Indian Institute of Technology
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NP-TEL
National Programme
On
Technology Enhanced Learning
Course Title
Compiler Design
Lecture – 11

by…
Prof. S. K. Aggarwal
Dept. of Computer Science and Engineering

So do you remember the discussion we had the end of previous class concept it given to the set of conception of assailer parsers started with the excursion grammar given to the full table for it and then I give this grammar and I ask to construct the parsers to it how many of you are construct have written this stationeries raise your hands students please at least and what about the others all those whom have not done this please once again raise your hands in this case it does not undecided right.

Whether you have done it or not done it that is still decide to the lecture that still people what is the reason you did not understand the SLR parsers or there is no time to do it SLR parsers is not clear there is no point going head from this point onwards okay SLR parsers construction of SLR parsers is clear or not yes no silences again if we get back there is no respond the question from what we prepare from this I am not teaching for the board.

I am teaching for you the construction of the SLR parsers is everyone sir anyone spend the reduction step means when if I reduce the production I follows alpha dot then for all the symbols follow of it in that how do we canvas in the food entry in the parsers how did the food entry the parsers okay so question is that when we had food for reduction how can I say entry in the parsers so suppose I have some item.

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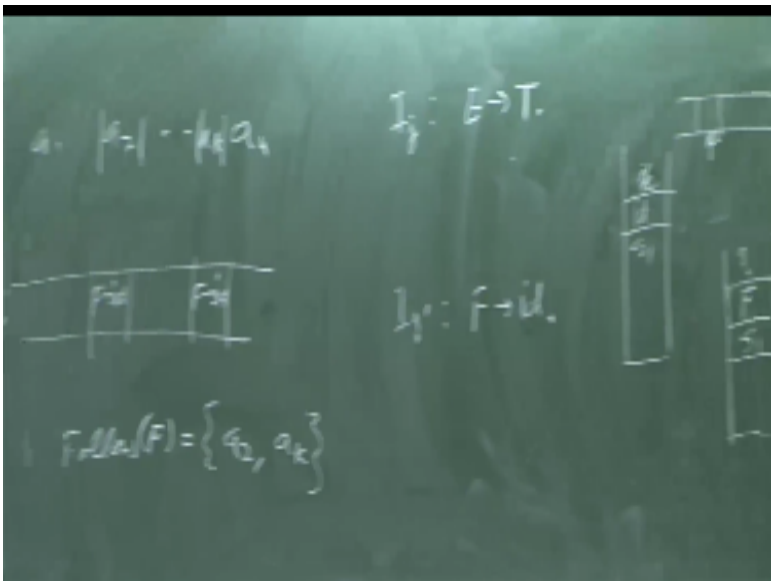

I will not worry about what the item are some item are where I have the production of this form or I have allow item in this form now this item is saying so once again I will constantly try to explain you this is saying that this particular write now or suppose I had another item there are at there are o item of this form now what is saying is that whatever I respect to see I have seen that i am already put a reduction now question is that what are the symbols that I can put reduction.

Let us again look at this tag some states is S1 then I have ID on this and in some states that tools I then I see certain symbols then I will put reduction that is going to state the parsers so when I say that in this state for example I am ready for reduction by ID in this particular rule ID will get square F so this state must be the F state is derive okay now what is the steps which I will take in the process of reduction.

What will happen to snack after this step so before reduction this is the state of the parsers that I have and after reduction what will be the state of the parser I have some s 1 I have F here and then let me say the people symbol remains the same but this going to be some push it so let us not worry about participate could be that we determine later but if this configuration has to be a very configuration in my sentence upon Sigma Gamma okay.

Then what should this symbol so this is precisely what I did I said that in my article the state was warning to or rope was warning to Jap time which is this day for all symbols which is so these are the symbols terminal symbols A1 I say let me determine what are the symbols I mean for all of us and for all those symbols are making ranking which is saying FO2 okay so what about this A4 and AK so I am just tuning follow of F is A2 and AK .

