcutta. New classes were being formed. Mill owners, mill workers, working class,	मैत्रेई:- जैसे शहनाज़ बता रही थी, राजा और नवाबों की परंपरा से निकलकर एक नई शहरी संस्कृति जन्म ले रही थी। बम्बई, कलकत्ता, मद्रास जैसे महानगरों में नये वर्ग बन रहे थे - कारखाना मालिक, कारखाना मजदूर,		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
132.	continued			<p>middle class, intellectual class. Though these classes were the product of the British economic system, it was these classes who provided the new leadership during the freedom struggle.</p> <p><u>Nissim</u>: It was becoming clear that we needed to develop our own economic system. The <u>Swadeshi</u> movement was an example of this. India needed industries that were established with</p>	<p>मध्यम वर्ग, बुद्धिजीवी वर्ग— ये वर्ग बने तो थोड़े अंग्रेजी अर्थ-व्यवस्था के कारण, पर आज़ादी की लड़ाई में नया नेतृत्व भी इन्हीं लोगों में से आया।</p> <p>निस्सिम: - ये समझ साफ हो रही थी कि अपनी निजी अर्थ व्यवस्था का विकास ज़रूरी है। स्वदेशी आंदोलन इस का ही एक उदाहरण था। भारत को चाहिये ये ऐसे उद्योग, जो भारतीय पूँजी के आधार पर</p>		
133.	420	20	MS Maitreyi.	<p><u>Nissim (voiceover)</u>: Indian capital.</p> <p><u>Maitreyi (sync)</u>: For this we needed scientists and technicians, but in those days it was not easy to acquire a science education. The right to science was in itself a step towards independence. So it is not surprising that those working in the field of science were also involved in the freedom struggle.</p>	<p>निस्सिम: - स्थापित हो।</p> <p>मैत्रेई: - इसके लिए सायन्टिस्ट्स और टेक्निशियन्स की ज़रूरत थी, पर तब सायन्स की पढ़ाई इतनी आसान नहीं थी। विज्ञान पर अधिकार जमाना खुद आज़ादी की दिशा में एक कदम था। इसलिए हमें आश्चर्य नहीं होना चाहिए कि बीसवीं सदी तक जो विज्ञान में काम कर रहे थे वो आज़ादी की लड़ाई से भी जुड़े थे।</p>		

(Footnote: 133. Maitreyi doesn't mean science was difficult to study, she means it was difficult for Indians to get to study science.)

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
134.	433	06	MS Nissim.	Nissim: In addition to new discoveries, the need to spread science was also understood. And the main centre of this activity was	निस्सिम:- नए खोजों के साथ-साथ विज्ञान-प्रचार के महत्त्व को भी समझा गया। और इस हलचल का एक प्रमुख केन्द्र बना		
→ 135.	438	03	Map of India: camera zooms in to Calcutta.	the capital of British India — Calcutta.	निस्सिम:- अंग्रेजों की भारतीय राजधानी, कलकत्ता।	Fade in	
136.	442	29	Low angle MS Bose Institute. Camera tilts down & pans left to include Ranjan and Raghu walking left to right across building. They turn the corner and walk away from camera.	Recently, Ranjan and Raghu visited the Bose Institute in Calcutta. It was founded in 1917 by Jagdish Chandra Bose.	निस्सिम:- हाल ही में रंजन और रघु कलकत्ता की बोस इन्स्टिट्यूट गए थे, जिसकी स्थापना जगदीश चन्द्र बोस ने 1917 में की थी।		
137.	449	27	LS Ranjan and Raghu walking left to right across lawn of Bose Institute, to one of the buildings.	There they met Dibakar Sen, who showed them the instruments made by Jagdish Chandra Bose.	निस्सिम:- वहाँ दोनों की मुलाकात हुई दिबाकर सेन से, जिन्होंने जे. सी. बोस के बनार हुर यंत्रों का परिचय दिया।		Birds
138.	457	05	CU transmitting & receiving ends of Bose's wireless signalling set. Camera pulls back as Dibakar Sen points out the various parts, to MLS Sen, assistant and Ranjan.	NB: SYNC DIALOGUE TRACK Ranjan's V.O. for conversation with Dibakar Sen (match carefully): He showed us the 100 year old wireless signalling set, made by J.C. Bose. It has a transmitter, and receiver. When a microwave	सेन:- ये 100 बरस से पुराना इंस्ट्रुमेंट है, ये जे. सी. बोस ने बनाया। ये है ट्रान्स्मिटर, ये है रिसेवर। यहाँ से माईक्रोवेव जनरेट	Fade out	
139.	466	22	MCU Ranjan - reaction.	is generated,	सेन:- जब होगा,		Sound of transmitter, traffic

(Footnotes: 138, 139: Say J.C. Bose as 'Jay See' Bose in all languages - not 'Ja Cha' etc. Similarly P.C. Ray is 'Pee See' Ray etc., below).

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
140. (FN)	467	28	CU Sen's hand pressing button on transmitter. Camera pans left over receiver and galvanometer.	the transmitter receives the current, which is indicated by the galvanometer needle deflection.	सेन:- जस्ट सी वॉट हॅपन्स। ट्रान्समिटर से ये रिसेीवर - और आफ्टर रिसेीविंग गॅल्वेनोमीटर डिफ्लेक्शन।		Sound of transmitter, traffic
141.	476	23	MLS Sen, assistant and Ranjan. Ranjan gets up and walks left to side of desk. Camera pans and tilts up with him, ending at low angle MS Ranjan.	Ranjan (sync): In 1895, Jagdish Chandra Bose demonstrated this wireless signaling set — two years before Marconi! Later he demonstrated this in the Royal Society of London. Bose was the first Indian scientist to get worldwide recognition. The most vital part of this instrument is this receiver — which was made by Bose. He called it the "Coherer". While making this, he realised that there are two types of receivers: a "p" or positive type, in which the current increases in the receiver. And the other, "n" or negative type, in which the current decreases. It was not known then (in those days) that these receivers work on the principle of semi-conductors. This principle was understood only fifty years later.	रंजन:- इसी वायरलेस सिग्नलिंग सेट का डेमन्स्ट्रेशन 1895 में कलकत्ता के टाऊन हॉल में जगदीश चन्द्र बोस ने किया था - मार्कोनी से दो साल पहले। बाद में इसे उन्होंने रॉयल सोसायटी ऑफ लण्डन में भी प्रदर्शित किया। बोस पहले भारतीय वैज्ञानिक थे जिन्हें दुनिया- भर में मान्यता मिली। इस इंस्ट्रुमेंट का सबसे महत्व का अंग है। ये रिसेीवर जिसे बोस ने बनाया और कोहेरर नाम दिया। इसे बनाते वक्त उनके ध्यान में आया कि रिसेीवर दो प्रकार के हैं - एक "पी", पॉज़िटिव टाइप, जिसमें रिसेीवर में करंट बढ़ जाता है - और दूसरा "एन", यानि नेगेटिव टाइप, जिसमें रिसेीवर में करंट कम हो जाता है। तब ये मालूम नहीं था कि ये रिसेीवर सेमी-कंडक्टर सिध्दान्त पर काम करते थे। इसकी जानकारी पचास साल बाद ही होने वाली थी।		Traffic

(Footnote: 140. Say J.C. Bose as 'Jay See' Bose in all languages - not 'Ja Cha' etc. Similarly P.C. Ray is 'Pee See' Ray etc., below).

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
142.	508	14	MCU Sen looking at the wireless transmitting set.	Ranjan (V.O.): Today this is the foundation of modern electronics.	रंजन:- आज ये मॉडर्न इलेक्ट्रॉनिक्स की बुनियाद है।		Traffic
143.	510	14	B&W photograph - J.C. Bose in old age, with instrument.	Raghu (V.O.): J.C. Bose is best known for his experiments on plants.	रघु:- जे. सी. बोस खनस्पतियों पर किए गए प्रयोगों के कारण ज्यादा मशहूर रहे।		
144.	514	03	B&W photograph - MCU Bose at a younger age.	Raghu (V.O.): Although he could be considered the first bio-physicist,	रघु:- हालांकि वो एक माने में पहले बायो-फिज़िस्ट थे,		
145.	516	19	B&W photograph - J.C. Bose at graduation from London University.	his most important work was in the field of physics, which he had studied at London University.	रघु:- लेकिन उनका महत्वपूर्ण काम फिज़िक्स में रहा, जिसे इन्होंने लण्डन यूनिवर्सिटी में पढ़ा था।		
146.	520	02	MLS Raghu sitting at desk in Bose Institute. Ranjan enters from right behind him, and crosses to stand left of Raghu.	Raghu (sync): He worked on electromagnetic waves and their properties. He succeeded in making electromagnetic waves of 1cm to 5mm wavelength. Today these are part of the microwave spectrum. It was during these experiments that he became interested in plants.	रघु:- इलेक्ट्रो-मैग्नेटिक वेव्स और उनके प्रॉपर्टीज़ पर उन्होंने काम किया, और एक सेन्टीमीटर से पाँच मिलीमीटर वेवलैन्थ वाली इलेक्ट्रो-मैग्नेटिक वेव्स बनाने में कामयाब रहे जो आज माइक्रोवेव के स्पेक्ट्रम में आती हैं।		

<u>S.No.</u>	<u>Footage</u> <u>Ft. Fr.</u>	<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound Effects</u>
146.	continued					
147.	530 29	CU one of Bose's instruments with experiment in progress on a plant stalk. Camera pans left to moving pen making tracing on graph paper.	Ranjan (V.O.): Later he conducted many experiments on plants, to understand their response to stimuli. For example, what is the effect of	रंजन:- इन प्रयोगों के दौरान ही उनकी वनस्पतियों में रुचि बढ़ी।		
148.	535 35	LS the above instrument.	electric currents on plants?	रंजन:- पेड़-पौधों पर क्या असर होता है ?	Fade in	
149.	537 12	Another instrument, with experiment on plant stalk in progress.	What kind of nervous system do plants have?	रंजन:- उनका नर्वस सिस्टम किस प्रकार का होता है ?		
150.	538 38	Another instrument.	In order to record the different reactions/results,	रंजन:- इन अलग-अलग प्रतिक्रियाओं को रिकॉर्ड करने		
151.	540 26	Another instrument.	he had his own instruments built -	रंजन:- के लिए उन्होंने अपने उपकरण बनवाए -		
152.	542 01	Another instrument.	right here in Calcutta in his small laboratory, with the help of local craftsmen.	रंजन:- यहाँ पर, अपनी छोटी-सी प्रयोगशाला में, यहीं के कारागरों की मदद से।		
153.	545 28	B&W photograph - of J.C. Bose and a group of his students and colleagues.	Other scientists of that time were also engaged in similar efforts. In the beginning, all of them had to make or acquire their own instruments.	रंजन:- उस वक्त के और वैज्ञानिकों की भी इसी ही कोशिश थी। शुरू-शुरू में तो उन्हें खुद ही इंस्ट्रुमेंट्स का इन्तज़ाम करना पड़ता था।		

Fade out

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
154.	550	38	B&W photograph - CU Meghnad Saha.	Meghnad Saha, who worked in the field of nuclear physics, also built his own instruments.	रंजन:- मेघनाद साहा, जिन्होंने न्यूक्लियर फिज़िक्स में काम किया था, अपने इन्स्ट्रुमेंट्स खुद बनाए।		
155.	555	00	B&W photograph - part of cyclotron built by Saha.	Here in the Palit Laboratory	रंजन:- यहाँ पलित लैब में		
156.	556	02	B&W photograph - another portion of the cyclotron, including control panel.	was built India's first cyclotron.	रंजन:- भारत का पहला साइक्लोट्रॉन बिठाया गया।		
157.	558	00	B&W photograph - MCU Saha's electron microscope.	Barely a year after the electron microscope was invented, Saha constructed one here with the help of his students.	रंजन:- दुनिया का पहला इलेक्ट्रॉन माइक्रोस्कोप बनने के एक ही साल बाद साहा ने अपने विद्यार्थियों के साथ उसे यहाँ बनाया।		
158.	563	16	B&W photograph - Saha with his students, and an instrument built by them.	Ranjan (V.O.): It is said that Saha used to send his students to buy material from the scrap markets of World War Two.	रघु:- कहा जाता है कि साहा अपने विद्यार्थियों को दूसरे महायुद्ध के भंगार बाज़ार में सामान खरीदने भेजते थे।		
159.	568	05	Ranjan & Raghu enter from right in a buggy, and exit left. Camera pans with them and stops at LS Victoria Memorial.	He used this scrap material to make his instruments. In those times, when it was so difficult to acquire a science education, it was next to impossible to do any original work or research.	रघु:- और उपकरण बनाने के लिए उसका उपयोग करते थे। जिस माहौल में सायन्स एजुकेशन करना ही इतना मुश्किल था, उसमें रिसर्च या कोई भी ओरिजिनल काम करना तो और भी दूर की बात थी।		Horse-carriage, traffic

