निर्माण प्रबंधन (Construction Management) के सिद्धांत

[Nirman prabandhan (Construction Management) ke Siddhant]

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Lecture – 25

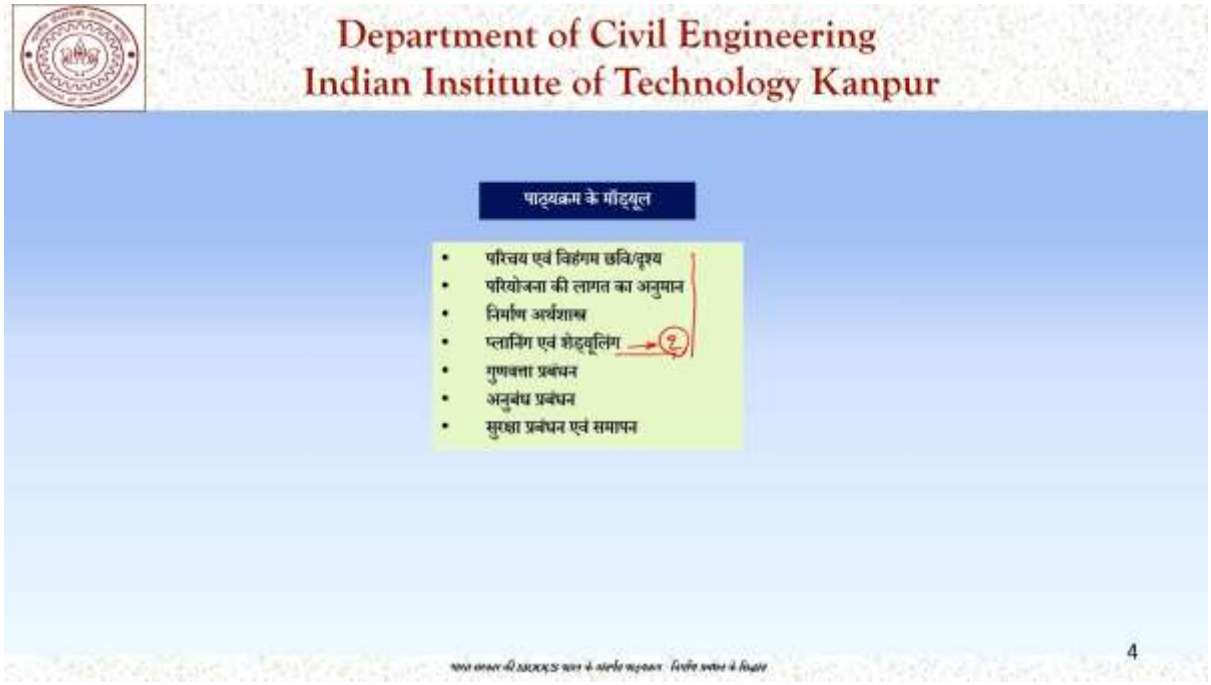
Module Nirmaan mein Gunavatta Niyantran

Namaskaar aur aapaka ek baar phir svaagat hai Bhaarat sarakaar kee MOOCS pahal ke antargat paathyakram Nirmaan Prabandhan ke Siddhaant (Principles of Construction Management) mein.

(Reference Time 00:23)

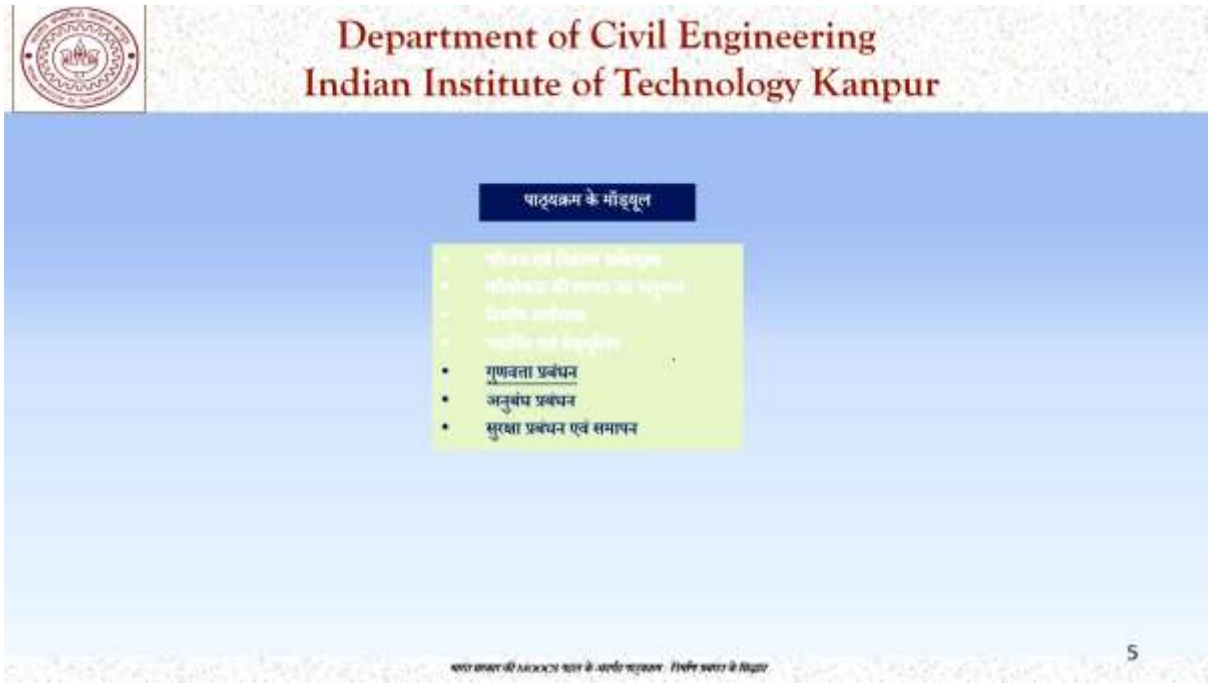
Aur aaj ham charcha kar rahe hain lecture 25 par. Jahaan par ki ham ek naya module nirmaan mein gunavatta niyantran par charcha aarambh karenge.

(Reference Time 00:34)



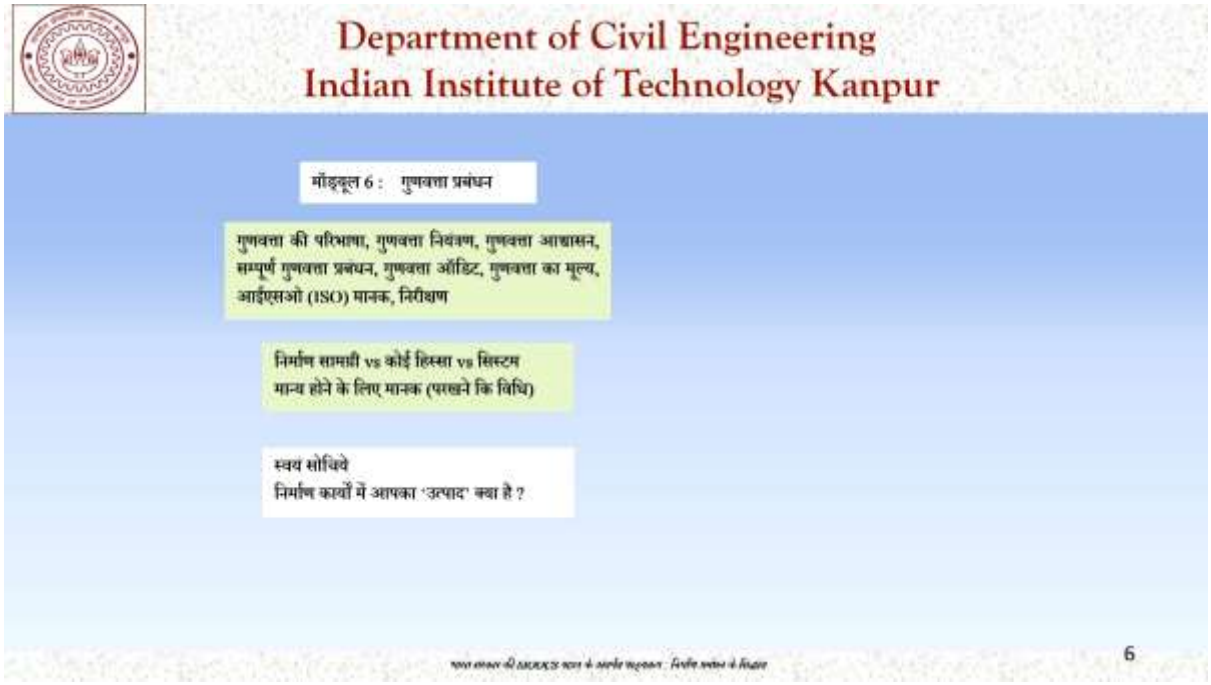
Ye list hai paathyakram ke jo module hain unakee aur yahaan aap dekhenge ki ye chaar module dikhae gae hain. Planning aur scheduling mein kyonki hamane do module record kiye.