This has to follow six perhapsing on those symbols you want to do this reduction if you try to do reduction hi beach a sentential form which is in bed yeah and what were those reduction apart

from religion we have shift and we had pull we want to expect space so let us go back to example some of the thing have already worked out I have worked out 3 states 0 1 & 2 and I ask you to complete this which most of you have not done and not done it and believe me this is not something which is a fashion situation because if you always try to be just in time.
Which is saying that it my exams and 21st then I will do some study on 20th everything will work out fine the other tackle that I am going to do it in for the moon shop so please when I give an assignment where the purpose assignment the reason I gave you this assignment and not for some wish it was if I put some weight I am sure you would have done it and you would have been submitting it no but saying that this does not have a credit and you just have to do this exercise and then we are not doing it does not end.
So what I am going to do now is I am going to give you five minutes and I want everyone now to take a sheet off of this please concept this and now this will be grateful and have certain which please do it this is a peace for you I wish I have return it I will not give more than 5 minutes some of you are not carrying the note books can note it down in a paper in stud of time wasting it becomes a quiz you have certain wastage.
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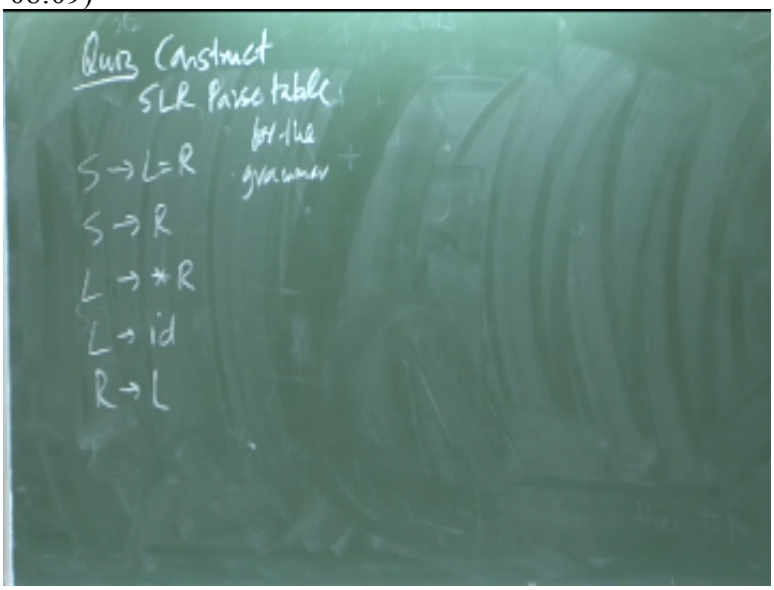

So how many of you manage tree four five six seven eight very good so many persons okay what was not clear why so long what was the problem constructing the follows are the problem constructing the table for the problem so again I am repeating the question I have in the beginning of the class is it that you did not understand it or is in to be not attract it what is the problem, what is the problem unless you come out of the problem I do not know how to solve it I do not even know what is the problem.

Writing and move on and I can continue that what is the point of doing all the glittering I do not know whether you are not practicing or you not understanding do it once again how many of you people in that it should be done all over again because if problem is limited few people I can sort out I cannot spend extra time for doing it today if it is not a problem for whole class I can spend time with a few of you.
But everyone feels that is not been followed then guess then I will go again do it with a sector okay that is a good idea other than taking a old example and going through it this is the grammar
And also give you sort of highly saying that you can take the sector and please this point of time not understand something ask questions so what is the first step we had in the grammar than I start constructing my positive modern from the derive.
I need to operate the govern what does the operatation means that I had rules with the explain goods explain is the new start right the first thing idea for me is to do is one third of me to divide it I will start something defects of can you have a silence please I mean if you have a problem you either discuss with me but you do not discuss with your neighbors you have issues ask questions.
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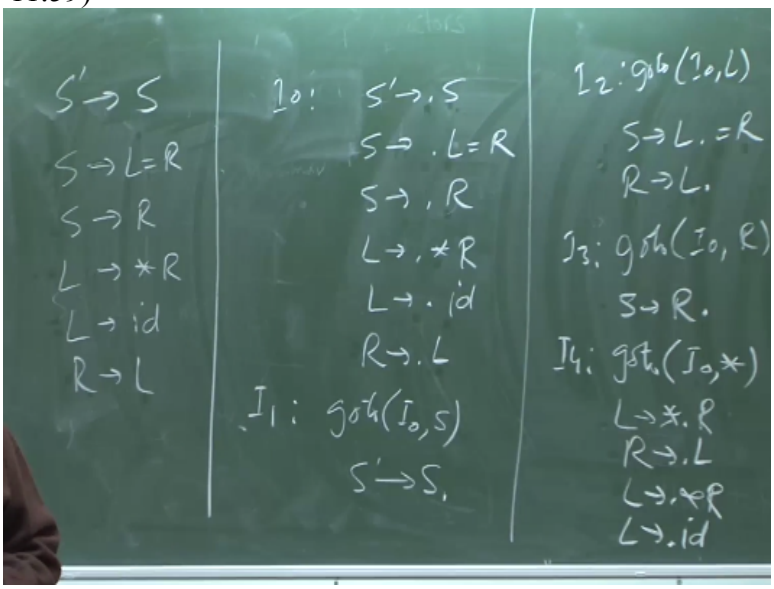