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
160.	576	15	Top angle MCU Ranjan in moving buggy.	Ranjan (sync): All the research and science education was of no use unless it could be applied. Another scientist of that period, Prafulla Chandra Ray realised that	रंजन:- और फिर उस रिसर्च और सायन्स एड्युकेशन का भी कोई फायदा नहीं था जब तक उसका उपयोग नहीं हो पाता था। उस दौर के एक वैज्ञानिक, प्रफुल्लचंद्र राय ने भी, ये बात महसूस की।		Horse-carriage
161.	582	34	Top angle MS Ranjan and Raghu in buggy, receding road in background.	most of his students, after studying chemistry, took up administrative jobs,	रंजन:- कि उनके ज्यादातर विद्यार्थी केमिस्ट्री पढ़ने के बाद अडमिनिस्ट्रेटिव कामों में।		Horse carriage
162.	586	08	B&W photograph - P.C. Ray surrounded by admirers.	Ranjan (V.O.): and it was for this reason that P.C. Ray, along with some of his students,	रंजन:- लग जाते थे। और यही वजह थी कि पी.सी. राय ने अपने विद्यार्थियों के साथ		
163.	589	15	MCU sign saying "Bengal Chemicals and Pharmaceuticals Ltd."	started the Bengal Chemical and Pharmaceutical Works.	रंजन:- बंगाल केमिकल अँड फार्मस्यूटिकल वर्क्स की।		
164.	590	30	Top angle LS, BCPL.		रंजन:- स्थापना की।		Traffic
165.	592	30	MS two workers packing medicines in BPCL. Camera tracks right over line of workers, tilting down to the medicines, and tilting up to end on MCU Ranjan.	Ranjan (sync): Bengal Chemical and Pharmaceutical Works was a different kind of industry, for its profits went to the workers, research scholars and students.	रंजन:- बंगाल केमिकल अँड फार्मस्यूटिकल वर्क्स एक अलग तरह का उद्योग था, जिसका मुनाफा जाता था मज़दूरों को, रिसर्च करने वालों को, विद्यार्थियों को।		Packing
166.	601	00	CU sign board, saying "Sir P.C. Roy Research Laboratory"	Ranjan (V.O.): Prafulla Chandra Ray became famous in the scientific community...	रंजन:- प्रफुल्ल चंद्र राय वैज्ञानिक जगत में प्रतिष्ठित हुए।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
167.	603	21	B&W photograph - P.C. Roy at work in his laboratory.	because of his discovery of the process for making mercurous nitrite. He wanted to use science	रजन:- मर्क्युरस नाइट्राईड बनाने की वि की खोज के कारण। विज्ञान का उपयोग		
168.	606	35	Angular MLS, BCPL.	to establish new industries, so that the country's economic condition could be improved.	रजन:- वो नए उद्योगों की स्थापना में करना चाहते थे ताकि देश की आर्थिक हालत सुधारी जा सके।		
169. (FN)	610	28	MS lab workers at assembly line for bottling a medicine. Camera tracks right, over moving assembly line to "capping" machine.	Raghu (V.O.): The success of this plant (industry) which was set up to produce medicines and other chemicals, soon led to the founding of other enterprises like the Calcutta Soap Works, Bengal Enamels, Bengal Potteries.	रघु:- दवाईयाँ और अन्य रसायन बनाने के लिए शुरू हुआ ये उद्योग जल्द ही कलकत्ता सोप वर्क्स, बंगाल इनेमल्स, बंगाल पॉटरीज़		Sound of the machine & bottles
170.	618	12	CU row of bottles being filled with medicine, four at a time.	Indian scientists and technicians got the opportunity to work in these industries	रघु:- जैसे उद्योगों में विकसित हुआ। इनमें भारतीय वैज्ञानिकों और तकनीशनों को काम करने का मौका मिला।		Sound of the machine & bottles
171.	622	23	B&W print -aerial view of BCPL, in a book.	and, what is more, the money invested in these ventures also	रघु:- और भारतियों ने ही इन उद्योगों में		Factory siren
172.	624	31	Closer shot of above.	came from Indians.	रघु:- पूंजी लगाई।		
173.	625	38	MLS portrait of P.C. Roy.	During his last years, P.C. Roy went back to teaching.	रघु:- अपने आखिरी सालों में पी. सी. राय / फिर अध्यापन की ओर झुके,		Factory siren
174.	629	04	Closer shot of above.	He also remained actively involved in social work.	रघु:- और सामाजिक कामों में भी सक्रिय रहे।		Fade out factory siren

(Footnote: 169. This is different from the original Hindi text. Please keep to this English translation.)

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
175.	632	04	LS Bow Bazaar crossing, Calcutta. Tram enters from left and moves right.	Ranjan: (V.O.): In 1907, a 19 year old youth came from Madras to Calcutta	रंजन:- 1907 में एक उन्नीस वर्षीय युवक मद्रास से कलकत्ता आया था ,		Traffic
176.	637	16	Angular MLS Bow Bazaar street with traffic. Tram enters from right, exits left. Ranjan gets off tram and moves right towards Goenka College of Commerce. Camera pans with him as he enters gate.	Ranjan (sync): to work in the Accountant General's office. One day while travelling in a tram, he noticed a signboard — INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE.	रंजन:- अकाउन्ट जेरल के ऑफिस में काम करने। एक दिन ट्राम में जाते-जाते उसने एक साईन बोर्ड देखा — INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE.		Traffic
177.	644	28	MLS Goenka College of Commerce. Ranjan enters from left in front of it, stops to talk, then moves right towards Ramen Memorial.	The same evening, he went there. At that time, Amritlal Sircar was the Secretary of the Association. The young man told him that he wanted to do research. Sircar happily gave the young man the keys (to the laboratory) and thus	रंजन:- उसी शाम वो वहाँ पहुँच गया। उस समय असोसिएशन के सेक्रेटरी थे अमृत लाल सरकार। युवक ने उनसे कहा, वो रिसर्च करना चाहता है। सरकार ने खुशी से युवक के हाथ में चाबियाँ सौंप दीं और		Traffic
178.	653	26	CU the bronze bas-relief of Ramen.	Ranjan (V.O.): C.V. Raman	रंजन:- सी. वी. रामन		Traffic
179.	654	16	CU inscription, memorial - IN THIS PLACE AT THE INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE PROF. C.V. RAMAN DISCOVERED ON FEBRUARY 28, 1928 THE EFFECT NAMED AFTER HIM FOR WHICH HE WAS AWARDED NOBEL PRIZE IN 1930.	was able to commence his scientific work.	रंजन:- अपना वैज्ञानिक काम शुरू कर सके।		Traffic
180.	655	38	Angular MLS a row of banners reading "Raman Centenary Celebration". Ranjan enters left and walks right across them, towards camera.	Ranjan(sync): C.V. Raman was born on 7th November, 1888. A hundred years have passed since then, and here...	रंजन:- सी. वी. रामन का जन्म हुआ था 7 नवंबर 1888 को। तब से आज तक सौ साल बीत चुके हैं, और यहाँ		Traffic, footsteps

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
181.	664	02	Low angle MS a banner saying "Exhibition - life and works of Prof. C.V. Raman" etc.	Ranjan (V.O.): in Calcutta's Birla Industrial and Technological	रंजन:- कलकत्ता के बिरला इन्डस्ट्रियल और टेक्नोलॉजिकल		Traffic
182.	666	00	MS a man passing by the "Raman Centenary Celebration" banners.	Museum, the Raman Centenary Year was being celebrated.	रंजन:- म्यूजियम में रामन जन्मशताब्दी मनाई जा रही है।		Traffic
183.	667	35	MCU a giant cut-out of Raman's face.	Raman was a brilliant student.	रंजन:- रामन बड़े बुद्धिमान विद्यार्थी थे।	Fade in	
184.	670	21	B&W photograph - CU Raman in childhood.	He passed his matriculation at the age of eleven, and when he was eighteen	रंजन:- ग्यारह साल की उमर में उन्होंने मैट्रिक किया। और अठारह साल की उमर में		
			<u>Dissolve to</u> CU page entitled "Unsymmetrical Diffraction-bands due to a Rectangular Aperture by C.V. Raman".	his first scientific paper was published.	रंजन:- उनका पहला सायन्टिफिक पेपर छपा।		
			<u>Dissolve to</u> B&W photograph - group photo of staff at office of the Accountant General of India.	Though he worked in the accounts department, Raman's true interest lay in science.	रंजन:- हालांकि वो अकाउंट्स में नौकरी करते थे, उनका असली इंटरैस्ट सायन्स में ही था।		
185.			<u>Dissolve to</u> B&W photograph - C.V. Raman in his youth.	He continued with his job, but in his spare time	रंजन:- नौकरी के साथ-साथ वो अपने खाली समय में अकेले		
			<u>Dissolve to</u> B&W photograph of the old IACS lab.	he worked all alone in the 'Association' laboratory.	रंजन:- कल्टिवेशन ऑफ सायन्स के लैबॉरेटरी में काम करते थे।		

S.No.	Footage Ft. Fr.	Shot Description	Dialogue	Dialogue	Music	Sound Effects
185.	continued	<u>Dissolve to</u> B&W photograph - Raman & students at IACS, meeting a foreign scientist.	In the following years he conducted several important experiments.	रंजन:- इन सालों में उन्होंने काफी महत्वपूर्ण प्रयोग किए।		
186.	687 19	Inside the Raman Exhibition at BITM, Calcutta. MLS a girl examining exhibit, then walking away right. Camera tracks left, across a western drum to MLS Ranjan. He walks right to drum. Camera pans with him to MS Ranjan & drum. Ranjan beats drum with stick.	Raman always had a special interest in acoustics. He tried to understand and study the sounds produced by different musical instruments. The difference between a tabla or a mridangam and western drums is that in western drums there is just a single stretched piece of leather, and hence each drum produces a single type of sound.	रंजन:- ध्वनि-विज्ञान या अकूस्टिक्स में उनकी हमेशा दिलचस्पी रही। इसी स्लिसिले में उन्होंने वाद्यों की आवाज़ की खासियत को समझने की कोशिश की। तबला, मृदंगम वगैरह में, और पश्चिमी ड्रम में फर्क ये है कि पश्चिमी ड्रम में बस एक चमड़ा तना हुआ रहता है और एक ड्रम से अकसर एक ही तरह की आवाज़ निकलती है।	Fade out	Beat of drum
187.	705 27	MS a collection of Indian tablas. Camera pans right and tilts upto Ranjan. He leans forward, strikes three tablas. Camera tracks in a circle left to right, tilting down to MLS the tablas.	But Indian drums are designed differently. Isn't this (last) one the most mellifluous?	रंजन:- मगर हिन्दुस्तानी ताल वाद्यों की बनावट अलग होती है। है न सबसे सुरीला?		Beats of tablas
188.	713 11	MS Ranjan.	This is the genuine (real) tabla. Raman understood why tabla produces different tones.	रंजन:- ये है असली तबला! रामन समझ सके की इसपर अलग - अलग सुरीले बोल इसलिए बजाए जा सकते हैं।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
189. (FN)	717	17	MCU a tabla. Ranjan's fingers point to the rings of leather on surface of tabla, then play a <u>bol</u> on it.	Ranjan (V.O.): It is because on the stretched leather of a tabla, there is an additional leather ring, and in the centre, there is the <u>kali syahi</u> — in layers.	रंजन:- क्योंकि इसके तने हुए चमड़े पर चमड़े की और एक रिंग है, और बीच में परतों में लगी हुई काली स्याही।		Tabla <u>bol</u>
190.	724	16	MS Ranjan in front of a wall of exhibits on Raman. He looks up right, at a colour print. Camera tilts up and pans right to the exhibit in panel headed "Blue of the Sea - Raman's Explanation".	Ranjan (sync): Curiosity about our world and the nature of things is basic to science. Raman was curious about many little things. During his journey to Europe,	रंजन:- जैसे तो हर वैज्ञानिक को दुनिया के बारे में जिज्ञासा होती है। रामन को छोटी-छोटी बातों में बड़ी जिज्ञासा थी। जब वो यूरोप गए, तो अपनी यात्रा के दौरान		Traffic
191.	730	35	CU the above print: artist's impression, portraying Raman on the deck of ship, looking at the sea.	Ranjan (V.O.): he was fascinated by the sea and its ever changing aspects (appearance).	रंजन:- उन्होंने समुद्र के बदलते रूप देखे,		Waves
192.	732	29	Top angle MCU waves: surf on rocks.	Its blueness — why is the sea blue? In those days it was accepted	रंजन:- उसकी नीलिमा देखी। समुद्र का रंग नीला क्यों होता है? तब यही माना जाता		Waves
193.	736	16	Top angle LS waves. Camera pans right over them, from rocky shore.	that because the sky is blue, its reflection makes the sea blue. And the sky is blue because light collides against the dust particles	रंजन:- था कि आसमान नीला है और उसकी परछाई समुद्र को भी नीला बना देती है। और आसमान नीला है क्योंकि प्रकाश डस्ट के पार्टिकल्स से टकराकर		Waves
194.	742	16	Top angle LS waves, rocky shore in foreground.	and scatters in a particular manner.	रंजन:- एक खास तरह से बिखरता है।		Waves