(Reference Time 00:47)



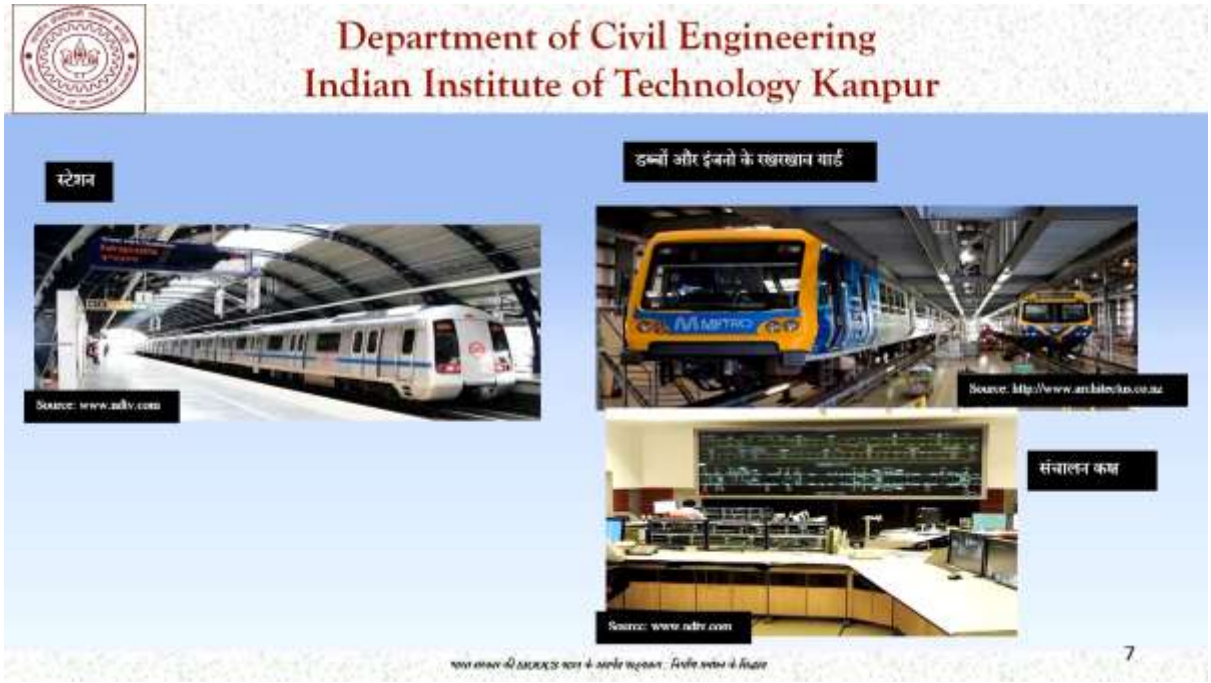
Isalie ab aaj jo gunavatta prabandhan ka hamaara module hai vah module 6 ho gaya.

(Reference Time 00:53)



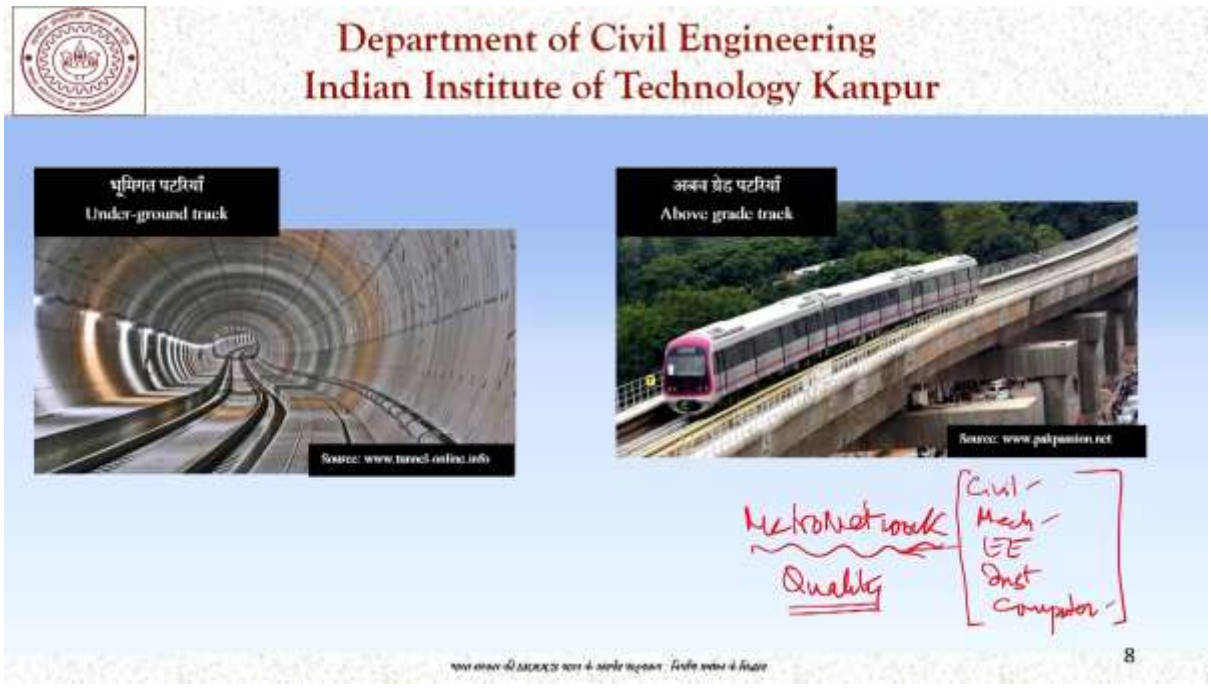
Module 6 jo gunavatta prabandhan ka module hai. Isaka introduction jab ham shuroo mein yah paathyakram shuroo kar rahe the tab yah slide use kee thee aur usamen hamane kaha tha ski gunavatta prabandhan ke antargat ham charcha karenge gunavatta kee paribhaasha, niyantran, aashvaasan, sampoorn gunavatta prabandhan (total quality management), audit, gunavatta ka mooly, ISO maanak evan nireekshan kee. Saath hee saath ek sankshipt charcha huee thee ki nirmaan kaary se jude gunavatta prabandhan mein nirmaan saamagree ek ghatak, member aur ek system in teen levels par charcha ho sakatee hai. Aur unako maany hone ke lie maanak hone chaahie jin par ki pareekshan hona chahie ya moolyaankan hona chaahie aur prashn yah tha ki hamaare nirmaan kaaryon mein utpaad kya hai? Product kya hai? Jisakee ki gunavatta kee charcha ham karana chaahate hain.

(Reference Time 01:53)



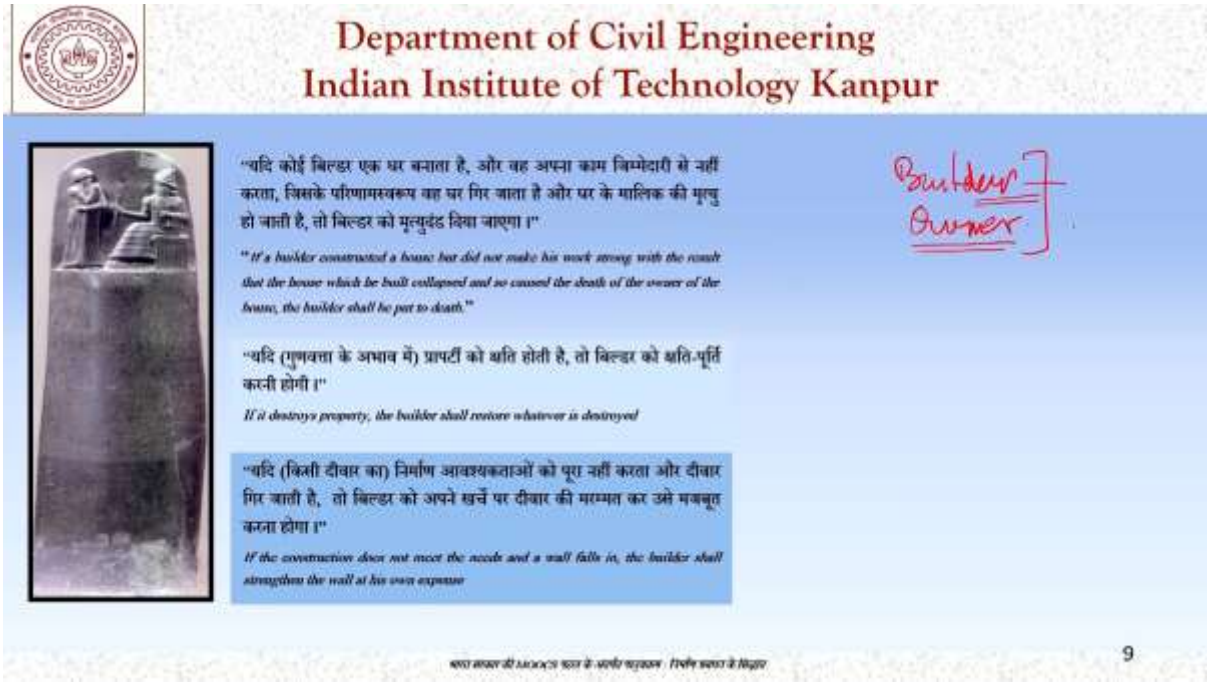
Yah slide bhee hamane pahale prayog kee thee aur yah darshaatee hai ek metro system ke parts ko. Station hai, dibbe aur engine ke rakharakhaav ke yard hain aur sanchaalan kaksh hai.