So the first thing we need to do is start constructing all the state of velocity wise the first step of the velocity item is always going to be 1 by 0 is going to be 2 0 right the first production which I had it here and when I came user of this what it says is that if I seen so now I am again trying to explain you actually that I am not asking anything but I am expecting you see a profile then derivation of L the derivation of S okay.
What I have a 2 productions of S one happened here is that now I will say that I am expecting to see either derivation like this or I am expecting to see derivation like this okay now same thing

happens here that I apply this good then I say that I am expecting to see something the derive from L so therefore the 2 rules here and I say that I am expecting to see either this derivation or I am expecting to see this derivation.
And similarly with R I will say that it is only one option of R and therefore and I am expecting to see this derivation okay and this is have already taken rosier of dot L I do not have anything to do with this so this is the first five sector which is coming from the fuser of the first Ella o item I have in my grammar which is in progress okay now what I have to do is I am playing this effect and what are the symbols on which what are the grammar symbols both terminal and non terminal on which I can do a transition of I C.
So let us look at each of this symbol and feed the new states y starting of that symbols and we need a new state write translating of same symbol so if I look at the first symbol first symbol I see is that I can do a transcription of S if I do transcription of S that say that if marinate state I show that a transcription of S that is into a new state a new state corresponds available between S that is the rule.
Now is there any other rule any other elavent that agree the transcription of S that will give me I that can I do concession of L in go to I, L and let me call this set as I2 now what are the rules what are l and R item say which I can do it from the issue here nearly I can do this concession right anything I else I can add here so if I look at this particular enough item here also I can do a concussion of L okay.
Now I will say that R is to L okay nor I can say fusion because this is a terminal symbol there is not going to be any rule corresponding to this therefore I cannot activate the rules now I say let me again go to I 0 and say what are the other symbols on which I can do transcription another symbol I can do transcription is R if I try to do this symbol of R I will get it I 3 this is S going to be R dot anything else I can add here.
If I say now that will be fine in go to of I 0 and I do a transcription on star and we will get I 4 okay what does this give me I am going to L go to star dot R now if I take fusion of this I am going to look at all the production of R here the production of R here is R is going to dot L which is the production of R if now I say the production of L because of this requesting to take all the rules of L therefore I will say there are only 2 rules to responding when we say that L goes to star R and L goes to ID that is top in the define code.
And this I have already name this is I 4 okay so I could have done in this condition what about ID and I can also move the transcription on ID and I say that if I say that go to of I0, ID that is going to give me L going to ID dot in the three and name this as I 5 now it is not going to give