(Footnote: 189. Use the language version equivalent for kali syahi)

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
195.	744	14	MS Ranjan in front of wall of Raman exhibits. He looks down right at apparatus demonstrating the behaviour of light when passed through different kinds of liquids. He presses the light on. Camera pans right & tilts down.	Ranjan (sync): But Raman was not satisfied with this explanation. He conducted experiments and proved that just as light scatters in the atmosphere, similarly in water it collides with water molecules	रंजन:- रामन को इससे संतोष नहीं हुआ। उन्होंने प्रयोग किए और ये साबित किया कि वातावरण में जिस तरह प्रकाश बिखरता है, उसी तरह पानी के मॉलिक्यूलस से टकराकर		
196.	751	01	CU the light being passed through a viscous fluid.	Ranjan (V.O.): and scatters in water too.	रंजन:- पानी में बिखरता है।		
197.	752	11	MLS Ranjan, the apparatus and exhibits in background.	Ranjan (sync): He conducted many experiments on the scattering of light in liquids, and the outcome of this work was the 'Raman Effect'.	रंजन:- प्रकाश के द्रव्य या लिक्विड में बिखरने पर उन्होंने कई प्रयोग किए, जिनका नतीजा था "रामन इफेक्ट"।		
198.	756	36	Animation - a beaker of water and a burner, emitting light waves, depicted as yellow rays, which flicker on and off.	Ranjan (V.O.): When monochromatic or single wavelength rays of light, or electromagnetic waves,	रंजन:- जब कोई मोनोक्रोमैटिक या एक वेवलेंथ की प्रकाश की किरणें, या इलेक्ट्रोमैग्नेटिक वेव्स,	Fade in	
199.	760	26	Beaker full of water, dissolve to water molecules; dissolve to light ray passing between the molecules;	pass through a clear liquid, one of two phenomena (things can happen) can occur — a light particle or photon will either pass between the liquid molecules,	रंजन:- किसी शुद्ध लिक्विड से गुजरती है, रंजन:- तो दो बातें हो सकती हैं। रंजन:- लाइट पार्टिकल, या फोटॉन, या तो उस लिक्विड के मॉलिक्यूलस के बीच से निकल जायगा,		

<u>S.No.</u>	<u>Footage</u> <u>Ft.</u> <u>Fr.</u>	<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound Effects</u>
199.	continued	<p><u>dissolve to</u></p> <p>the light ray colliding with a molecule. Two arrows appear on either side of the ray, indicating direction of energy flow, corresponding to explanation: pointing to, and then away from, molecule;</p> <p><u>dissolve to</u></p> <p>a single molecule. A light ray appears on one side, colliding with the molecule. Corresponding to explanation, arrows show ray first losing, then gaining, energy and respectively, the generation of blue light wave of longer wavelength and red light wave of shorter wavelength;</p> <p><u>dissolve to:</u></p> <p>a beaker of water, and a burner emitting rays of light.</p>	<p>or will collide against them. In this collision, it will either give its energy to the molecule or gain energy from the molecule. Exactly which of these happens</p> <p>will depend on the particular liquid's molecular structure. If the energy decreases, the wavelength of that light will increase. and if the energy increases, the wavelength will decrease. Due to the change in energy, the colour of the light too will change.</p> <p>This changed colour</p>	<p>रंजन:- या उनसे टकराएगा। टकराने पर वो अपनी एनर्जी या तो मॉलिक्यूल को दे देगा, या उस मॉलिक्यूल से एनर्जी पाएगा। इनमें से कौनसी प्रक्रिया होगी, ये उस</p> <p>रंजन:- खास लिक्विड के मॉलिक्यूल की खास बनावट पर निर्भर है। अगर एनर्जी कम हुई तो किरण की वेवलेंथ बढ़ जायेगी, और एनर्जी बढ़ी तो वेवलेंथ कम हो जायेगी। एनर्जी घटने या बढ़ने से प्रकाश किरण का रंग भी बदल जायेगा।</p> <p>रंजन:- इस बदले हुए रंग को रामन ने</p>	<p>Fade out</p>	
200.	789 23	<p>MLS Raman's spectrometer on table. Camera tracks left and tilts up to MS Ranjan. He walks left along wall of exhibits. Camera tracks with him.</p>	<p>Ranjan (sync): was seen and measured by Raman, using this spectrometer. The Raman effect was very useful in understanding the molecular structure of different chemicals, because by observing the extent and direction of the change in light, it was possible to understand (gain knowledge of) the molecular structure.</p>	<p>रंजन:- इसी स्पेक्ट्रोमीटर से देखा, नापा।</p> <p>अलग-अलग रसायनों के मॉलिक्यूलर स्ट्रक्चर जानने के लिए रामन इफेक्ट बहुत ही उपयुक्त साबित हुआ, क्योंकि कि अब प्रकाश किरण का रंग कितना, और किस दिशा में बदलता है, ये देखकर मॉलिक्यूलर स्ट्रक्चर जाना जा सकता था।</p>		

<u>S.No.</u>	<u>Footage</u>		<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound Effects</u>
	<u>Ft.</u>	<u>Fr.</u>					
201.	799	16	B&W photograph - Nobel prize award function. Camera tilts down to stage.	<u>Ranjan (V.O.):</u> This discovery in physics helped solve many problems of chemistry. For this discovery, Raman was awarded the Nobel Prize in 1930.	रंजन:- फिज़िक्स की इस खोज से केमिस्ट्री की कई समस्याओं का हल हो सका । इसी खोज के लिए उन्हें 1930 में नोबल पुरस्कार मिला ।	Fade in	
		to 808 04					
			Dissolve to CU the Nobel prize medal.				Fade out

(End of
Reel 1)

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
202.	Reel 2						
	000	00	MLS Raghu at bookshelf removing a book. He walks right, behind it, to Maitreyi & Nissim at table. He sits down with them. Camera tracks with him and tilts down to end at MLS Raghu & Maitreyi.	<p>Raghu: Till then, people believed that it was possible to arrive at a complete (final) understanding of nature. This belief was the foundation of Newtonian science. Now, in the 20th century, even this outlook underwent a change.</p> <p>Maitreyi: By the last decade of the 19th century, it was being felt that all the basic work in science had been done. But within</p>	<p>रघु:- अब तक विज्ञान की यही धारणा थी कि प्रकृति को अंतिम रूप में समझा जा सकता है। न्यूटोनियन सायन्स की यही नींव थी। अब बीसवीं सदी में ये धारणा भी बदल गई।</p> <p>मैत्रेई:- उन्नीसवीं सदी के आखिरी दशक तक ये लगने लगा था कि विज्ञान का बुनियादी काम पूरा हो चुका है। लेकिन इससे</p>		
203.	014	26	MS Nissim - reaction.	Maitreyi (V.O.): the next fifty years, new principles were established,	मैत्रेई:- सिर्फ पचास साल के भीतर जो सिधदान्त स्थापित हुए,		
204.	016	21	MLS Raghu & Maitreyi at table.	<p>Maitreyi (sync): which overturned the old principles (concepts, premises, theories) entirely. From this we learnt that there is no such thing as a final or ultimate truth in science, reaching which</p> <p><i>Science attains Absolute?</i></p>	मैत्रेई:- उन्होंने पुराने सिधदान्तों को उलट-पुलट दिया। इससे यही शिक्षा मिली कि ऐसा कोई अंतिम सत्य नहीं, जहाँ पहुँच कर विज्ञान रुक जाता है।		
205.	022	14	MCU Nissim. He nods, then turns to look at Raghu.	--	--		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
206.	023	11	MS blackboard. Raghu entering from right, walks to it and writes formula "E = mc ² ", turns to talk to camera (and to nchor people), then turns back to write on board again.	Raghu: All of us know this famous Einsteinian equation. Earlier, energy and mass were considered separate entities but later it was proved (established) that these are, in fact, interchangeable. Nuclear energy is an example of this. Similarly...	रघु:- आइन्स्टाईन का ये प्रसिद्ध सूत्र तो हम सब जानते ही हैं। पहले एनर्जी और मास बिलकुल अलग-अलग माने जाते थे। उसके बाद ये सिद्ध हुआ कि उन्हें एक दूसरे में बदला जा सकता है। न्यूक्लियर एनर्जी इसी का उदाहरण है। उसी तरह।		Writing on blackboard
207.	034	39	CU Raghu's hand drawing a wave and a particle, on the black-board.	Raghu (V.O.): waves and particles were also considered separate (entities),	रघु:- वेव्स और पार्टिकल्स-इन्हे भी बिलकुल अलग-अलग माना जाता था।		Writing on blackboard
208.	038	01	LS Raghu at blackboard, Nissim and Maitreyi at table in foreground. He comes up to table and sits down at it.	Raghu (sync): but gradually even this belief broke down, and they came to be seen as dual aspects of the same reality. Today, this is the foundation of modern science. And this is not all - X-Rays, semi-conductors, transistors, nuclear power plants —	रघु:- धीरे-धीरे ये दिवार भी टूटी, और ये दोनो वास्तविकता के दो पहलुओं के रूप में माने जाने लगे। आज का आधुनिक विज्ञान इसी नींव पर टिका हुआ है। और सिर्फ ये ही नहीं, मगर एक्स-रेज़, सेमी-कंडक्टर्स, ट्रान्ज़िस्टर्स, न्यूक्लियर पावर-प्लांट —		
209.	048	21	MS Maitreyi, reaction.	Raghu (V.O.): are all products of this new science.	रघु:- ये सब इस नए विज्ञान के परिणाम हैं।		
210.	050	14	MLS Nissim, Raghu and Maitreyi at table. Camera tracks in to MS Nissim.	Raghu (sync): Traditional science underwent a rapid and fundamental change. Nissim: The generation of scientists after Bose and Ray took a keen interest in this change. For instance,	रघु:- पारंपरिक विज्ञान में ये बदलाव आया-वो बहुत तेज़ और बुनियादी था। निस्सिम:- बोस और राय के बाद के वैज्ञानिकों की पीढ़ी ने इस बदलाव में गहरी रुचि ली। जैसे		

<u>S.No.</u>	<u>Footage</u> <u>Ft. Fr.</u>	<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound Effects</u>
210.	continued		Einstein's theory of relativity was (first) translated from the original German to English...not in any European country, but right here in Calcutta. This translation was done by Satyendra Nath Bose.	आइन्स्टाइन की थियरी ऑफ रिलेटिविटी का मूल जर्मन भाषा से अंग्रेजी अनुवाद किसी यूरोपीय देश में नहीं, बल्कि कलकत्ता में हुआ था। और वो अनुवाद किया था सत्येन्द्रनाथ बोस ने।		
211.	065 00	B&W photograph - the young S.N. Bose.	Nissim (V.O.): S.N. Bose made a major contribution to modern physics.	निस्सिम:- एम.एन. बोस का आधुनिक फिज़िक्स में बड़ा योगदान रहा।		
212.	067 30	CU page of a letter from Einstein to Bose.	With Einstein, he formulated the Bose-Einstein statistics -	निस्सिम:- आइन्स्टाइन के साथ उन्होंने सब-अटॉमिक पार्टिकल्स के व्यवहार को समझाने वाला		
213.	070 35	XCU Einstein's salutation at end of the letter.	which explain the behaviour of sub-atomic particles.	निस्सिम:- बोस-आइन्स्टाइन स्टैटिस्टिक्स बनाया,		
214.	072 22	MS Nissim.	Nissim (sync): The particles which follow these statistics are known as bosons.	निस्सिम:- जिसके आधार पर चलने वाले पार्टिकल्स को "बोसॉन्स" कहा जाता है।		
215.	074 39	MS Raghu at table.	<i>Raghu (sync)</i> Yes It was possible then to do fundamental research (work) in science without expensive instruments and institutional support.	रघु:- हाँ, उन दिनों विज्ञान में बुनियादी काम करना संभव था, महँगे उपकरणों और संस्थानों के सहयोग के बगैर भी।		
216.	079 13	LS Udaipur Solar Observatory from banks of Fatehsagar lake.	Amrita (V.O.): Similar fundamental work was done in astronomy too.	अमृता:- ऐसा ही बुनियादी काम खगोल-विज्ञान में भी हुआ।		Birds, water