(Reference Time 02:10)



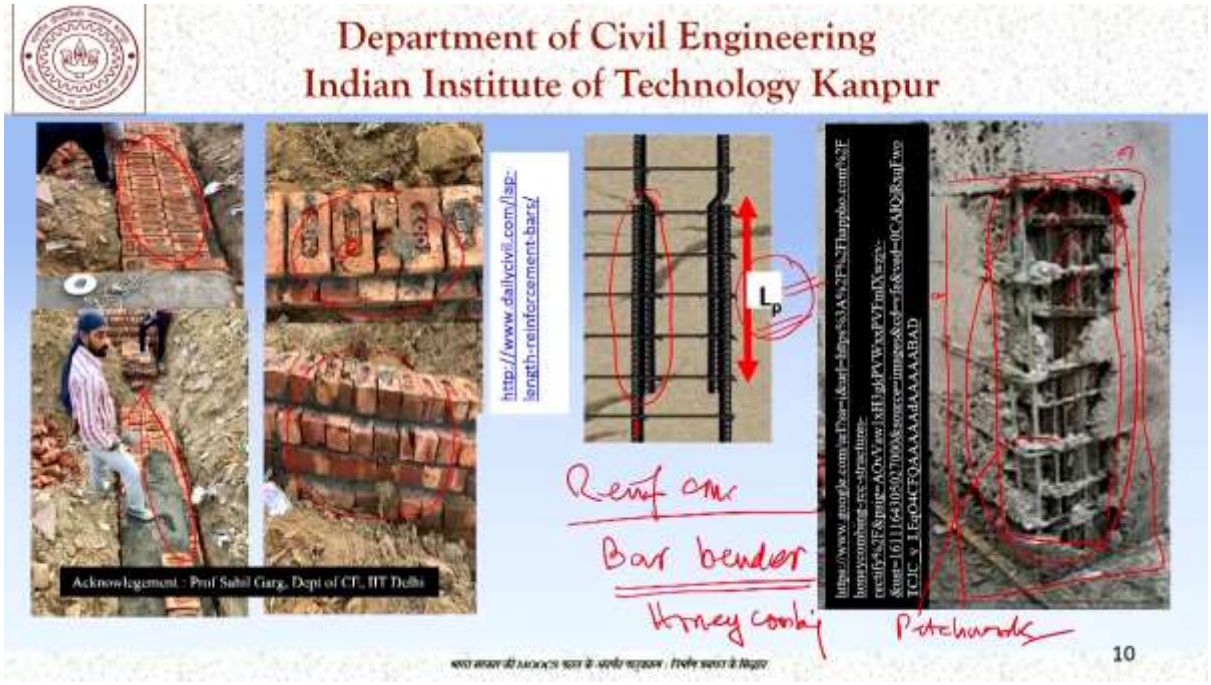
Isake saath hee yahaan par bhoomigat patariyaan ya above grade patariyaan hai, in sabako milaakar hee ham ek effective metro system ya urban transport system banaate hain. Isake nirmaan mein civil engineers hee nahin balki mechanical, electrical, instrumentation, computer aur tamaam any visheshagy judate hain. Vah apane-apane ghatak apane-apane components banaate hain aur ek total system banaaya jaata hai metro network ya metro line ka. To is tareeke ke network ya is tareeke ke system kee jab ham quality ya gunavatta kee baat karate hain to yah aavashyak hai ki ham civil, mechanical, electrical, instrumentation, computer in sabhee visheshagyaataon ko specializations ko ek water type compartment ke roop mein na dekhen aur unako integrated comprehensive tareeke se samajhane kee koshish karen. Yah baat tay hai jo mechanical engineer ka kaam hai kaarakhaane mein dabbon ka banaaya jaana; engines ka banaaya jaana usamen electrical engineering ka bhee part hota hai aur ve sab civil engineers ke banaaye hue tracks par chalate hain. To agar inamen se kisee bhee jagah truti hogee to vah system trutipoorn hoga, gunavatta kam hogee. Is comprehensive understanding ko dhyaan mein rakhate hue is module mein ham apanee charcha ko aage badhaenge.

(Reference Time 03:54)



Nirmaan kaary se judee gunavatta ka prashn naya nahin hai us samay bhee raja mahaaraaja tatha builders deal karate the aakhirakaar manushy kee rahane kee jo aavashyakata hai house yah bahut hee puraanee need hai aur usase jude hue tamaam prashn moolatah shaayad badale nahin hai. Us samay ka literature agar ham dekhenge to usamen is prakaar ke tablets dekhenge yadi koee builders ek ghar banaata hai aur vahaan apana kaam jimmedaaree se nahin karata jisake parinaamasvarup vah ghar gir jaata hai aur ghar ke maalik kee mrtyu ho jaatee hai to builders ko mrtyudand diya jaega. Ek aur tablet hai jisamen shaayad is baat ka ullekh hai ki yadi gunavatta ke abhaav mein property ko kshati hotee hai to builders ko kshatipoorti karanee hogee. Yadi nirmaan aavashyakataon ko poora nahin karata aur deevaar gir jaatee hai to builders ko apane kharche par deevaar kee marammat kar use majabut karana hoga. Us samay bhee ek builder kee baat ho rahee hai, ek owner kee baat ho rahee hai aur yah maana ja raha hai ki owner apana ghar ya deevaar ek builders se banava raha hai, aur builders kee jimmedaaree hai ki vah uchit gunavatta ka ghar ya deevaar banaaye. In tablets mein un maanakon kee poorti na kar paane par builders par kis prakaar kee penalty lagegee, usaka ullekh bhee hai. Ab penalty kitanee honee chaahiye, kitanee nahee honee chaahiye vo samay ke saath badalatee rahatee hai aur abhee bhee ham quality kisakee responsibility hai isakee charcha karate hain. Quality pooree na hone par kisako kis prakaar kee bharapaee karanee hogee isakee charcha karate hain aur yah sab baaten anubandh mein charchit hotee hain. To ham aage chalate hain aur aajakal ke nirmaan kaary mein jo gunavatta ke prashn hain un par charcha aarambh karate hain.

(Reference Time 06:03)

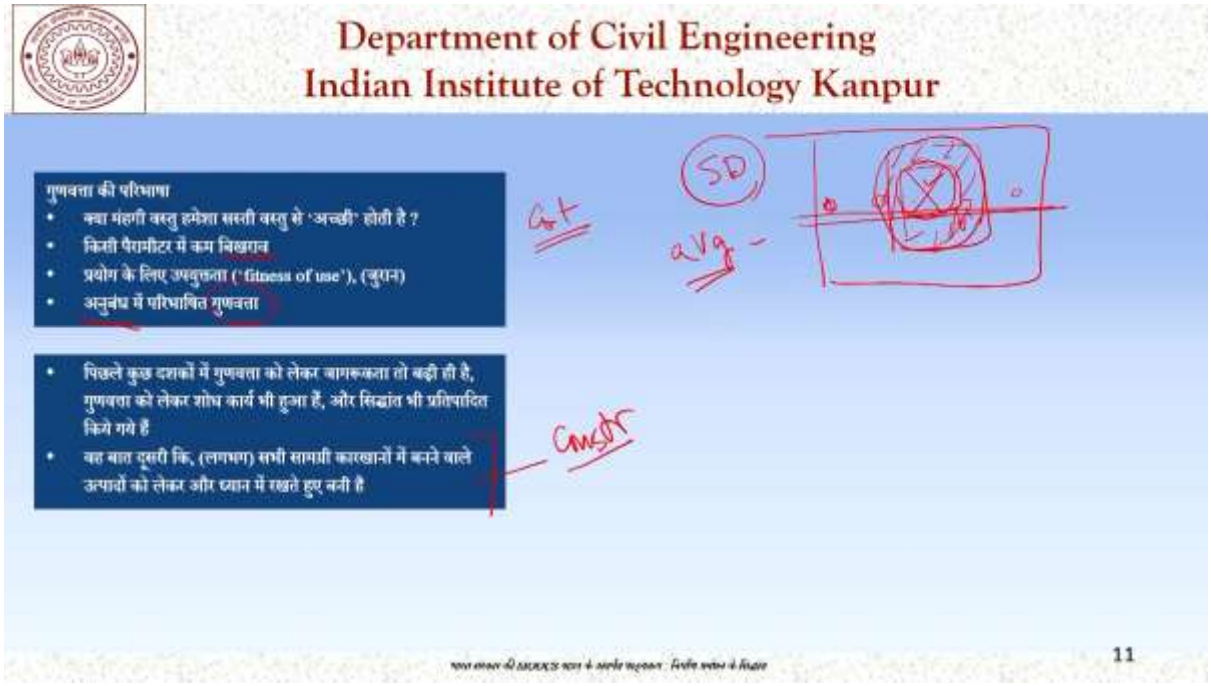


Yah chitr hai ek masonry work kee ki sambhavat: kaee kaaran hain jisase ki ye jo kaary ho raha hai yah bahut hee santoshajanak gunavatta ka nahin hai. Isamen do-teen baaten spasht roop se saamane aatee hain ki yah jo mesan hai kya isakee hee jimmedaaree hai? Aur kya yah prashikshit hai? Aur ek bahut mahatvapoorn baat jo hamako samajhanee chaahie ki antat: yah neev hai aur kuchh der baad yah neev dhak dee jaegee yah badee kar dee jaegee aur yah baad mein pata bhee nahin chalega ya pata karana bahut hee mushkil ho jaega ki yahaan par neev kee gunavatta kya thee, what is the quality of the work done in the foundation. Yah baat gunavatta ke sandarbh mein charcha karate samay hamesha dhyaan mein rakhanee chaahie ki civil engineering mein nirmaan kaary mein gunavatta ke kaee parameters aise hote hain jo kee aankhon se ojhal ho jaate hain aur usake baad unakee charcha kar paana ya unaka moolyaankan kar paana bahut hee mushkil hota hai.