me anything more in so again I will do the transcription L but L is already being given in this state si I have the existed I right.
In I 0 I cannot do any work on this on I 0 on various number symbols I can either go to one two three four five clear si I existed I 0 I move on to I 1 then I took transcription of any symbol of I 1 nothing right what about I 2 I will just do it on this state let me say that on go to of I 2 and equal and I will call it I 6 this gives me S go to L equal to dot R right and now I have to tale a fusion okay.
That it means I look after all the productions of R , R is means portal because of this L I take one more round of portals that I say L goes to dot star R and L goes to dot ID right okay I cannot do any transcription on this state okay on this item I can say L R goes to L dot anything else I can do only the reduction if I move on from this so I 2 is gone I 3 I cannot do this version what about I 4 I can do this Transcription on this so now in can conclude.
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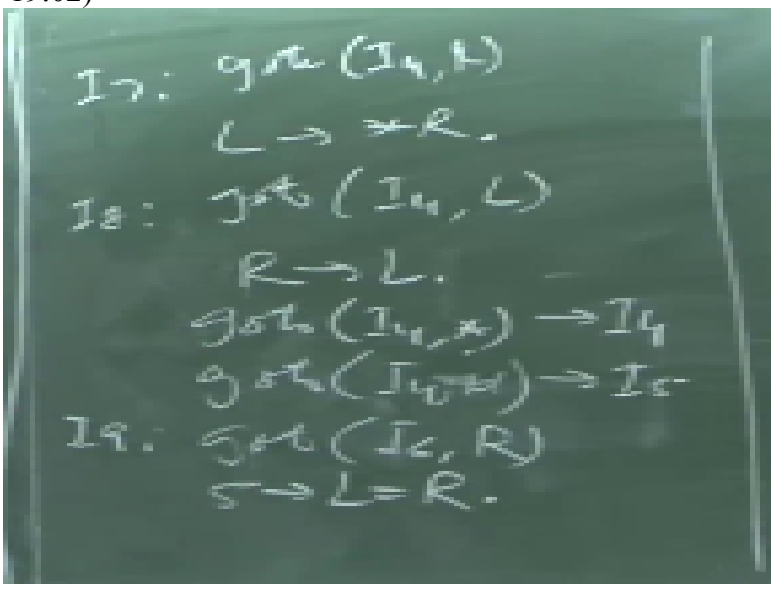

Go to of I4 of this construction is mean into start R dot right anything else this is only symbols this only place R is only right of Dot and if I now take something comes this is here I stopped okay, now if I try to do go to of I4 so let me call this as I7 are if I try to compute go to of I4 on L what is that meaning R going to be L. where is I2 someone is saying I2 inside whether two sets are equaling are not a sub-set or the full set.
Okay if I do this, this is going to give me R l. Does this exist anywhere do no right so let me call it has again okay an then I can do position on start so if I now do to of I4 on start or what is that meaning that is I4 okay new words added I just add this is I4 and if I now say that go to of I4 on

ID what is that I5 right that it be I5 so we will see that I am already sort close to convert more states I5 I cannot by any transition what about I6 okay.
So I6 if I do a transition a R let us go to 2 of 6 and the transition of R what is that give me that is be concluded already no, so that is going to be S going to LD. And let me call this as final, okay now you can see that the no other rule on which I can go a transition on R this is only excited this is nothing on the right of dot more so finish here, now if I say I compute throughout remaining items.
I am not trying to compute go to of I6 on L what is that meaning that is be R going to L. what is that I8 and if I now say ,So if I now say in i6 I do a transition on stock so if I say go to a I6 and start what is that meaning I6 very good and ten if I do it position non I6 small ID and I say go to I6 or ID that was be already within here I5 ,and I6 is the I cannot move transition here I cannot say transition here right I cannot haven okay now contract the parse table okay is we need to do we to all the symbols and all the states so what are the terminal symbols I have ID half and equal okay.
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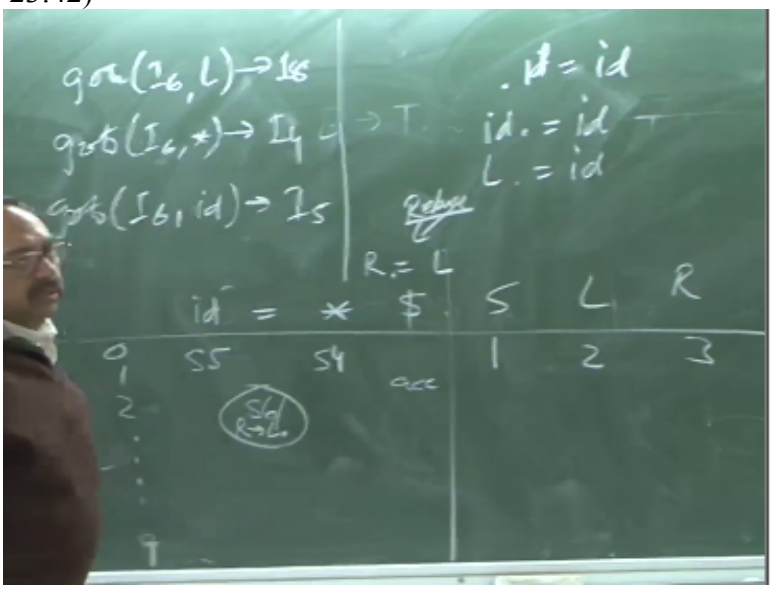