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
217.	082	08	MS Amrita in boat, moving towards Udaipur Solar Observatory.	The scientists who were involved in calculating the orbits of stars or planets or deciding their positions, now busied themselves with the question: What are stars made of? This quest led to astrophysics. Meghnad Saha was a major contributor to this branch of science.	अमृता:- जो वैज्ञानिक अब तक गृह-तारों की कक्षा का मापन, या उनके स्थान का निर्धारण कर रहे थे, वो अब इस अध्ययन में लग गए कि तारे बने किन पदार्थों से हैं? इसी खोज से ऑस्ट्रो-फिज़िक्स की गुस्सात हुई। और इसमें मेघनाद साहा का बड़ा योगदान रहा।		Water
218.	093	38	From boat - the observatory as boat approaches.	I visited the Udaipur Solar Observatory to understand some aspects of his work. There I met Dr. Arvind Bhatnagar.	अमृता:- उनकी काम की कुछ बातों को समझने में उदयपुर की सोलर ऑब्ज़र्वेटरी गई थी। वहाँ मैं मिली डॉक्टर अरविंद भटनागर से।		Water, birds
219.	101	09	Low angle MLS board - "UDAIPUR SOLAR OBSERVATORY". Camera pans right and tilts down to Amrita on steps, observatory in background. She walks left up steps to observatory.	Amrita (sync): We already knew the connection between colour and temperature. For example, when we heat iron, it first becomes red, then turns orange and finally white. This understanding became the basis of classification of stars.	अमृता:- रंग और तापमान का सम्बन्ध हमें पहले से पता था—जैसे लोहे को गर्म करें तो वो पहले लाल, बाद में केसरिया, और आखिर में सफेद हो जाता है। ऐसी ही समझ तारों के वर्गीकरण का आधार बनी।		Birds, water
220.	113	18	MCU Dr. Bhatnagar.	NB: SYNC DIALOGUE TRACK			
				Amrita's V.O. for Dr. Bhatnagar: Dr. Bhatnagar explained that each element has its own particular/characteristic reaction, which is its signature/symbol.	डॉ भटनागर:- हर पदार्थ की अपनी खास प्रक्रिया होती है, जो उस पदार्थ की निशानी है।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
221.	116	24	MS Amrita looking at various spectra in display window of spectrometer.	By studying this spectrum we can know the sun's temperature and what elements exist there (in the sun).	डॉ. भटनागर:- इस स्पेक्ट्रम के अध्ययन से हम सूर्य का तापमान और सूर्य में कौन-कौन से पदार्थ हैं, उनका पता लगा सकते हैं।		
222.	121	28	CU the pink & blue part of the spectrum. A pencil points to lines in the pink area.	For instance, these two lines are sodium lines. Amrita (V.O.): When scientists observed the light emitted from the stars through the spectrometer,	डॉ. भटनागर:- और ये दो लाइनें सोडियम की हैं और... अमृता:- जब वैज्ञानिकों ने तारों के प्रकाश को स्पेक्ट्रोमीटर		
223.	125	39	Spectrum of the sun.	they found the presence of different elements in different degrees. For instance, in the sun's spectrum, there were (relatively) more heavy metals like sodium, calcium, whereas hydrogen was much less.	अमृता:- से देखा, तब उन्हें इनमें अलग-अलग पदार्थ नज़र आए, अलग-अलग मात्रा में। जैसे सूरज में सोडियम, कैल्शियम जैसे हवी मेटल्स ज़्यादा दिख रहे थे, जब कि हायड्रोजन बहुत ही कम।		
224.	132	37	B&W reproduction of spectrum of Sirius.	But in Sirius, (relatively) more hydrogen was detected.	अमृता:- पर व्याध-तारे में हायड्रोजन ज़्यादा नज़र आया।		
225.	134	39	LS the observatory at night, Amrita at table set in the exterior (lawns) beside smaller telescope.	Amrita (sync): Does this mean that all stars are made of different elements? Meghnad Saha worked on this problem. In 1920-21, in his articles he wrote that an important reason for the stars' different spectral lines was the stars' different temperatures and (air) pressures.	अमृता:- तो इसका मतलब - क्या तारे सचमुच अलग-अलग पदार्थ से बने हैं? इस समस्या पर काम किया मेघनाद साहा ने। 1920-21 में लिखे अपने लेखों में उन्होंने बताया कि तारों की अलग-अलग स्पेक्ट्रल लाइन्स होने का एक महत्व का कारण है तारों का तापमान और दबाव।		Crickets

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
226.	147	07	<p>Animation: Diagram of atom with nucleus and 3 electrons in orbit. The electrons leave one by one as the temperature rises, depicted by colour deepening from yellow to orange to red. Finally, the last electron leaves. The temperature rises further, from blue to white.</p>	<p>Amrita (V.O.): If an electron of any atom is excited by providing adequate energy, say, by increasing the temperature, then the electron jumps its orbit and leaves the atom. This is known as ionization.</p>	<p>अमृता:- किसी अटम के इलेक्ट्रॉन को पर्याप्त उर्जा देकर उत्तेजित किया जाए, जैसे ज्यादा तापमान देकर,</p>	Fade in	
227.	161	03	Spectrum of the sun.	<p>This ionization is the cause (reason for) of specific spectral lines.</p>	<p>तो वो इलेक्ट्रॉन अपनी मौजूदा कक्षा से निकलकर अटम को छोड़ देता है। इसे आयनाइजेशन कहते हैं।</p>		
228.	164	08	<p>LS observatory exterior at night. Camera tracks in to MLS Amrita.</p>	<p>For example, let us take the sun and Sirius. Both of them have the same elements on their surface but their spectral lines are different. This is because the temperature of Sirius is 10,000 degrees Kelvin—double the temperature of the sun. At this temperature, heavy metals like sodium and calcium are already completely ionized. There is no question of their further ionization. And for this reason the heavy metal lines which are present in the sun's spectrum...</p> <p><i>elements</i></p> <p><i>elements</i></p>	<p>अमृता:- इसी आयनाइजेशन से विशिष्ट स्पेक्ट्रल लाइन्स दिखाई देती हैं।</p> <p>अमृता:- जैसे सूरज और व्याध को ही लीजिए। दोनों की सतह पर समान ताप है, लेकिन उनकी स्पेक्ट्रल लाइन्स बिल्कुल अलग-अलग हैं, क्योंकि व्याध की सतह का तापमान है 10,000°K — सूरज से दूगुना। इस तापमान में सोडियम, कैल्शियम जैसे हवी मेटल्स पहले ही पूरे आयनाइज्ड होते हैं। उनके और आयनाइज्ड होने का सवाल ही नहीं उठता। और इसीलिए सूरज के स्पेक्ट्रम में दिखने वाली हवी मेटल्स की लाइन्स</p>	Fade out	Crickets

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
229.	182	34	Spectrum of Sirius.	are absent in the Sirius spectrum.	अमृता:- च्याथ के स्पेक्ट्रम में नहीं दिखतीं।		
230.	184	36	MS Amrita at table.	Amrita (sync): Thus the equation formulated by Saha on the basis of temperature and pressure enabled us to estimate the atmosphere of stars which are millions of light years away.	अमृता:- ये तापमान और दबाव के आधार पर साहा ने जो इक्वेशन बनाया, उससे हम पृथ्वी से करोड़ों मील दूर तारों के वातावरण का अंदाज़ कर सके।		Crickets
231.	190	13	CU film projection - "AUGUST 7, 1972 GREAT PROTON FLARE IN SAME REGION 3 DAYS LATER POST FLARE LOOPS (H α - 0.5 A)	NB: SYNC DIALOGUE TRACK Amrita's V.O. for Dr. Bhatnagar: Dr. Bhatnagar said that the energy emitted from this solar flare is equivalent to the energy emitted by the simultaneous explosion of two thousand billion hydrogen bombs.	डॉ. भटनागर:- अगर		
232.	193	12	CU projection:solar flare.		डॉ. भटनागर:- दो हजार अरब हायड्रोजन बॉम्ब इक साथ विस्फोट हो तो इतनी उर्जा इस सोलर फ्लैर से निकल रही है।		
233.	198	12	OSS Amrita looking at the projected film of the solar flare. The film ends and a light is switched on.	The magnitude of the flare is easily about twenty times the size of the Earth. (It can easily accomodate twenty Earths). In the solar flare that we saw just now, magnetic energy was converted to heat energy.	डॉ. भटनागर:- इसके अंदर कम से कम बीस पृथ्वी आसानी से समा सकती हैं। जैसे कि आप ने अभी सोलर फ्लैर देखी,		
234.	203	21	MS Dr. Bhatnagar.		डॉ. भटनागर:- इसमें चुंबकीय शक्ति, यानि कि मग्नेटिक एनर्जी, उर्जा में बदल रही है।		
235.	206	39	MS Amrita - reaction.	Once we understand this process, he felt, it might give us ideas...	डॉ. भटनागर:- अगर हम इसको अच्छी तरह से समझ सकें, तो बहुत हद तक		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
236.	210	24	MS Dr. Bhatnagar.	to help us solve the energy crisis on Earth.	डॉ. भटनागर:- पृथ्वी पर उर्जा की समस्या हल हो सकती है।		
237.	212	32	B&W photograph: young Meghnad Saha.	Amrita (voiceover): Meghnad Saha.	अमृता:- मेघनाद साहा	Fade in	
238.	214	00	B&W photograph : Meghnad Saha, older.	I find him unique because	अमृता:- मुझे इस लिए अलग लगते हैं।		
239.	215	08	B&W photograph : Meghnad Saha at IACS, showing Nehru around.	he was also aware of the (social) problems existing in his time.	अमृता:- क्योंकि वो अपने काल की समस्याओं के बारे में भी जागस्क रहे।		
240.	217	28	CU page of Saha's journal - entitled "Science and Culture".	His name figured among those	अमृता:- देश के भविष्य की योजना बनाने		
241.	218	36	XCU page of the journal - part of the title of the article can be seen.	who planned the future of our country.	अमृता:- वालों में उनका नाम आता है।		
242.	220	04	CU top of page of journal - "Science and Culture".	When Raghu and I visited	अमृता:- जब रघु और मैं कलकत्ता		
243.	221	12	CU title of book - "30 YEARS OF SAHA INSTITUTE OF NUCLEAR PHYSICS"	the Saha Institute in Calcutta,	अमृता:- की साहा इंस्टिट्यूट गए थे,		
244.	222	20	MLS Raghu, Enakshi and Shantimay Chatterjee.	NB: Sync dialogue track			
				we met Enakshi and Shantimay Chatterjee. Together they have written a book on Meghnad Saha.	अमृता:- हम इनाक्षी और शान्तिमय चॅटर्जी से मिले। दोनों ने मिलकर साहा पर किताब लिखी है।		
245.	226	04	MCU Shantimay Chatterjee talking to Raghu.	Shantimay Chatterjee is also the editor of 'Science and Culture' the magazine begun by Saha.	अमृता:- शान्तिमय चॅटर्जी साहा के "सायन्स अॅन्ड कल्चर" मैगज़ीन के सम्पादक भी हैं।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
246.	229	18	MCU Enakshi Chatterjee.	<p>Raghu (voiceover for Chatterjees): Enakshi Chatterji said, "Modern science came late to our country. In those days, scientists like J.C. Bose, P.C. Ray worked very much in isolation, and the romance of science gripped them. But Saha had a vision. He felt that alongside the freedom struggle, we needed our science to develop... We needed organised science... That is why we consider him a significant scientist of our nation."</p>	<p>इनाधी:- हमारे देश में ऐसे तो माँडन सायन्स आया भी देखते। जब आया तब भी ये सब इंडिकिजुअल सायन्टिस्ट्स जो थे, जैसे पी.सी. राय, जे. सी. बोस, साहा, ये सब वो रोमैन्टिक फेज़ आप कह सकते हैं, ये सब स्टूडेंट अपना प्रइयूस कर रहे थे, और उनके चारों तरफ एक परिमंडल हो रहा था। लेकिन साहा इन सब से, हम कहेंगे कि सबसे ज्यादा उनका विजन था। वो सोचे कि इसे तो चल नहीं सकता है। आज़ादी के साथ - साथ हमारा सायन्स का भी तो होना चाहिए तरक्की, इसके लिए ऑर्गनाईजेशनल सायन्स चाहिए। और जो बिग सायन्स और सायन्स का जो ऑर्गनाईजेशन के बारे में - साहा ही ऑर्गनाईज़्ड थिंकिंग जिसको है हम कहते हैं, वो साहा किये थे। इसलिए हम उनको, कह सकते हैं, बहुत सिग्निफिकन्ट सायन्टिस्ट हैं हमारे देश के लिये।</p>		
247.	257	37	MS shelves of books in library. Amrita enters from right, looks back left to table on which lie works of Meghnad Saha, one book open at a page containing his photograph. Camera tracks in and tilts down to books.	<p>Amrita (sync): Reading old manuscripts (books) to understand a period is one thing, but to meet people of that period is an entirely different experience. This journal was started through Saha's initiative. Turning its pages...</p>	<p>अमृता:- पुरानी दस्तावेज़ों से एक दौर को जानना अलग बात है। लेकिन उन दिनों को देखनेवालों से मिलना कुछ और ही अनुभव। ये जर्नल साहा की कोशिशों से शुरू हुआ था। इसके पन्ने उलटते</p>		