Ek aur udaaharan hai jahaan par ki ham dekh rahe hain reinforcement bars mein lap length ka. Design mein is diameter kee sariya ko oopar se lekar neeche tak lagaane ka praavadhaan hai lekin sariya kee lambaee kam hone ke kaaran yah ek lap length lagaane ka praavadhaan hota hai. Yah lap length kitanee honee chaahie yah bhee code mein diya hota hai, lekin antat: yah reinforced concrete work hai aur isamen hajaaron sariya hongee aur hajaaron lap joint honge har lap joint kee gunavatta yadi ham usakee is length se maapate hain to yah sunishchit kar paana ek engineer ke lie nireekshan dvaara ki un hajaaron sariyon mein yah lap joint kee jo requirement hai vah pooree kee gaee hai yah lagabhag asambhav hai, to hamen kya karana chaahie? Yah aavashyak hai ki jo bar vendor hai jo ki sariya ka kaam kar raha hai usako is lap length ke mahatv ke baare mein pata ho aur vah yah sunishchit kare ki har lap length jitanee honee chaahie utanee avashy hai. Sankshep mein quality engineer ka hee nahin balki nirmaan kaary se jude har vyakti ka daayitv hota hai. Ek aur udaaharan aap dekhie vah hai reinforced concrete ka hee construction work. Jahaan par ki yahaan aapako dikh raha hai ki concrete jo ki chaaron taraph aa jaanee chaahie thee vah nahin aaee hai. Yahaan par ya yahaan par to sariya chhip gaee hai yahee baat mainne kahee thee ki jo reinforcement work hai vah concrete ke andar chala jaega. Yahaan par concrete na pahunchane ke kaaran kuchh bhee ho hamen is prakaar ka nirmaan kaary maany nahin hota, acceptable nahin hota hai. Is tareeke kee honeycombing dekhe jaane par yahaan par ham patchwork kar dete hain aur jo vistaar hota hai construction ka, usamen is prakaar ke patchwork shaayad aakhir mein pata

bhee nahin chalate lekin antat: vah poore construction kee gunavatta ko to kam karate hee hain. To aaiye is backdrop se ham apanee charcha aage badhaate hain.

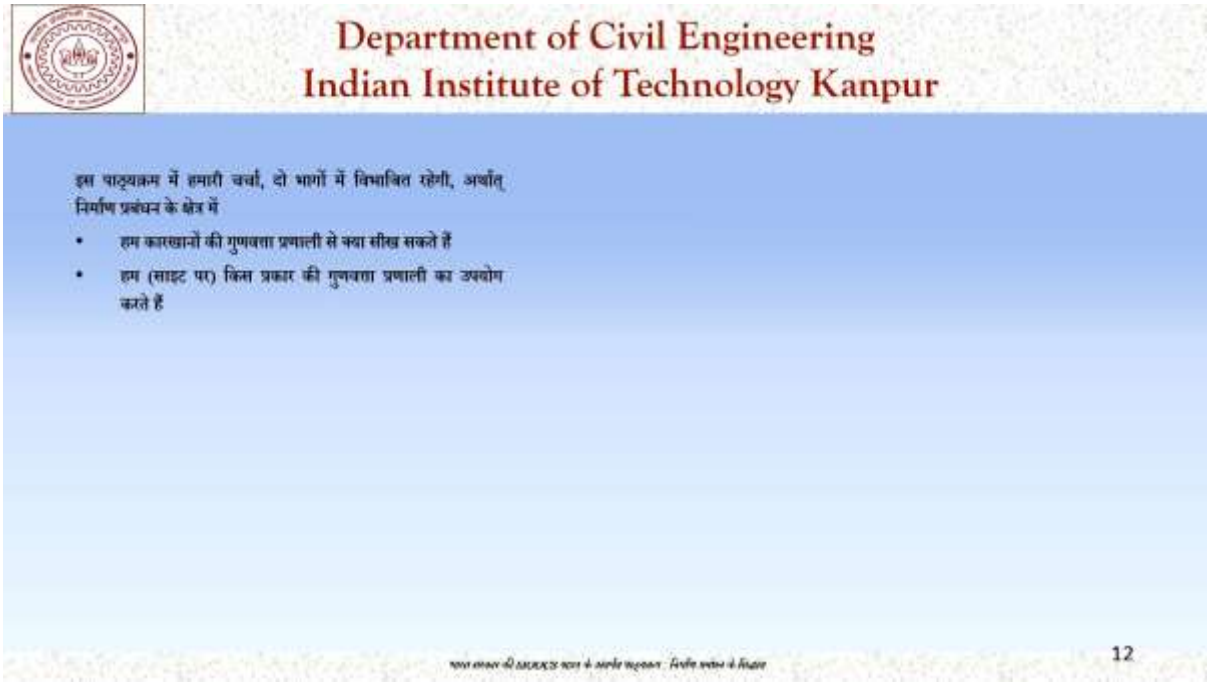
(Reference Time 09:48)



To gunavatta kee paribhaasha nirmaan kshetr mein kya honee chaahie kya mahangee vastu hamesha sastee vastu se achchhee hotee hai, kya usakee cost ek gunavatta ka parameter maana ja sakata hai, kisee parameter mein kam brickwork consistency in values yah bhee gunavatta ka ek parameter hai. Agar ham chaahate hain ki ham is jagah par lagaataar nishaana lagaayen, to yahaan par nishaana lagaana to sabase shreyaskar hai lekin yah aavashyak hai agar yahaan nahin laga pae to kam se kam usake aasapaas ke kshetr mein to lagaayen hee. Yadi hamaara nishaana is kshetr ke ird-gird rahata hai to ek baat hai, lekin agar ham ek bada bhaaree vistaar le lete hain aur kabhee yahaan nishaana lagaate hain, kabhee yahaan nishaana lagaate hain, kabhee yahaan lagaate hain to hamaaree quality kharaab hai. To jo bikharaav hai jisako ki ham statistics mein standard deviation kahate hain, standard deviation kam hona chaahie. Average value ka adhik hona hee gunavatta nahin hai. Standard deviation bhee ek bahut hee mahatvapoorn parameter hota hai. Prayog ke lie upayuktata (Fitness for use) yah ek paribhaasha hai jo ki juraan ne dee yah bhee ek maany paribhaasha hamaare lie ho sakatee hai. Lekin antat: nirmaan kaaryon mein gunavatta anubandh mein paribhaashit kee jaatee hai. Contract mein kis quality ka work hona chaahie yah likha hota hai aur un maanakon ko poora karana us project kee gunavatta ka maanak maana jaata hai. Yah hamesha dhyaan mein rakhana chaahie ham sankshep roop mein aage charcha bhee karenge ki gunavatta ke saath ek cost judee hotee hai to jo thekedaar hota hai ya contractor hota hai vah use level kee gunavatta ko dhyaan mein rakhate hue cost quote karata hai agar gunavatta mein adhik chaahie to cost thodee bahut badhatee avashy hai. To yah hamesha dhyaan mein rakhana chaahie ki antatah kyonki anubandh ke maadhyam se hee client aur thekedaar jude hue hain isalie anubandh mein gunavatta kis prakaar se paribhaashit hai aur kya vah bhaasha sampoorn hai. To aage badhate hain pichhale kuchh dashakon mein gunavatta ko lekar jaagarookata to badhee hee hai gunavatta ko lekar shodh kaary bhee hua hai aur tamaam siddhaant bhee pratipaadit kie gae hain. Vo baat doosaree hai ki lagabhag sabhee saamagree jo kee quality literature bana hai, kaarakhaane mein banane vaale utpaadon ko lekar aur