So I have ID it was start and dollar which forces symbol and terminal symbol, at no okay this is action part and what is the go-to part to be S right terminal and non-terminal that is it how many sates you have 10 states index form and group line those are the states okay this is meaning while this is part reduction part sorry S ′ is not variable this is no need .Because this reduction is only giving me an exact state.
I cannot move a transitional expect is there any state in which I can go transition on the in which I can do a combination of expect that is the unique start symbol on the right hand side so you can

clearly see that in state 1 if I see dollar there is X so state 1 dollar is what are the rules we had for construction of the parks table the rules of the construction work that if I am in some state and I do a transition on transition on a terminal symbol .I
go to a new state then the NP is going to be shift and then go to the new state okay, so for example here if I see this is in 0 if I see start and will before shift in 0 and if I mean you know can I see ID then I say shift go to say 5 so and into if I see s then I go to state 1 so that gives me an NP go to part 1 which is 1 and if I am in state 0 and I see L that takes me to true and if am in state O and see R then I go to state 3 in state 1 in state 0 is there any reduction which is possible is there any rule in which body to the right close position.
So P 0 will not have any reading section right ϱ corresponding to this is when you have only one entry and that entry will do we accept state all the symbol which is all of s ′ that is what except okay before we can make reduce entries you also need to compute the follow set I am not going to do that computation for you just try to do that computation let us go to this particular state so the root 2 or ϱ number 3 of this table this thing if I see equal AI2 so look at I 2 equal to state 6 right.
So if I mean I go and I see equalized a shift and go to state 6 okay but now this who has also reduction. I know what are the four symbols of R and corresponding to two and the symbols occurring follows at the path as they reduce by a soon and let us say this rule if I start counting from here if this is 1 2,3,5, and so this is rule number six I will do this reduction okay on Ziggler's recurring 404 now let us find out what are the symbols we follow okay was he looking for so if I say triangle s and F goes to R D and R goes to L.
Then L goes to ID then you have the strings we had some somewhere you can have symbol on right go R it is some sentence form a and equal is definitely one of those because you can see that if I have L here yet then corresponding to this I can say L goes to Sarah I can replace this and then equal will be follow and therefore in state 2 I will do a reduction by this rule and.
I am calling is what are the rule R going L dot okay now I have a problem, what is the problem I have one people entries in my past table and that will be shift now beyond this point you go ahead and construct the sum the entries at least if have understand how to get ideas and getting IP’s single exercise to okay but if I want to move I get into this place and say that I have I choose to use one okay now when I say I have a shift reduce the water that mean what that means is that either my languages.
I find if it is and be worse and therefore I construct part of the what I say that and enough answer for that or I say that is not that is not powerful enough and therefore is not in the talk this

power is not in the task at all okay, so let us try to figure out that what is going to know so let me keep this item for you let us take a string in this let me string ID =ID now first let us find out whether this is the galaxy in the diameter half so I can start the derivation from here it S goes to L sign R now L can go to ID here.

So ID can come there as closed position and R I can go to L and L can go to ID so there is valid string in the language right okay, suppose I try to move over shift reduce parser on this what will happen in shift reduce parser will begin with my god will give in this position caucus in this position or possibly that will happen I need do a shit and by shifting I will be a shift now once I reached here what is it that I can move it I D the only thing that ID with I can covert with this into L.

So I you reduce section there and a new section we seen our configuration shift parser you can see that L sign ID is valid language effort now from this point onwards what happens is now we have reached actually the situation I am in this day they are saying that if I am in this state ,I can either shift or I can reduce suppose like a option of reducing it because equal is in form of n are equal in the form of R so and therefore as the handle and I can do this reduction and that is going to give me a configuration.

Which is this by suppose, I can reduce, I can taken a shift because option are so let me simultaneously and let me erase this part okay if I now shift this is make a form.