<u>S.No.</u>	<u>Footage</u> <u>Ft. Fr.</u>	<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound Effects</u>
247.	continued		makes me feel	मैं अपने आप को		
248.	268 04	CU page of book with Saha's photograph.	<u>Amrita (voiceover): very close to Saha's time.</u>	अमृता:- साहा के वक्त के बहुत करीब महसूस करती हूँ +		
249.	269 30	CU book-cover titled "Collected Works of Meghnad Saha".	Maybe this is because	अमृता:- शायद इसलिए		
250.	271 03	MS Amrita at desk with books.	<u>Amrita (sync): in this building there are scholars whom Saha taught, maybe because this journal still has its office</u>	अमृता:- कि इस बिल्डिंग में वो स्कॉलर्स हैं जिनको साहा ने पढ़ाया था, इसलिए भी कि इस जर्नल का दफ्तर अब भी यहीं नीचे है - इसी		
251.	277 15	CU cover of an early edition of the journal "Science and Culture".	<u>Amrita (voiceover): in this campus.</u>	अमृता:- कैंपस में।		
252.	278 35	Top angle composite shot of various photographs of Saha, his colleagues etc. on table. Camera tilts up to Raghu sitting behind it, ending on MCU Raghu.	<u>Raghu (voiceover for S. Chatterjee): I asked Shantimay Chatterjee, wasn't the planning commission formed keeping in mind industrialisation for the future? Wasn't it felt that industrialisation was a must--in order to fight poverty, unemployment--for economic progress and national security?</u>	रघु:- प्लानिंग कमिशन के बनाने के पीछे भाविष्य में औद्योगिकरण का विचार था, न ? सोचा गया था कि अगर गरीबी या बेकारी की समस्या से जूझना है, राष्ट्रीय सुरक्षा या आर्थिक तरक्की करनी है, तो बिना औद्योगिकरण कोई चारा नहीं है ?		Traffic
253.	287 25	MS Shantimay and Enakshi Chatterjee.	<u>Raghu (voiceover for Shantimay Chatterjee): He replied that Saha couldn't accept</u>	<u>Shantimay: See, Saha could never accept</u>		
254.	290 14	B&W photograph - Gandhiji, Nehru and other Congress workers spinning on charkhas.	the so-called 'charkha philosophy', even though	<u>Shantimay: the philosophy of charkha, although his guru</u>		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
255.	292	35	B&W photograph - CU P.C. Ray spinning on charkha.	P.C. Ray, his guru, believed in it.		<u>Shantimay</u> : P.C. Roy was totally converted to it.	
256.	294	16	MS Shantimay and Enakshi Chatterjee.	Saha stressed that large-scale industrialization was necessary for development.		<u>Shantimay</u> : He believed that large-scale industrialisation is extremely important to quickly develop the resources of the country and bring the results to the people of India.	
257.	302	22	MCU Enakshi Chatterjee.	<u>Raghu (voiceover for Enakshi)</u> : Saha felt that river planning was a crucial aspect of industrialisation. He came from a small village in Bengal, where		<u>इनाक्षी</u> :- साहा जब औद्योगीकरण के बारे में सोचते थे उसमें एक बड़ा हिस्सा था रिवर प्लानिंग। ये इसलिए था कि वो आए थे इत बंगाल के एक गाँव से, जहाँ वो	
258.	310	12	CU Shantimay Chatterjee - reaction.	flooding of the river was a common feature.		<u>इनाक्षी</u> :- नदी में बाढ़ आना - ये वो बहुत रेग्युलर फीचर था।	
259.	312	06	MCU Enakshi Chatterjee.	Later, after he became a scientist, he went to America and saw the work being done on the Tennessee Valley Project.		<u>इनाक्षी</u> :- फिर बाद में जब वो सायन्टिस्ट बनके सारा दुनिया घूमे, वो अमेरिका में देखे कैसे टेनिसी वैली में काम हो रहा था।	
260.	318	10	XCU beginning of title of Saha's article in his journal - camera slowly pans right over the title: "Multi - Purpose Development of Indian Rivers".	He wanted to emulate this, as here we, too, have big rivers whose waters could be put to use.		<u>इनाक्षी</u> :- तब वो सोचने लगे कि हम भी ऐसा कर सकते हैं, हमारे देश में, क्योंकि हमारे यहाँ बहुत बड़े-बड़े नदियाँ हैं और उसके पानी का हम उपयोग कर सकते हैं।	
261.	323	10	MCU Enakshi Chatterjee.	---		<u>इनाक्षी</u> :- और इन्डस्ट्रियलइजेशन का एक बहुत बड़ा हिस्सा रिवर प्लानिंग में	