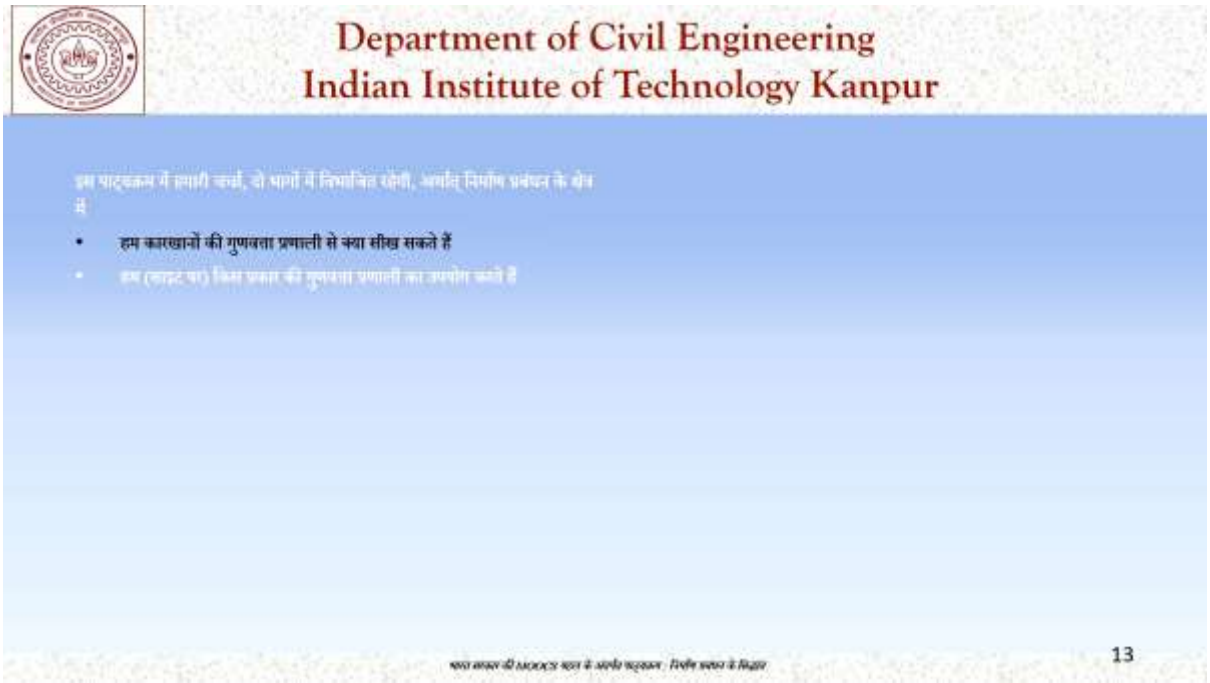
unhen dhyaan mein rakhate hue banee hai isase ham construction industry mein ya nirmaan udyog mein kya seekh le sakate hain yah hamaare oopar hai aur ham isee baat ke aadhaar par is module mein apanee charcha ko aage badhaenge.

(Reference Time 12:53)



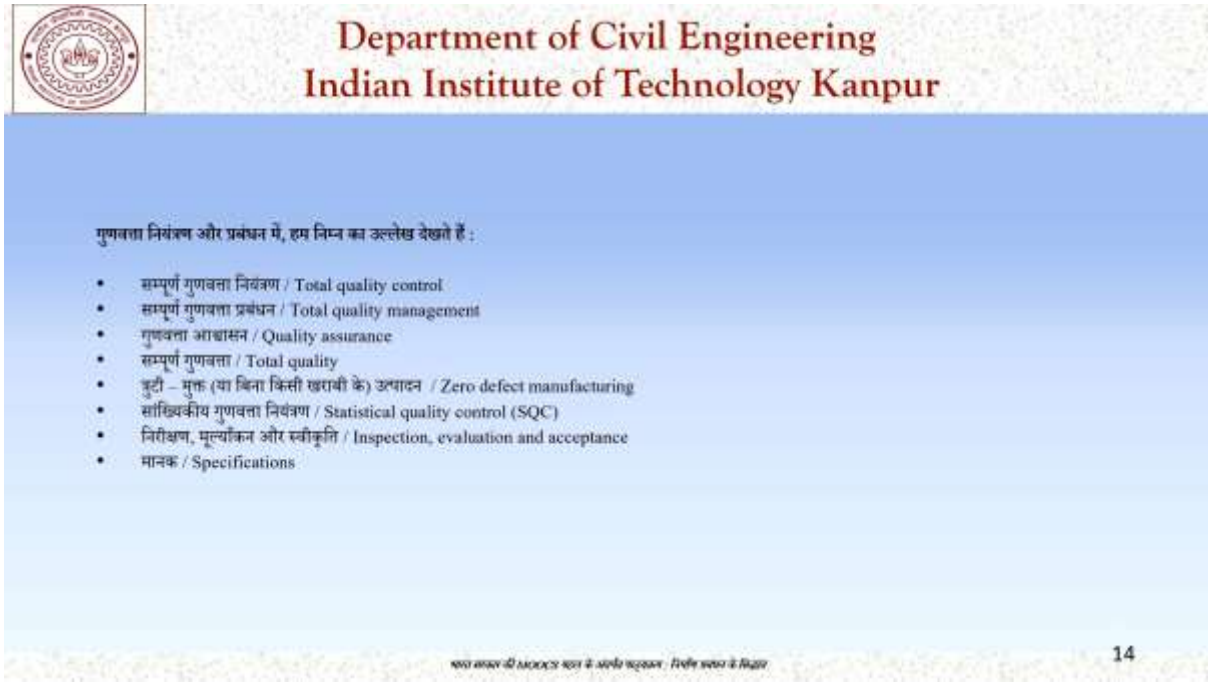
Is paathyakram mein hamaaree charcha do bhaagon mein ya do levels par vibhaajit rahegee. Ek to nirmaan prabandhan ke kshetr mein ham kaarakhaanon kee gunavatta pranaalee se kya seekh sakate hain aur doosaree hai ham site par kis prakaar kee gunavatta pranaalee ka upayog karate hain.

(Reference Time 13:10)



To ham kaarakhaanon kee gunavatta pranaalee kee baat karate hain to ham charcha karana chaahate hain un siddhaanton kee jo ki kaarakhaane mein banane vaale utpaadon ko lekar pratipaadit kie gae hain.

(Reference Time 13:22)

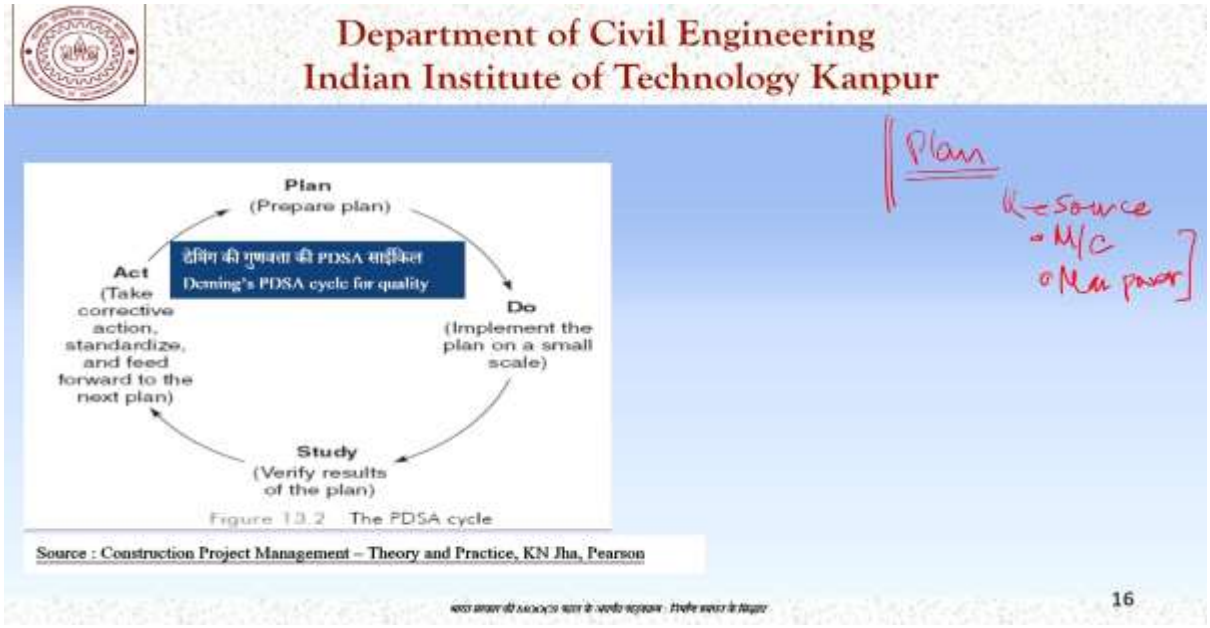


Aur is sandarbh mein ham is prakaar ke tamaam words, keywords dekhate hain. Total quality control (sampoorn gunavatta niyantran), sampoorn gunavatta prabandhan (total quality management) TQM, gunavatta aashvaasan (quality assurance), ab quality control aur quality assurance mein kya antar hai? Yah main aapake oopar ek homework ke roop mein chhod deta hoon. Total quality (sampoorn gunavatta), truti mukt ya bina kisee kharaabee ke utpaadan hona (zero defect manufacturing). Saankhyikeey gunavatta niyantran (Statistical Quality Control), nireekshan, moolyaankan aur sveekrti (inspection, evaluation and acceptance) ka products, maanak ya specifications jinake ki aadhaar par ham gunavatta niyantran karenge.

(Reference Time 14:15)

Ek aur pahaloo hota hai jab ham total quality management ya sampoorn gunavatta prabandhan kee baat karate hain to usamen tamaam keywords hote hain. Jaise Management Commitment and Leadership (sheersh netrtv kee gunavatta ke prati pratibaddhata) prashikshan ya training teamwork, Statistical Method, gunavatta kee laagat aur Supplier Involvement. Kisee bhee product ke manufacture ya productionse jude har vyakti ka involvement total quality management ka ek abhinn hissa hai.