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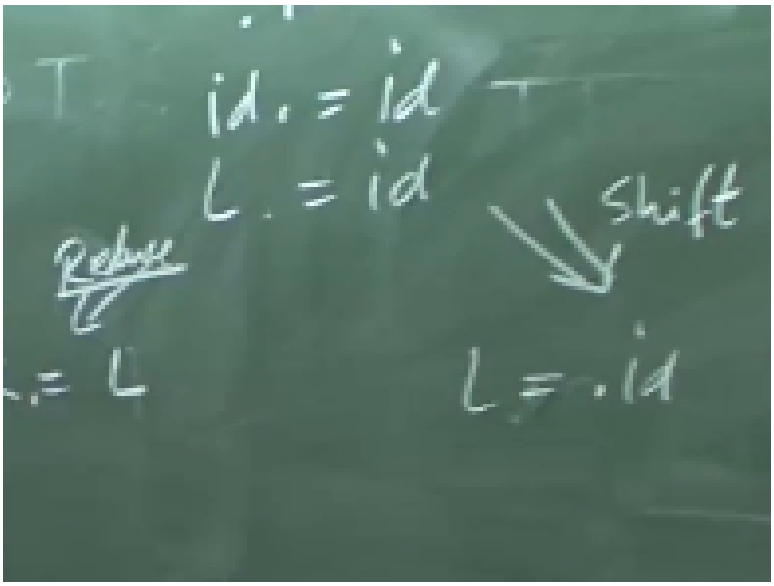

Which is now when I say that I have done a reduction look at here what are the next thing I can do now you can see that here R is on the right hand side of production but if I do this reduction that mean S and from S I goes to S ′ okay and that will be to only thing I can do that here is after

this particular thing I can only do a shift but interesting now here going to get most thing is going to say that here, the state I gave what are the substance.
I mean so all the states when I say I have the set of items I2 and I8 are not the same they have different sets ,so what so that is what grammar okay you are saying that from here I can conclude that I hope without constructing people that I have a shift reduce so you are saying that from here I can conclude that I hope for certain people that I should produce concrete here because that you think is not possible it is also possible that your grammar has not been written properly and then put if I change the form of the number then it is possible with the seller right .
So I am saying here two possibilities one possibility is that the grammar is in the form which is not in SLR or we say grammar as such does not matter whatever grammar former you write for this language that you will never able to pass with the self so what I am doing here is I think that this when I do a reading section here I am actually doing the wrong to do section I should have done a shift because this is not the grammar which is ambiguous this is ambiguous language and here.
And therefore I am saying that SLR parsing method of the problem and not the form of the because if I say my language is not any ambiguous I have some language is an ambiguous for this and that is what we are saying language is an ambiguous but SLR of course it is not popular if I say language parse does not matter technique this point clear you have to so what happens here introduce of reduce if I had a shift is that I will continue and I will reach the start symbol okay.
So what is the problem with receives now response and see that is there a possibility or some sentential form in this language which starts from R on any comes with a sensational form which is variable from S5 and which starts at the beginning followed by equal although ID sign ID is a valid string but this is hitting me a sentential form which is saying that somewhere are is understand therefore R=L is so do I have a valid sentential form like R=L language and I derive R=L starting with .
That means that the problem is because this review section is wrong so this is leading to an incorrect sentential form whereas shift will take me to all the right hand side forms and I go that this grammar is this particular method when I say reduction is happening that wrong sensational form shift I could have gone okay so that means in this sate this reduce action should not happen okay when I say that I am reducing here.
I am reducing here this reduction should not be there because this reduction take me to end state which is giving me in non-sequential form or if an valid sensational form if I somehow can

eliminate this the reduce from here my job is done right, so let us take a break here today and the next class will do it from this point we try to see that what we break into this the powerful parser we have today problem.

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Camera

Ram Chandra

Dilip Tripathi

Padam Shukla

Manoj Shrivastava

Sanjay Mishtra

Editing

Ashish Singh

Badal Pradhan

Tapobrata Das

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Aradhana Singh

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Preeti Sachan

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Ashutosh Kumar

Light& Sound

Sharwan

Hari Ram

Production Crew

Bhadra Rao

Puneet Kumar Bajpai

Priyanka Singh

Office

Lalty Dutta

Ajay Kanaujia

Shivendra Kumar Tiwari

Saurabh Shukla

Direction

Sanjay Pal

Production Manager
Bharat Lal
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