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
262.	325	20	Top angle MCU title of journal "Science and Culture", Vol. X.	--	इनाक्षी:- होता है, ये साहा के सब राईटिंग्स		
263.	326	30	CU title of another issue of the journal - Vol. XIII.	--	इनाक्षी:- से हम देखते हैं।	Fade in	
264.	327	38	MS Amrita in front of shelves of books in library.	Amrita (sync): While addressing the Bengal Youth Conference as its President, Saha had said, "The makers of our great religion created a big wall (barrier) of superstitions and traditions to rule over the people from the lower castes.	अमृता:- बंगाल यूथ कॉन्फरन्स को अध्यक्ष के रूप में संबोधित करते हुए उन्होंने कहा था - "हमारे महान धर्म बनाने वालों ने अंध श्रद्धाओं और रीती रिवाजों की एक बड़ी दीवार खड़ी कर दी थी, निचली जातियों पर अधिकार जताने के लिए।		
265.	338	04	B&W photograph - slum in Bombay, 19th century.	Amrita (voiceover): But instead, for thousands of	अमृता:- पर नतीजा ये हुआ कि		
266.	339	32	B&W photograph - Civil Disobedience, Bombay; demonstrators court arrest.	years, they were themselves ruled by foreigners.	अमृता:- खुद उन्हें ही हजारों सालों तक विदेशियों ने हाथिए पर कर दिया।		
267.	342	26	B&W photograph - Gandhiji, Serojini Naidu and others.	We will be making a big mistake if we take simple living as an ideal for life.	अमृता:- हम गलती करेंगे अगर सादे जीवन को ही आदर्श मान बैठेंगे।		
268.	345	29	B&W photograph - a factory.	It is our duty not to remain aloof from Western industrial culture.	अमृता:- हमारा कर्तव्य है कि पश्चिम की मशीनी		
269.	347	37	B&W photograph - a view of another factory.	Instead, we must become masters in these areas."	अमृता:- संस्कृति से दूर न रहें, बल्कि इन क्षेत्रों में महारत हासिल करें।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
270.	350	37	CU Amrita in library.	Amrita (sync): I do not look down upon sacrifice, but I give more importance to working and to developing our strength. Sacrifice, <u>bali-daan</u> ,is often another name for inability."	अमृता:- मैं त्याग और बलिदान को कम नहीं आंकता, पर कार्य और शक्ति को ज्यादा महत्व देता हूँ। त्याग और बलिदान अक्सर अयोग्यता का दूसरा नाम बन जाते हैं।	Fade out	
271.	357	37	MLS Raghu, Shantimay and Enakshi Chatterjee.	<hr/> NB: Sync dialogue track <hr/>			
				Raghu (voiceover): We can understand the reasons for his unhappiness if we look at the events of that time.	रघु:- उस दौर की घटनाओं को देखते हुए उनकी बेचैनी समझी जा सकती है।		
272.	360	29	MCU Enakshi Chatterjee.	Raghu (voiceover for Enakshi): Saha was anxious because he had had many hopes about independence and about planning. And now, things were not being implemented fast enough. Moreover, he had certain views about what <u>was</u> being implemented. But how could he have aired these views? That is why in 1952, he stood for parliamentary election and won a seat from Calcutta.	इनाक्षी:- हाँ, बेचैन तो वो हो रहे थे, क्योंकि जिस आज़ादी के बारे में साहा इतना सोचे थे, प्लानिंग के बारे में सोचे थे, अब वो इतना ज़रूर इम्प्लिमेंटेशन तो नहीं हो रहा था। और जो भी हो रहा था उसके बारे में उनको बहुत कुछ कहना था, लेकिन वो कहते कैसे ? इसलिए उन्होंने 1952 में तय किया कि वो पार्लियामेंट इलेक्शन में खड़े हो जाएंगे, और उन्होंने जीत भी लिया एक सीट कलकत्ता से, और 1952 में वो पार्लियामेंट आ गए।		
273.	377	35	CU Raghu.	Didn't he play a major part in setting up the National Planning Committee, I asked?	रघु:- नेशनल प्लानिंग कमिटी बनाने में उन्होंने बड़ी भूमिका निभाई थी न ?		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
274.	380	26	MCU Shantimay Chatterjee.	Raghu (voiceover for Shantimay Chatterjee): Under Pandit Nehru's Chairmanship, almost every important Indian scientist participated in the National Planning Committee.	Shantimay: The National Planning Committee under the chairmanship of Pandit Nehru was, collected, almost every important scientist in India, from north, south, east, west. Saha took a very important role but many others played equally important role there also.		
275.	393	16	B&W photograph - the old IACS Lab.	Raghu (voiceover): All these scientists were associated with the Indian Association for the Cultivation of Science.	रघु:- ये सारे सायन्टिस्ट्स इंडियन असोसियेशन फॉर कल्चिवेशन ऑफ सायन्स से जुड़े थे।		
276.	397	06	MLS Raghu on staircase in Bose Institute. He walks down it, left, and then towards camera. Camera tilts & pans with him.	Raghu (sync): Bose and Ray taught at the Presidency College. Meghnad Saha was their student. Mahendra Lal Sircar's colleague Ashutosh Mukherjee started the College of Science.	रघु:- बोस और राय दोनों प्रेसिडेंसी कॉलेज में पढ़ाते थे। मेघनाद साहा उनके विद्यार्थी रहे, महेंद्रलाल सरकार के सहयोगी आशुतोष मुखर्जी ने कॉलेज ऑफ सायन्स शुरू किया।		
277.	405	34	B&W photograph - College of Science.	Raghu (voiceover): This was the first college in India to teach science at the post-graduate level.	रघु:- जो भारत में सायन्स की पोस्ट ग्रेजुएशन की शिक्षा देने वाला पहला कॉलेज था।		
278.	409	13	B&W photograph - P.C. Ray and other science enthusiasts.	Raghu (sync): All these scientists, belonging to the same period but working in different fields, sharing similar thoughts on many issues/agreeing about many things....	रघु:- इतने सारे वैज्ञानिक, एक ही समय में अलग - अलग क्षेत्रों में काम करने के बावजूद कई बातों में विचारों में मेल...		
279.	415	07	MLS Raghu on staircase. Camera tracks back as Ranjan enters from right, foreground.	Ranjan: I think it has to do with the atmosphere then. All those scientists worked at the time when the struggle for independence	रंजन:- मुझे लगता है कि ये माहौल की बात है। ये सब एक ऐसे समय के लोग हैं, जब स्वतंत्रता आंदोलन		
280.	419	31	B&W photograph - tear gassing of a Congress meeting at Govalia Tank, Bombay, 1942.	Ranjan (voiceover): was on. Science also became a weapon in this struggle.	रंजन:- ज़ोरों पर था। इसमें विज्ञान भी एक हथियार बना।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
281.	421	33	LS the auditorium at the Bose Institute, benches in foreground. Ranjan enters from right, and sits down on a bench. Raghu enters from right and climbs up to podium.	Ranjan (sync): They were very aware that one of the reasons for our colonization was our backwardness in science. They felt we should not, now, be left behind in the scientific developments taking place in the world. We should develop our own science. Their developing their own instruments indicates they felt the need	रंजन:- उन्हें इस बात का अहसास था कि हमारी देश की गुलामी का एक कारण हमारा विज्ञान में पीछे रहना है। दुनिया-भर में सायन्स में जो हो रहा था, उसमें हम पीछे न रहें, अपना सायन्स खुद डिवेलप करें। खुद इन्स्ट्रुमेंट्स बनाने के पीछे इस सेल्फ-रिलायन्स की, आत्मनिर्भरता की ही		
282.	435	26	Low angle MLS Raghu at podium.	Ranjan (V.O.): to be self-reliant. Raghu (sync): Here, in this auditorium, scientists from all over	रंजन:- भावना थी। रघु:- यहाँ, इस जगह में, कितने ही वैज्ञानिकों ने	Fade in	
283.	438	17	B&W photograph - Niels Bohr with D. Bose.	Raghu (V.O.): the world gave important lectures.	रघु:- भाषण दिए होंगे।		
284.	440	12	Closer shot of Niels Bohr in the above photograph.	Starting institutes for research and study,	रघु:- पढ़ाई और रिसर्च के लिए इन्स्टिट्यूट्स शुरू करना,		
285.	442	08	LS Raghu at podium. Ranjan enters from left, in front.	Raghu (sync): publication of journals, science magazines for children, public demonstrations of their work - all these were among their scientific activities. (They considered these activities a vital part of science). Ranjan: Besides,	रघु:- जर्नल्स छापना, बच्चों के लिए मैगज़ीन्स, और अपने काम का डेमॉन्स्ट्रेशन करना - ये सब उनके लिए सायन्स का ही एक हिस्सा था। रंजन:- इतना ही नहीं,		
286.	447	22	B&W photograph - Srinivasa Ramanujam.	Ranjan (V.O.): so much happened in the science of that period. Ramanujan contributed significantly to mathematics,	रंजन:- विज्ञान में कितना कुछ हुआ इस काल में। रामानुजम का गणित में बड़ा मूलभूत योगदान रहा।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
287.	451	14	B&W photograph - Vishweswaraya in his youth.	Vishweshwaraya worked on dam projects on various rivers.	रंजन:- विश्वेश्वरैया ने कई नदियों के बांधों पर काम किया,	Fade out	
288.	453	38	B&W photograph - Vishweshwaraya at the Bhadrawati Iron & Steel Works, Mysore.	He also started a steel factory in Mysore.	रंजन:- और मैसूर में आयरन फैक्टरी शुरू की।		
289.	456	06	B&W photograph - Vishweshwaraya with other experts at the Churchhill Machine Tool Co., UK.	The technologies practised in foreign countries	रंजन:- विदेश में जो तकनीकें इस्तेमाल हो रही थीं,		
290.	458	02	B&W photograph - exterior of a plant.	were attempted to be implemented here, in this period.	रंजन:- उन्हें यहाँ पर उपयोग में लाने की कोशिश भी इसी काल की है।		
291.	460	39	B&W photograph - another plant.	The links between science and industry became stronger.	रंजन:- विज्ञान और उद्योग का सम्बन्ध और गहरा होता गया।		
292.	464	02	MLS Nissim in anchor room, standing next to plant. He walks left to table at which Maitreyi and Shehnaaz are sitting, and sits down with them. Camera tracks right and pans left to them, ending on LS the three at table.	Nissim (sync): By the third decade it had become clear that it was futile to cooperate with the British anymore. The call for total independence was about to be given. After the First World War, the whole world faced a grave economic situation. The Great Depression. The USSR was the only country which could weather this, due to its planned economy. Our leaders, especially Nehru, were impressed by this fact.	निस्सिम:- तीसरे दशक तक साफ हो गया था कि अंग्रेजों के साथ और समझौतों से काम नहीं चलेगा। संपूर्ण आज़ादी की मांग शुरू होने को थी। पहले विश्व युद्ध के बाद दुनिया गंभीर आर्थिक संकट में थी - द ग्रेट डिप्रेशन। अपनी नियोजित अर्थ व्यवस्था के कारण केवल रूस ही उससे जूझ सका था, और हमारे नेता, खासकर नेहरु, इस बात से बहुत प्रभावित थे।		
293.	481	15	MCU Shehnaaz.	Shehnaaz (sync): The National Congress Planning Committee, established in 1938,	शहनाज़:- सन 1938 में बनी नेशनल कांग्रेस प्लानिंग कमिटी		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
294.	483	34	B&W photograph - one of the sessions of the Planning Committee.	Shehnaaz (V.O.): was an outcome of this impression. Industrialists, scientists, political leaders	शहनाज़:-इसी प्रभाव का नतीजा थी। उद्योगपति, वैज्ञानिक, नेता-		
295.	486	25	MCU Shehnaaz.	Shehnaaz (sync): came together for the first time. They discussed many issues. 29 sub-committees were asked to submit reports. Here are some of the documents.	शहनाज़:-पहली बार ये सब एक साथ आए। उन्होंने कई समस्याओं पर विचार किया। उनमें से सब-कमिटीज़ को अपनी-अपनी रिपोर्ट्स पेश करने को कहा गया। उन्होंने रिपोर्ट्स में से कुछ ये हैं।		
296.	493	03	Top angle MCU open report of the Congress Planning Committee. Camera tracks right over various other reports, pans left and tilts up to MS Shehnaaz.	Shehnaaz (V.O.): On the basis of these, one can understand their thoughts on various issues. Of course, they differed on many aspects. For example, family planning, public sector or private sector, should importance be given to agriculture or industries? And finally, what kind of industries - heavy industry or cottage industry?	शहनाज़:- उनकी रिपोर्ट्स से उनके विचारों का अंदाज़ मिलता है। वैसे कई मुद्दों पर उनके कई मतभेद भी थे- जैसे कि परिवार नियोजन, पब्लिक सेक्टर, प्राई- वेट सेक्टर, खेती को प्राथ- मिकता दी जाए या उद्योग को - और फिर किस प्रकार के उद्योग? हेवी इंडस्ट्री या कॉटेज इंडस्ट्री?		
297.	504	03	MCU Maitreyi.	Maitreyi (sync): One of the outcomes (of the committees) was that serious thought was given to industrialization. Development of industries, development of different technologies, government support for this, establishing educational institutes that would help to solve the problems of these industries.	मैत्रेई:- उनकी उपलब्धियों में से एक ये भी है कि औद्योगिकीकरण के बारे में गहराई से सोचा गया। अलग-अलग इंडस्ट्रीज़ का विकास, अलग-अलग तकनीकों का विकास, उनके लिए सरकारी मदद, उनकी समस्याएँ सुलझाने के लिए शैक्षणिक संस्थाओं की स्थापना।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
298.	513	12	MCU Shehnaaz.	Shehnaaz: But every report stresses the need to adopt the latest technology and ongoing research. It also emphasises that science cannot develop alone--it needs a supportive social system.	शहनाज़:- लेकिन हर रिपोर्ट में उस समय के सबसे विकसित तकनीक को अपनाने, और रिसर्च पर, जोर दिया गया था। और इस पर भी, कि अकेले विज्ञान तरक्की नहीं कर सकता है - उसके लिए एक सामाजिक व्यवस्था की आधार की ज़रूरत है।		
299.	522	34	MCU Nissim - reaction.	Shehnaaz (voiceover): It was truly a historic event. For the first time	शहनाज़:- ये वाकई एक ऐतिहासिक घटना थी। पहली बार		
300.	525	21	MS Shehnaaz.	Shehnaaz (sync): these problems were considered on such a large, inter-connected scale. These reports later influenced free India's policies too.	शहनाज़:- इस व्यापक स्तर से इन समस्याओं पर सोचा गया था। आगे चलकर आज़ाद भारत की तियों पर भी इन रिपोर्ट्स का प्रभाव पड़ा।		
301.	531	01	MCU Nissim.	Nissim: The coal industry is an example of the state of our industries at that time. Coal was the main source of energy in those days.	निस्सिम:- उन दिनों हमारे उद्योगों का क्या हाल था - इसकी मिसाल है कोयला उद्योग। उर्जा का मुख्य स्रोत तब कोयला ही था।		
302.	537	08	MS open door of a furnace. A man shovels coal into it.	--	--		Fire and shovel
303.	540	39	LS a coal-fire furnace.	Nissim (voiceover): The growth of the coal industry has a story behind it.	निस्सिम:- इसके विकास की अपनी एक कहानी है।		Fire & shovel
304.	544	05	MCU Nissim.	Nissim (sync): Amrita met many scholars and coal technologists to learn about this.	निस्सिम:- अमृता कई स्कॉलर्स और कोयला विशेषज्ञों से मिली, इसे जानने के लिए।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
→305.	547	20	Map of India. Camera zooms in to Dhanbad, Calcutta indicated for reference.	Amrita (voiceover): In Bihar, near Dhanbad, lie vast coal reserves.	अमृता:- बिहार में धनबाद के पास कोयले का बड़ा भंडार है।	Fade in	
306.	552	24	LS Bharat Coking Coal Ltd. quarries. Camera pans left over them to road.	Bharat Coking Coal Ltd. has many coal mines here. This coal is used in the metal industry.	अमृता:- भारत, कोकिंग कोल लिमिटेड की यहाँ खदानें हैं, जिनमें से धातु उद्योगों के लिए कोयला निकाला जाता है।	Fade out	Motor
307.	563	29	MLS a lift rising out of the shaft & stopping.	--	--		Lift
308.	569	16	A line of miners cross frame from right to left, one by one in MS.	--	--		Machines
309.	572	27	MS Amrita talking with K.K. Malhotra. They look at the mines left. Camera pans left to LS mines.	NB: Sync dialogue track Amrita (voiceover for Malhotra): I met Mr. K.K. Malhotra, who is working as an environmental engineer in Bharat Coking Coal Ltd. Nowadays, as he said, the open cast mining method is used whereas earlier, coal was extracted only from underground mines.	अमृता:- मेरी वहाँ मुलाकात हुई श्री.के.के. मल्होत्रा से, जो भारत कोकिंग कोल लिमिटेड में सन्वायरन्मेंटल इंजिनियर है। मल्होत्रा:- हम लोग ओपन कास्ट माइनिंग बोलते हैं, इससे हम लोग कोयला निकालते हैं, जब कि पहले ज़माने में अंडरग्राउंड का तरीका से ही कोयला निकाला जाता था। अमृता:- तो अब यहाँ अंडरग्राउंड माइन्स हैं, यहाँ पर ? मल्होत्रा:- अंडरग्राउंड माइन्स हैं, जो काफी पुरानी हैं। अमृता:- और ये खदान से कितना प्रोडक्शन होता होगा ?	Fade in	

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
310.	588	16	MCU the mouth of an abandoned mine.	We saw one such old underground mine.	मल्होत्रा:- ये पुराने ज़माने का खदान चला हुआ है अंडरग्राउंड।	Fade out	Trucks
311.	591	06	LS the mine-opening, Amrita & Malhotra in foreground in MLS, looking at it.	Very little good coal could be extracted from these mines. This was because the top and bottom layer of coal could not be marketed.	अमृता:- वो इतना-सा ही कोयला निकाल लेते थे पहले मार्केट.... मल्होत्रा:- क्योंकि इतना-सा कोयला ही अच्छी क्वालिटी का था, बाकि उपर में थोड़ा-सा जो है, जिसको वो मार्केट नहीं कर सकते थे - या नीचे वाला है, मार्केट नहीं कर पा रहे थे,		Trucks
312.	598	05	MCU Amrita - Reaction.	And thus only the marketable coal was extracted from these underground mines.	मल्होत्रा:- उतना हिस्सा छोड़ दिया और जिसको मार्केट कर पा रहे थे, उतना ही हिस्सा उसने लिया।		Trucks
313.	600	16	MCU Malhotra.	In those days there were no washeries. Hence only that coal which could be sent straight away to the steel plant,	मल्होत्रा:- और उस ज़माने में वाॅशरीज़ भी नहीं थीं। इसलिए जो कोयला सीधा जा सकता था स्टील प्लांट्स को या		Trucks, workers voices
314.	604	07	MCU the mine-opening.	or consumed directly, was extracted.	मल्होत्रा:- जो कन्ज्यूम हो सकता था, खाली उसी कोयला को ही निकाला गया। अमृता:- इन खदानों से निकाले गए कोयले का।		Trucks, workers voices
315.	606	38	Low angle LS pit-head. Camera tilts up, pans left and tilts down it.	Amrita's (voiceover): In order to use the coal for steel and other metal plants, it was necessary for the coal to go through the process of coal washing that is, to remove incombustible substance from the coal.	अमृता:- अगर स्टील या किसी अन्य धातु उद्योग में इस्तेमाल करना हो तो कोल वाॅशिंग करना, यानि कोयले से ने जलने वाली चीज़ें निकाल देना, ज़रूरी होता है।।		Machine