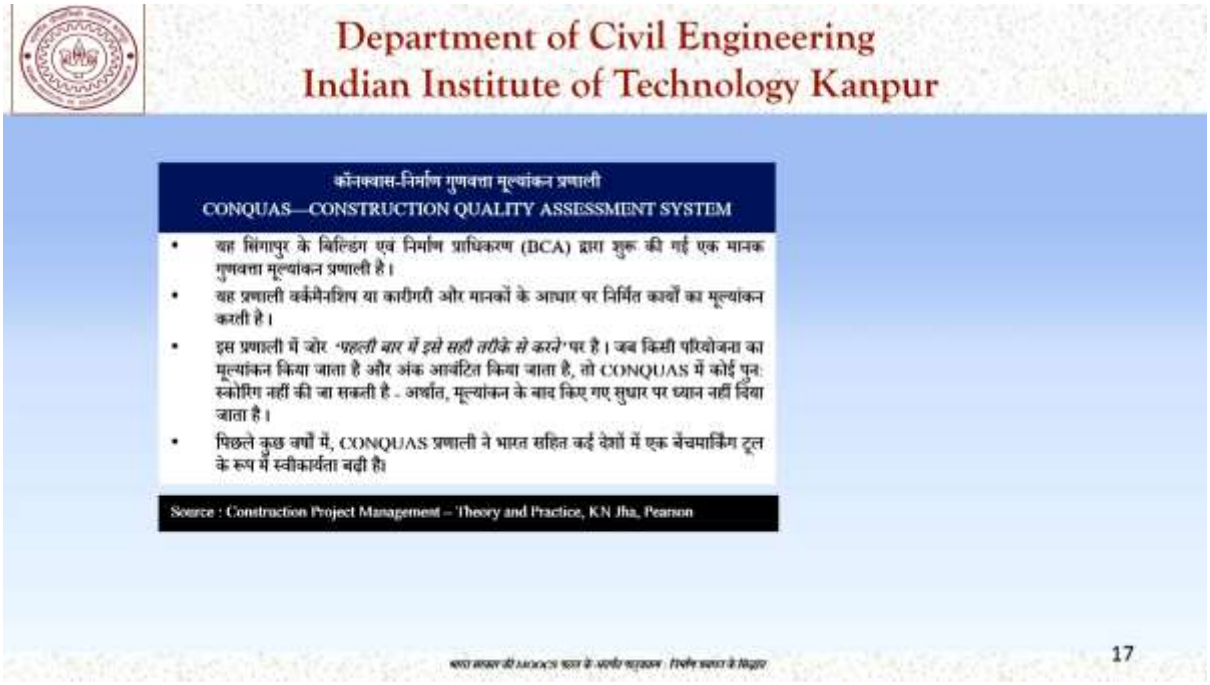
(Reference Time 14:49)



Kabhee baat hotee hai Deming's PDSA cycle for quality ke lie deming kee PDSA cycle yah hai Plan, Do, Study and Act aur vaapas se cycle aa jaatee hai act karane ke baad punah ek baar plan banaana aur niyojan karana. Yah hamesha dhyaan mein rakhana chaahie ki kisee bhee utpaad ko quality se banaana to ensure quality in a product, chaahe vah bridge ho chaahe vah ek pen ho usake lie plan karana bahut hee aavashyak hai. Hamesha pahale se sochana padata hai ki ham quality ko kis prakaar se sunishchit karenge usake lie hamen kya sansaadhan ya resources chaahie. Chaahe vah machines hon, quality control la ke lie hamen

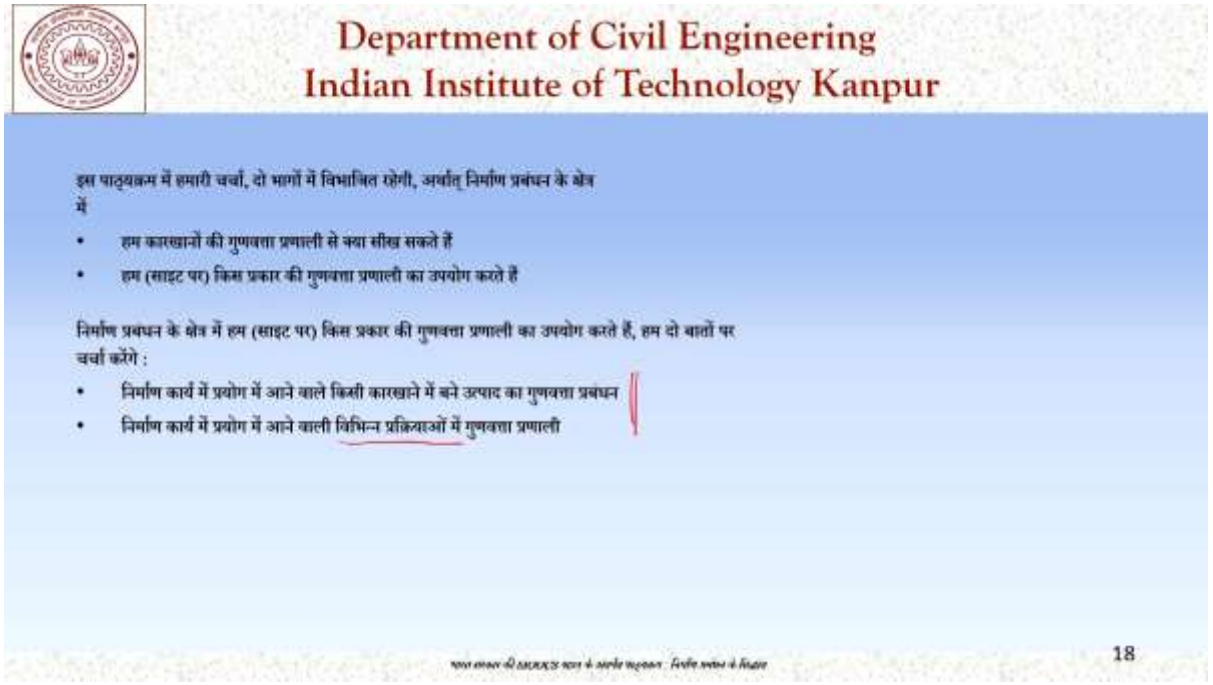
tamaam machines chaahie hotee hain upakaran chaahie hote hain aur ya hamaaree manpower ho hamaare jo quality nireekshak hai vah kis prakaar se train hone chaahie unako kya-kya cheejen aanee chaahie aur kya-kya cheej unako dekhanee chaahie. To jab tak ham apanee quality ka ek plan nahin banaate hain tab tak yah ummeed karana ki jab hoga tab dekha jaayega us prakaar quality sunishchit karana bahut hee mushkil hota hai.

(Reference Time 16:06)



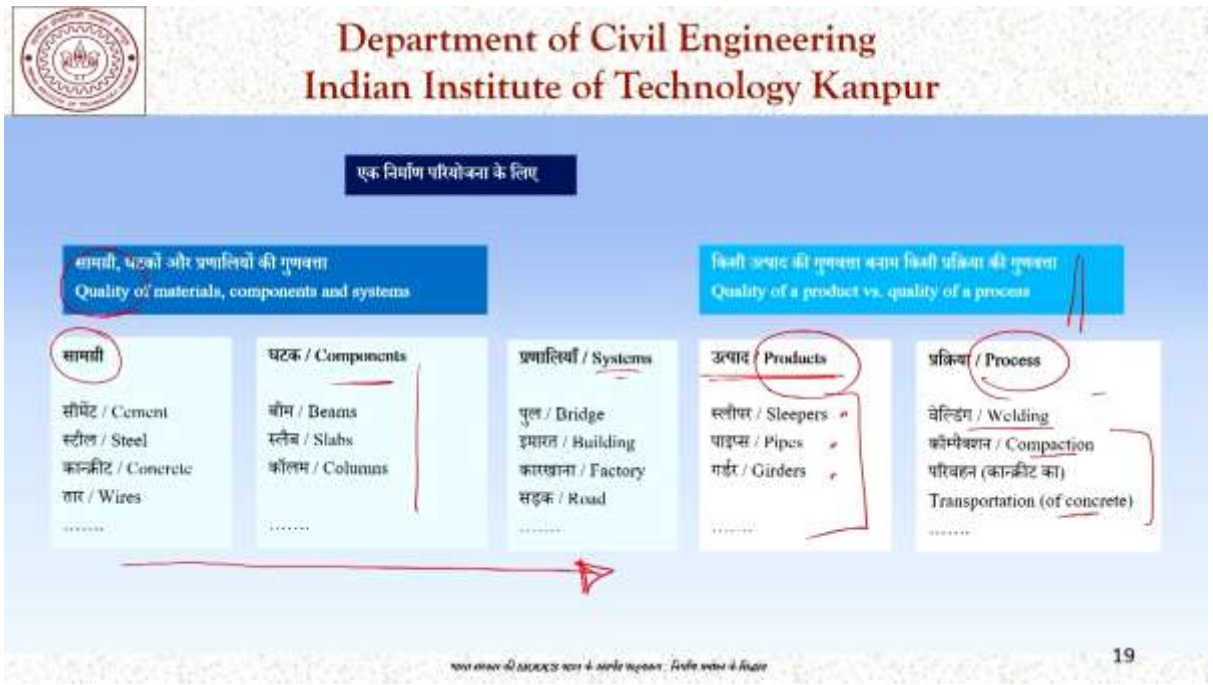
Yah baat nahee ki sabhee kuch literature maatr kaarakhaano mein banane vaale utpaadon par seemit hai. CONQUAS construction quality Assessment system ek udaaharan hai jahaan par ki kuchh cheej seekh kar nirmaan kaaryon mein quality ko kis prakaar se ensure kiya jae sunishchit kiya jae yah CONQUAS ek isaka udaaharan hai. Yah Singapore kee building evan nirmaan praadhikaran BSA dvaara shuroo kee gaee ek maanak gunavatta moolyaankan pranaalee hai. Is pranaalee mein workmanship ya kaareegaree aur maanakon ke aadhaar par nirmit kaaryon ka moolyaankan kiya jaata hai. Is pranaalee mein jor pahalee baar mein hee sahee tareeke se karana, do it right the first time par aadhaarit hai. Jab kisee pariyojana ka moolyaankan kiya jaata hai aur ank aavantit kie jaate hain to CONQUAS mein punah scoring nahin kee ja sakatee arthaat moolyaankan ke baad kie gae sudhaar account mein nahin lie jaate hain, jo product jis prakaar se bana hai usaka moolyaankan usee ke aadhaar par kiya jaega. Usake baad jo feedback diya gaya usako theek kar deejie kintu CONQUAS kee rating ya score nahin badalata hai. Yah pranaalee pichhale kuchh varshon mein bhaarat sahit kaee any deshon mein ek benchmarking tool ke roop mein sveekaar kee ja rahee hai kintu abhee bhee bahut hee limited scope hai shaayad bhavishy mein is prakaar kee pranaalee aur vikasit hogee aur tamaam nirmaan kaaryon mein isaka prayog dekha ja sakega.