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
315.	continued						
316.	614	03	Part of a coal washery, Amrita and Malhotra enter from left and examine machinery.	A government committee set up in 1925 reported that it was not possible to wash this coal as the impurity level in it was very high. Hence, coal washing would not be beneficial at all.	अमृता:- लेकिन 1925 में एक सरकारी कमिटी ने कहा था कि यहाँ के कोयले में न जलने वाली चीज़ें इतनी मिली हुई हैं कि उसे साफ करने की कोशिश से कोई फायदा नहीं हो सकता है।		Machines
317.	625	02	LS landscape with smoke from coking pits. Camera pans right over site, to smoking pits.	For years this report was accepted, and good quality coal which could have been used in the metal industry was wasted by using it as fuel for the railways.	अमृता:- बरसों तक लोग यही मानकर चलते रहे, और ये कोयला जो साफ होकर धातु उद्योग के काम आ सकता था, सिर्फ रेल इंजिन चलाने के लिए खर्च होता रहा।		Machines
318.	633	01	MS coal processing plant.	--	--		
319.	634	09	LS coal processing plant.	In India, coal washeries came	अमृता:- भारत में कोल वाशरीज़ काम करने लगीं।		Machines
320.	636	07	Top angle MLS Amrita at plant, walking towards camera. Camera pulls back with her.	Amrita (sync): up only after 1950. Like this washery in Lodhna, which began in 1955. Today we are able to wash this coal,	अमृता:- 1950 के बाद ही, जैसे लोधना की ये वाशरी बनी तब पचपन में। आज तो हमारा कोयला साफ किया जाता है,		
321.	641	23	Coal being flushed with water at high speed. Camera tilts down with the water flow.	Amrita (V.O.): and use it in the metal industry.	अमृता:- और धातु - उद्योग में इसका इस्तेमाल भी होता है।		Machines, water
322.	646	32	MS Amrita, in an open cast mine.	Amrita (sync): During the freedom struggle, certain coal technologists wanted to prevent this wastage of good quality coal.	अमृता:- आज़ादी के लड़ाई के माहौल में कोयला उद्योग से सम्बन्धित कुछ लोगों ने इस बेहतर कोयले को ज़ाया होने से रोकना चाहा।		Machines

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
323.	651	15	XLS two workers on a pile of coal.	Amrita (V.O.): Thus came the demand for better utilization of coal, and development of coal-washing techniques	अमृता:- इस तरह माँग हुई कोयले के बेहतर उपयोग की, और कोल वॉशिंग तकनीकी के विकास के लिए		Machines
324.	656	13	Top angle MLS worker loading a basket with coal.	with the aid of the government. But neither the government	अमृता:- सरकारी मदद की। पर इसमें न ही सरकार ने कुछ दिलचस्पी ली,		Coal
325.	660	16	Top angle LS workers loading baskets with coal.	nor the mine owners took any interest in this demand. Who were these mine owners?	अमृता:- न ही खदान मालिकों ने। ये मालिक कौन थे ?		Coal
326.	663	28	Top angle LS tracks. A line of coal-laden wagons emerges from tunnel and moves up right to surface. Camera tilts up with them.	Through extensive surveys, the British marked out the coal reserve areas and started leasing out these plots. The plots with low grade coal were allotted to Indians, whereas 80% of the plots, which had higher grade coal, were given over to British companies. The Railways	अमृता:- सर्वे के द्वारा अंग्रेजों ने खदानों का पता लगाया था। और फिर ये ज़मीन लीज पर देने लगे थे। जिन खदानों का कोयला कम दर्जे का था वो भारतीयों को दी गई, और अच्छी प्रतिशत खदानें— जिनसे बेहतर कोयला निकलता था—सौंपी गईं। अंग्रेज कंपनियों को। कई खानें रेलवेज		Train of wagons moving
327.	678	16	LS a wagon-load of coal being tipped into dumper.	owned many mines.	अमृता:- के पास थीं।		Coal felling
328.	682	39	Angular composition - train arriving at a platform. Camera pans right to engine as it slows down to stop.	The Railways not only owned mines, but they were also the biggest buyers. Thus they could decide the quality and price of the coal they were going to use.	अमृता:- रेलवे की अपनी खदानें थीं और वो कोयले के सबसे बड़े ग्राहक भी थे। इस तरह वो खुद तय कर सकते थे कि उन्हें कौनसा कोयला इस्तेमाल करना है, और उनकी क्या कीमत होगी।		Whistle, steam engine

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
329.	701	235	Top angle MS coal-grate in rail-engine. Worker takes out coal with a shovel.	They decided to use the best quality coal, at the cheapest price!	अमृता:- तो उन्होंने तय किया कि सबसे अच्छा कोयला ही इस्तेमाल करेंगे, कम से कम قیمت पर!		Steam engine, shovel coal
330.	707	19	Low angle MLS, the worker shovels the coal into the furnace of the engine, gathers another shovelful and throws that into the furnace.	--	--		
331.	709	23	MCU the shovel throwing coal into the furnace.	--	--		
332.	710	19	LS engine-driver & assistant at controls.	--	--		Whistle of steam engine
333.	711	18	Low angle MLS, the front of the engine.	--	--		Whistle, steam engine
334.	712	12	Top angle angular MLS, the engine moving away on tracks, pulling wagonloads of coal. Camera pans right to include platform.	And thus the best quality coal started getting sold cheaply.	अमृता:- और यँ बढिया कोयला सस्ते में बिकने लगा।		Steam engine moving
335.	718	37	LS Malhotra and Amrita walking right to left, towards abandoned mines. Camera pans left with them, then further to mine-openings.	(As a result) the mine owners had only one method of making a profit. That is - to extract maximum coal from a mine, without worrying about the future. Safety, too, was just not considered. Today in this Jharria coal field, one	अमृता:- मुनाफा कमाने का एक ही रास्ता रह गया - किसी भी तरह खदानों से ज़्यादा से ज़्यादा कोयला निकालना, भविष्य की सोचे बिना। सुरक्षा के बारे में तो सोचा ही नहीं गया। आज भी हमें इस झरिया कोल फ़ील्ड में		
336.	731	05	MS opening of disused mine.	can still see many old coal mines	अमृता:- ऐसी कई पुरानी खदानें दिखती हैं,		
337.	732	27	Top angle caved-in roofs of mines.	whose roofs have caved in,	अमृता:- जिनकी छतें गिरी हुई हैं,		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
338.	734	28	Top angle MLS a mine - site, submerged in water. Camera pans left over it.	or they are filled with water.	अमृता:- या वो पानी से भर गई है। मल्होत्रा:- माईनिंग कंपनीज़ का काम करने का तरीका बड़ा ही अन्सायन्टिफिक था।		
339.	743	17	MS Malhotra & Amrita walking up slope towards mines. Camera pans with them, then further over smouldering mines, tilting up a cliff to workers standing on top.	<hr/> NB: SYNC DIALOGUE TRACK <hr/> Amrita's V.O. for Malhotra: Mr. Malhotra said that the mining companies then worked very unscientifically. As a result, often the roofs of the mines collapsed. Buildings on the surface, too, collapsed. Fire also caused considerable damage, because it spread rapidly underground, to other mines. In many mines	मल्होत्रा:- जिसके कारण से बहुत बार जमीन भी धसा है और जमीन धसने के कारण बहुत बार ऐसा भी हुआ है कि उपर में बिल्डिंग्स थीं - वो धस गई हैं। यहाँ के पिलर बहुत छोटे थे, और आग लग गया और ये पूरा जो है जमीन धस गया। आग बढ़ा भी है जहाँ पहले था, और बहुत बार ऐसा भी हुआ है कि आग जहाँ नहीं था, वहाँ भी लग गया है। अमृता:- कई खदानों में		
340.	757	18	MLS a flaming mine-opening. Camera pulls back to XLS the opening, tilting up to include horizon.	the fires that started in those times are still raging, and have by now spread many kilometres wide. I had read that during 1931 - 1945,	अमृता:- उस समय लगी आग भी/अब तक जल रही है और इस दरमियान कहीं कहीं पर तो ये आग कई किलोमीटर की दूरी तक फैल गई है।। अमृता:- मैंने पढ़ा था कि 1931 से 45 के दरमियान इस झरिया कोल फ़ील्ड में कुछ		Crackling of fire, murmur of voices.

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
341.	769	32	MS Amrita and Malhotra.	300 million tons of coal were wasted in the Jharia coal field due to fire. And 75% of this was good quality coal. Mr. Malhotra confirmed this and pointed out that the first fire in Jharia coalfield started in 1916.	अमृता:- 300 मिलीयन टन्स कोयला नष्ट हो गया था, आग में जलने से- और जिसमें से 75 परसेन्ट अच्छा कोयला था। मल्होत्रा:- जी हाँ, क्योंकि पहला झरिया कोल फील्ड का फायर 1916 में हुआ है। और इसीलिए काफी हद तक जो है, कोयला जो आग में जल रहा है, अभी भी, और जल रहा था उस ज़माने में,		Sounds of machines, workers on site.
342.	782	10	LS a coal-fire in field. Camera pulls out, pans right over the field.	Good quality coal from the upper seams started burning, and even today there are approximately a hundred fires in this field and the loss is continuing. Amrita (V.O.): Well! We were talking about coal washing. In this direction (In this regard),	मल्होत्रा:- वो अप्पर सीम्स में था, जोकि अच्छी क्वालिटी की है। अभी भी करीब करीब 100 फायर्स जो है झरिया कोल फील्ड में, वो जल रहे हैं, अभी भी। और कोयला जो है लॉस चल ही रहा है। अमृता:- खैर, बात हो रही थी कोल वॉशिंग की। इस दिशा में		Crackling of fire
343.	794	00	MLS Amrita walking right to left on site. Camera tracks with her.	Amrita (sync): no effort was made by the government. As far as the big mine owners were concerned, they were anyway able to sell their coal. But the small mine owners did not have the finance to invest in these washeries, though they would have benefited the most from this process.	अमृता:- सरकार ने कुछ नहीं किया। जहाँ तक बड़े खदान-मालिकों का सवाल था, उनका कोयला तो वैसे भी बिक रहा था। पर छोटे खदान-मालिकों के पास वाशरीज़ में लगाने के लिए पूंजी कहाँ थी? हालांकि उनको तो इन प्रयोगों से फायदा ही होता।		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
344.	803	08	LS a truck carrying coal, moving towards camera.	Amrita (V.O.): And thus (and so we find that) all these experiments were carried out only at a minor level (small, insignificant level)	अमृता:- तो ये सारे प्रयोग बस छुट-पुट तौर पर,		Truck
345.	808	00	Top angle LS coal being loaded onto truck.	at many different places (at scattered places). The development of any industry depends on many factors. The coal industry was no exception.	अमृता:- अलग-अलग जगहों पर होते रहे। किसी तकनीक का विकास तो बहुत-सी बातों पर निर्भर करता है। कोयला उद्योग पर भी ये बात लागू हुई।		Workers, vehicles
346.	812	10	XLS a coal - trolley moving along a cable from left to right.	Gradually, many steel and other metal industries started coming up.	अमृता:- धीरे-धीरे देश में स्टील इंडस्ट्री और अन्य धातु उद्योग बट रहे थे,		Workers, vehicles
347.	815	39	LS a model plant at the Central Institute of Fuel Research. Camera tracks left to include Amrita, and moves with her as she walks right.	Amrita (sync): They started demanding good quality coal. In addition to this, during the Second World War there was an energy crisis. So it became very necessary to develop coal washing techniques. By and by the picture changed. It was not only scientists and engineers, it was not only the Indian mine owners, but British-owned coal companies, and coal consumers too, came together. They also received government support.	अमृता:- जो माँग कर रहे थे अच्छे दर्जे के कोयले की। और दूसरे महायुद्ध से उर्जा संकट भी पैदा हुआ था। तो कोल वॉशिंग तकनीक का विकास ज़रूरी हो गया। और अब देखते ही देखते बरत बनने लगी। न सिर्फ वैज्ञानिक और इंजिनियर्स, न सिर्फ भारतीय खदान मालिक, बल्कि अंग्रेज़ खदान कंपनियाँ और कोयले के ग्राहक भी एकजुट हुए। सरकार का भी समर्थन मिला।		Workers, vehicles
348.	832	00	Composite shot of another plant, Amrita walks left through equipment. Camera tracks with her, then pans further left and tilts up to industrial landscape.	A government fuel research committee was set up, and coal washing studies and experiments were initiated. Samples were collected from different areas. Testing plants were put up, and by 1946 a decision was taken about the type of coal washing plant to be set up.	अमृता:- एक सरकारी फ्यूल रिसर्च कमिटी बनी, कोल वॉशिंग स्टडीज़ और प्रयोग शुरू हुए, जगह-जगह से नमूने इकट्ठे किए गए, टेस्टिंग प्लांट लगाए गए। 1946 तक ये भी तय हो गया कि किस तरह का कोल वॉशिंग प्लांट लगना है।		Footsteps