(Reference Time 17:45)



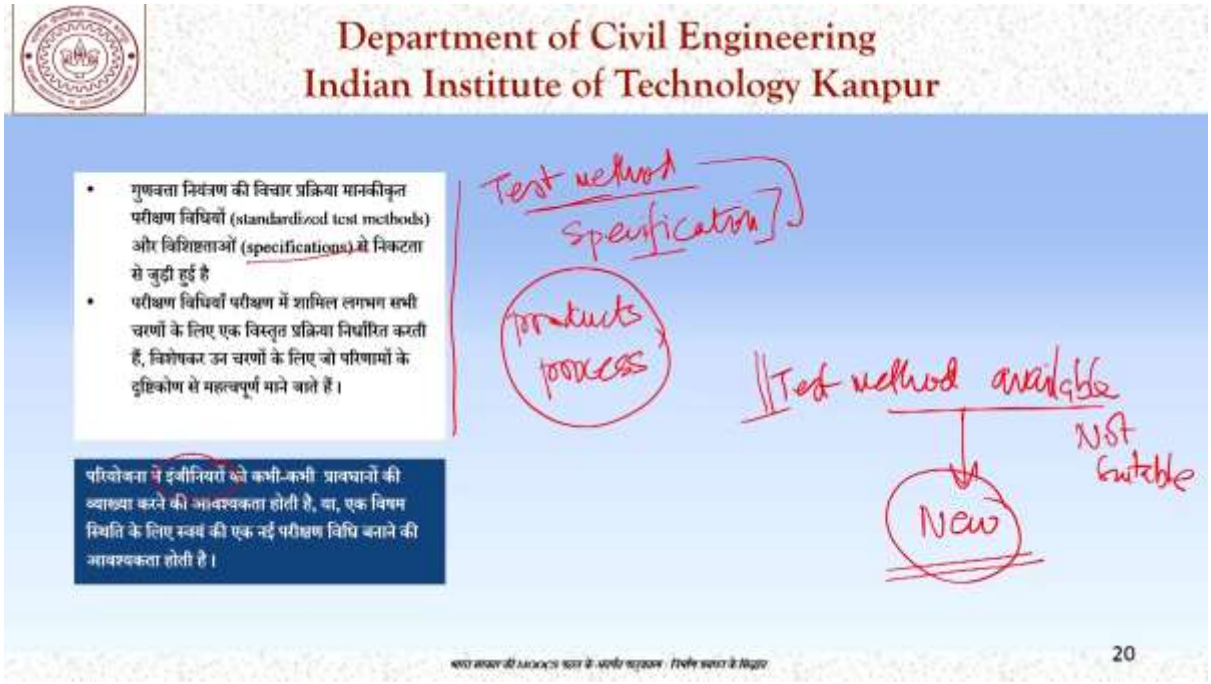
Hamane apane paathyakram mein apanee charcha ko do bhaagon mein vibhaajit kiya tha aur jahaan tak sait par gunavatta pranaalee ke upayog ka prashn hai ham do baaton kee charcha karenge. Ek nirmaan kaaryon mein prayog mein aane vaale kisee kaarakhaane mein bane utpaad kee gunavatta ka prabandhan arthaat un vastuon ka quality management jo ki kisee kaarakhaane mein bane aur hamaare nirmaan kaary mein use hue; jaise kee steel kee sariya hai, nal hai bijalee kee fittings hai aur ham sambhavat: isee tareeke se kaarakhaanon mein bane rail ke dibbo ka bhee treatment is soch ke antargat kar sakate hain aur doosara hai nirmaan kaary mein prayog mein aane vaalee vibhinn prakriyaon kee gunavatta pranaalee, vah prakriyaen ya processes jo ki nirmaan kaary ka ek abhinn ang hain. Unake udaaharan ham is lecture mein aage denge.

(Reference Time 18:46)



Ek nirmaan pariyojana ke lie ham sambhavat: do tareeke se aproch kar sakate hain ek hai saamagree, ghatakon aur pranaaliyon kee gunavatta (quality of materials, components and system). To materials kaun se hote hain? Cement, steel, concrete, wires and so on. Tamaam is tareeke ke padaarth hai jo ki ham nirmaan kaary mein prayog karate hain. Hamaare component kya hai Beam, slab, column, wall, railway track aur system kya hain? Bridge, building, factory, road ityaadi. To yahaan se lekar yahaan tak ham quality ko kis prakaar sunishchit karenge yah to hai ek soch ki ham sochen ki saamagree hamaare achchhe se achchhee saamagree ho, jo ghatak bane vah us achchhee saamagree se hee bane aur jo system banega vah in component se hee banega aur isalie achchha hoga. Aur doosaree baat hai quality of a product versus quality of a process, yah hamaare lie bahut hee mahatvapoorn hai. Jin products ka ham nirmaan kaary mein prayog karate hain jaise sleepers, pipes, gardar unakee gunavatta aur jo prakriya ham use karate hain jaise welding, compaction, transportation of concrete ya parivahan in products ka aur in processes ka in donon hee cheejon ke lie gunavatta ensure karane ke lie use sunishchit karane ke lie ek bahut hee standard aur aasaanee se samajh mein aane vaala procedure upalabdh hona chaahie taaki field par engineer usako follow kar sake ya jo quality engineer hai vah usako follow kara sake.

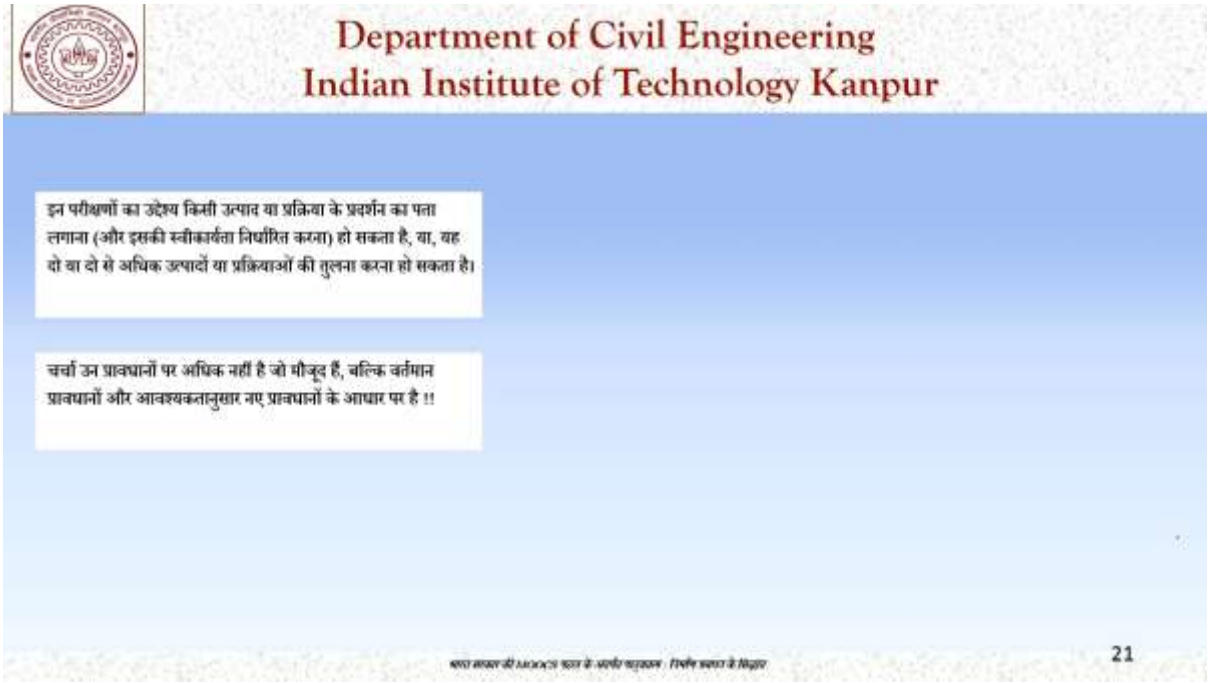
(Reference Time 20:33)