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
349.	842	28	Low angle MLS, another model plant. Amrita walks along railing, towards camera. Camera tracks left and pans right to keep Amrita in frame.	A known (successful) technique, which was in practice in other countries, took several years to come here. But when it came, it became an immediate success. Why? Was it pressure from the scientists? Was it the (fear of) exhaustion of good quality coal? Or was it due to the crisis caused by World War Two?	अमृता:- एक प्रचलित तकनीक, जो दूसरे देशों में इस्तेमाल हो रही थी, बरतों यहाँ नहीं आई, लेकिन जब आई तब बहुत जल्द सफल हुई। क्यों? वैज्ञानिकों की ओर से दबाव, या बेहतर कोयले का सत्त्व हो जाना, या फिर वो संकट जो दूसरे विश्व युद्ध की कजह से पैदा हुआ ?		
				(SONG)			
350.	854	39	B&W photograph - soldiers running down hill with rifles, in silhouette.	--	--	Song	
351.	856	00	B&W photograph - Hiroshima: dead bodies.	--	--		
352.	857	15	B&W photograph - gutted Prefecture Hall in Hiroshima.	--	--		
353.	858	27	Top angle shot. Amrita climbs up step-ladder at TOI press, towards camera. Camera tracks left & tilts up with her to Raghu & Ranjan on platform, then tracks forward, pans left to MLS Raghu.	Amrita: If we choose, science can be used for destruction. Ranjan: We hoped to use it for the development of our country. Raghu: We had so many dreams when we won our freedom—	अमृता:- यहाँ तो विज्ञान से कर सकते हैं विनाश, रंजन:- देश के विकास की हमने की थी इसकी आस। रघु:- देखे कितने सारे सपने जब आज़ादी हमने जीती,		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
354.	866	39	MS Shehnaaz	<p>Shehnaaz: B t let us talk about the times before that. (END OF SONG)</p> <p>Maitreyi V.O.: Science and the independence struggle —</p>	<p>शहनाज़:- पर उस घड़ी से पहले की सुनाई आप-बीती ।</p> <p>मैत्रेई:- विज्ञान और स्वाधीनता संग्राम —</p>		
355.	869	12	MS Maitreyi sitting in anchor room. Camera pulls back to include Nissim, too, in MLS both, then tracks & pans right to MS Nissim.	<p>Maitreyi (sync): their influence on each other can be seen with scientists like Meghnad Saha and leaders like Nehru. For them, science was not only a weapon but the basis of their thinking, and life. They believed in rational thinking and humanitarian values which emerge from scientific thinking (which are connected with science).</p> <p>Nissim: From Gandhiji, who believed in non-violence, to Dr. Ambedkar, Dr. Lohia, and then revolutionaries like Bhagat Singh — we can say that despite their (ideological) differences, all these freedom fighters agreed on rational thinking, experience, humanism and the importance of science.</p>	<p>मैत्रेई:- इनके एक दूसरे पर प्रभाव के मिसाल हैं साहा जैसे वैज्ञानिक और नेहरु जैसे नेता । इनके लिए विज्ञान सिर्फ एक हथियार नहीं, बल्कि उनके विचारों, उनके जीवन का आधार था । विज्ञान से जुड़े तर्क और मानवता पर आधारित मूल्यों पर उनका विश्वास था ।</p> <p>निस्सिम:- गांधीजी जैसे अहिंसा वादियों के साथ डॉ. आंबेडकर और डॉ. लोहिया, इन जैसी से लेकर भगत सिंह जैसे क्रान्तिकारियों तक — या ही कह सकते हैं, कि आपसी मतभेदों के बावजूद सभी स्वाधीनता-प्रेमी बुद्धिवाद, अनुभव और मानवतावाद के बारे में, विज्ञान के महत्व के बारे में, सहमत थे ।</p>		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
356.	894	18	MS Maitreyi	<p>Maitreyi: All of them dreamt about a future where science and technology would transform our society. Science would solve all problems. Their present (times) was full of problems and challenges. Many of these problems we are facing even today. By 1947, along with rational thinking and humanitarian values,</p>	<p>मैत्रेई:- ये सब लोग एक ऐसे भविष्य के सपने देख रहे थे जहाँ विज्ञान और तकनीक हमारे समाज को बदल देंगे। सारी समस्याएँ विज्ञान सुलझाएगा। उनका वर्तमान कई समस्याओं और चुनौतियों से घिरा था। इन में से कई समस्याएँ ऐसी हैं जिनका सामना हमें आज भी करना पड़ रहा है। 1947 तक आते-आते बुद्धिवाद और मानवतावाद के साथ - साथ</p>		
357.	909	07	B&W photograph - communal riots at Opera House, Bombay, 1947. Camera zooms out and pans left.	<p>Maitreyi (V.O.): communal forces were on the upswing in the country.</p>	<p>मैत्रेई:- देश में साम्प्रदायिक ताकतें भी उभर रही थीं।</p>		Fade in
358.	913	13	CU front page of TOI on 15th August, 1947; headline - "Birth of India's Freedom!"	<p>Nissim (V.O.): And on 15th August, 1947, when we became independent, along with the joy there was unhappiness—the unhappiness of Partition.</p>	<p>निस्सिम:- और 15 अगस्त, 1947 को जब हमने आज़ादी पाई, तो खुशी के साथ - साथ देश के विभाजन का दुख भी था।</p>		
359.	919	07	B&W photograph - section of the crowd at Red Fort, 15 August, 1947.	<p>Everybody experienced these emotions, this conflict (Everybody had these mixed emotions).</p>	<p>निस्सिम:- सारे लोगों ने इन दो भावनाओं को महसूस किया।</p>		
360.	921	19	MS Nissim.	<p>Nissim (sync): Perhaps Gandhiji and Nehru were the symbols of these emotions for the people.</p>	<p>निस्सिम:- गांधीजी और नेहरू शायद लोगों के इन भावनाओं के प्रतीक थे।</p>		
361.	924	29	B&W photograph - Gandhiji fasting to bring about communal harmony in Calcutta: 15th August, 1947.	<p>Nissim (V.O.): Gandhiji was fasting in Calcutta against...</p>	<p>निस्सिम:- गांधीजी कलकत्ता में अंशन पर बैठे थे,</p>		

S.No.	Footage		Shot Description	Dialogue	Dialogue	Music	Sound Effects
	Ft.	Fr.					
362.	927	13	B&W photograph - Gandhiji talking to a man, during the fast.	communal riots and killings.	निस्सिम:- सामुदायिक दंगों और हत्याओं के खात्मे के लिए।		
363.	929	08	B&W photograph - Nehru addressing crowds at Red Fort: 15 August, 1947.	And Nehru was urging people to	निस्सिम:- नेहरू लोगों का इस दुख से निकलकर		
364.	932	10	B&W photograph - LS crowd at Red Fort: 15 August 1947.	share the dream of a new India — to look towards the new horizon.	निस्सिम:- आज़ाद भारत के नए क्षितिज की ओर देखने प्रेरित कर रहे थे।		
365.	934	25	B&W photograph - closer view of people applauding.	--	--		
366.	936	37	MS Maitreyi.	Maitreyi (sync): People responded wholeheartedly to Nehru's call. And despite Partition and riots, they celebrated their independence, achieved after a long struggle.	मैत्रेई:- लोगों ने भी नेहरू की इन भावनाओं का पूरा साथ दिया, और विभाजन, दंगे—इनके बावजूद भी लोग लम्बे संघर्ष के बाद पाई गई स्वतंत्रता का जश्न मनाने लगे।	Fade out	
367.	944	14	End Credits				Fade in
		to	EPISODE XI				
		1018	produced by				
		19	COMET PROJECT				
			at Nehru Centre, Bombay, 1989				
			advisory committee				
			chairperson PROF YASHPAL				
			members D.P. AGRAWAL, B K CHATURVEDI,				
			VASANT R GOWARIKER, ASHOK JAIN, N V K MURTHY,				
			A RAHMAN, VINOD RAINA, N K SEHGAL,				
			SHIV SHARMA, ASIYA SIDDIQUI, B V SUBBARAYAPPA,				
			UPENDRA TRIVEDI, B M UDGAONKAR				
			anchor persons				
			Nissim HEMU ADHIKARI				
			Maitreyi VASUNDHARA PHADKE				

<u>S.No.</u>	<u>Footage</u> <u>Ft. Fr.</u>	<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound</u> <u>Effects</u>
367.	continued	End Credits (Continued)				
		reporters				
		Amrita Prasad	URMI JUVEKAR			
		Shehnaaz Khan	SOHAILA KAPUR LIMAYE			
		Ranjan Pradhan	ANIRUDDHA LIMAYE			
		Raghunandan	SHIVKUMAR SUBRAMANYAM			
		research and script				
		SUHAS PARANJPE, URMI JUVEKAR,				
		CHANDITA MUKHERJEE				
		direction				
		CHANDITA MUKHERJEE				
		assisted by	URMI JUVEKAR, SMRITI NEVATIA			
		continuity	NIKHAT SIDDIQUI			
		cinematography				
		C K MURALEEDHARAN				
		assisted by	SATISH NARAYAN, SIDHARTHA RAO			
		additional camera	SAMEER SABNIS			
		at camera	PRAKASH SUTRAVE			
		audiography	INDRAJIT NEOGI			
		associate recordist	AJAY MUNJAL			
		editing	RENU SALUJA			
		assisted by	URMI JUVEKAR			
		negative editor	RAMESH PATEL			
		mixing	A M PADMANABHAN			
		at Aradhana Sound Service				
		music	K NARAYANAN			
		dialogue	PRAKASH HINDUSTANI, SMRITI NEVATIA			
		lyrics	SMRITI NEVATIA			
		with	A V RAMMURTY			
		song composer	SHRIDHAR PHADKE			
		singers	JANHAVI, SHRIKANT PARGAONKAR,			
		ROHINI SAHASRABUDDHE, DILIP SHARMA				
		production	SHEIL SADWELKAR, SUDIPTA SEN,			
		GEETA RAMAKRISHNAN				
		project administration				
		GEETA RAMAKRISHNAN				

<u>S.No.</u>	<u>Footage</u> <u>Ft. Fr.</u>	<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound Effects</u>
367.	continued	<p>End Credits (continued)</p> <p>base office K G VISALAKSHI, HEMANT DESAI, SUPREN CARDOZA</p> <p>Delhi Coordination</p> <p>Communication Centre (Delhi)</p> <p>titles</p> <p>design MALATHI SRINIVASAN</p> <p>artworks SHEIL SADWELKAR</p> <p>animation V J MOHAN, URMI JUVEKAR</p> <p>shooting M A HAFEZ</p> <p>at Prasad Productions Madras</p> <p>graphics PRAMOD RANE</p> <p>typesetters Byteset Communications</p> <p>studio furniture</p> <p>Chippendale (Exports) Pvt Ltd</p> <p>cine equipment</p> <p>National Film Development Corpn</p> <p>processing Adlabs</p> <p>Prasad Film Laboratories</p> <p>colour analysis J BOLAN</p> <p>at Prasad Film Laboratories</p> <p>telecine Garware Video Centre</p> <p>music recording</p> <p>Aradhana Sound Service</p> <p>song recording Western Outdoor</p> <p>sound transfer Aarti Sound Centre</p> <p>lights Sony Cine Service.</p> <p>visual sources</p> <p>Aurora Art Publishers, Leningrad</p> <p>Bhav Daji Lad Museum, Bombay</p> <p>Birla Industrial and</p> <p>Technological Museum, Calcutta</p> <p>Blitz Publications, Bombay</p> <p>Dover Publications, Inc</p> <p>Jawaharlal Nehru Memorial Fund, Delhi</p>				

<u>S.No.</u>	<u>Footage</u>	<u>Shot Description</u>	<u>Dialogue</u>	<u>Dialogue</u>	<u>Music</u>	<u>Sound Effects</u>
	<u>Ft.</u> <u>Fr.</u>					
367.	continued	End Credits (continued) Nehru Planetarium, Bombay Tata Institute of Fundamental Research, Bombay "The Lost Generation" The Times of India Time Life International acknowledgements DINESH ABROL A N BANERJEE ARVIND BHATNAGAR ENAKSHI CHATTERJEE SHANTIMAY CHATTERJEE S P MATHUR VIVEK MONTEIRO AMANDA SARKAR SUBIR SARKAR, ASIYA SIDDIQUI SAMAR BAGCHI, SEEMA BAKSHI, D BOSE, ARINDAM GANGULY, ABDUL KALAM, K K MALHOTRA, TAPOSH MAZUMDAR, MANOJ PAL, SUBODH RANDIVE, DIBAKER SEN, SAMEER SEN, SUJIT SEN, S K SINGH Bharat Coking Coal Ltd , Dhanbad Bengal Chemicals and Pharmaceuticals Ltd , Calcutta Bombay Port Trust Bose Bhavan, Calcutta Bose Institute, Calcutta Development and Education Communication Unit, SAC, Ahmedabad Indian Association for the Cultivation of Science, Calcutta Indian Railways				