Gunavatta niyantran kee vichaar prakriya maanakeekrt pareekshan vidhiyon (standardized testing methods) aur vishishtataon (specifications) se nikatata se judee huee hain pareekshan vidhiyaan prashikshan mein shaamil lagabhag sabhee charanon ke lie ek vistrt prakriya nirdhaarit karatee hain visheshakar un charanon ke lie jo ki parinaamon kee drshti se mahatvapoorn maane jaate hain. Kaha yah ja raha hai ki tamaam test methods hai jo ki har method ke lie jo ki har utpaad kee gunavatta ko maapane ke lie upalabdh hai. Tamaam specifications hai jo ki us test method se aae result ka moolyaankan karane ke lie upalabdh hai aur yah test method, specification un sabhee products ya processes ke lie hone chaahie jo ki hamaare nirmaan kaary ka ek abhinn ang hai lekin pariyojanaon mein engineers ko kabhee-kabhee praavadhaanon kee vyaakhya karane kee aavashyakata hotee hai ya ek visham sthiti mein svayan ek naee pareekshan vidhi banaane kee aavashyakata bhee ho sakatee hai. Kisee engineer ko is baat se dar nahin lagana chaahie ki jo test method upalabdh hai,

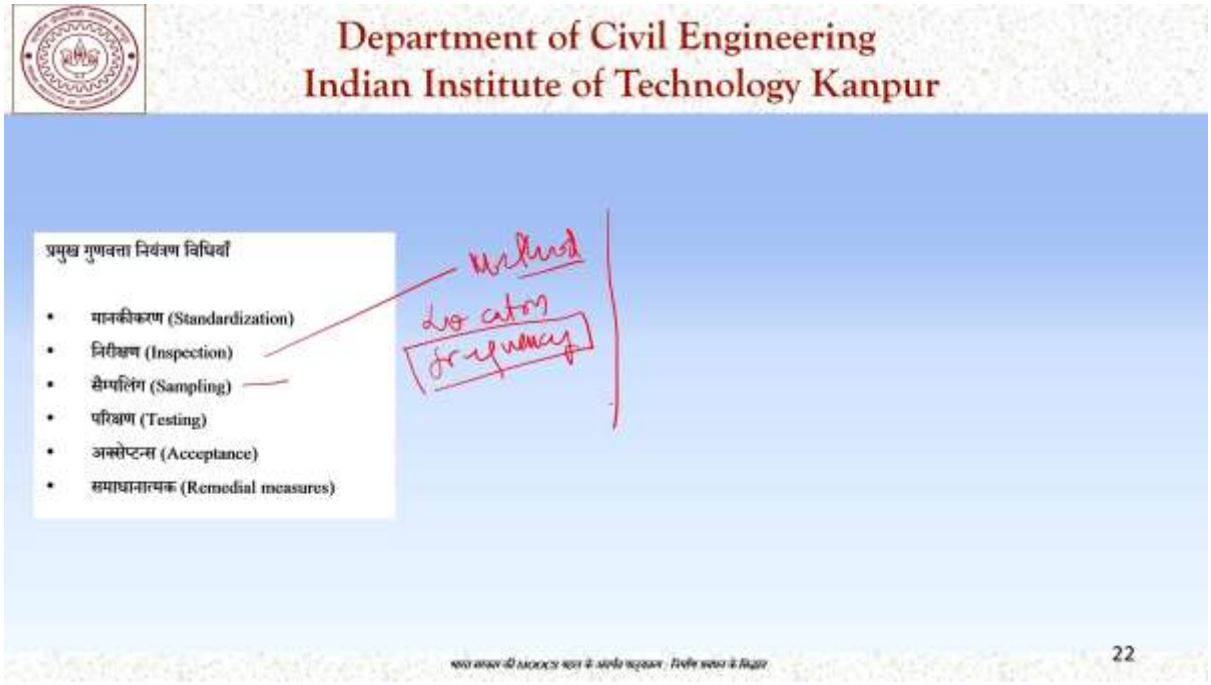
available hai vah hamaare lie yadi upayukt nahin hai (not suitable hai) to ham ek naya test method isake aadhaar par banaen lekin yah svatantrata tabhee use karanee chaahie jabaki vaastav mein us test method ko use nahin kiya ja sakata hai. Yah svatantrata sabhee ko nahin dee ja sakatee hai usako exercise karane ke lie administrative control bahut hee aavashyak hai aur yah baaten sheersh netrtv par hee chhod denee chaahie, lekin usase darana nahin chaahie ki ham kisee na kisee tareeke se existing test method se hee kaam chala len isakee aavashyakata kadaapi nahin hotee hai. Is module mein kaee aise udaaharan die jaenge jahaan par yah darshaane ka prayaas hoga ki jo existing test methods hain jo soch hai vah vishesh sthition mein kaam nahin aatee hai.

(Reference Time 20:33)



Jab ham pareekshan kee baat karate hain to pareekshan ke do uddeshy hote hain ek to yah doosara hota hai utpaadon ya prakriyaon kee tulana karana is baat par ham ek agale lecture mein charcha to avashy karenge kintu hamaaree charcha is poore module mein is baat par nahin hogee ki kis prakaar ke praavadhaan upalabdh hain ya maujood hain balki is baat par hogee ki vartamaan praavadhaanon aur aavashyakataanusaar nae praavadhaanon ka aadhaar kya hoga. Jo existing provisions hain vah to aap kitaabon mein svayan padh sakate hain aur yah apekshit hoga ki aap unako svayan padh len. Jo aadhaar hain un praavadhaanon ke un par charcha kendrit rahegee.

(Reference Time 23:30)



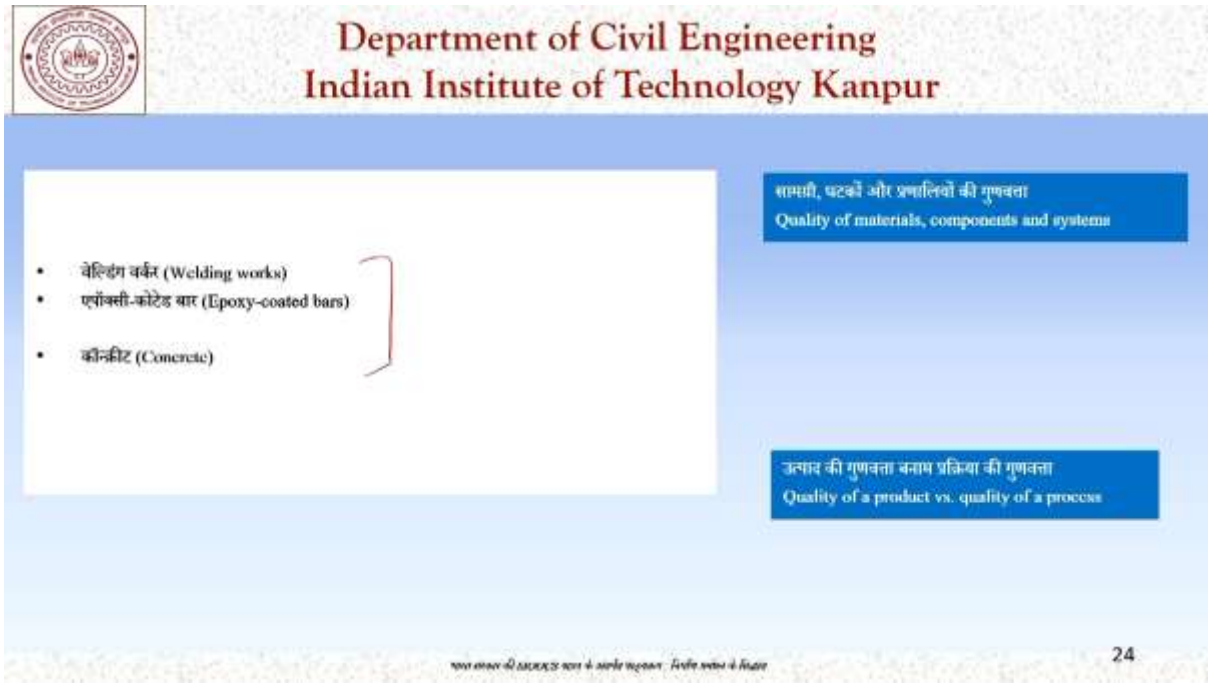
Jo pramukh vidhiyaan hamaare gunavatta prabandhan mein dekhee jaatee hain vah hai standardization ya maanakeekaran, nireekshan, sampling, pareekshan aur acceptance criteria aur saath-saath samaadhaanaatmak arthaat remedial measures. Jab sampling kee baat hotee hai to frequency and location. Jab inspection kee baat hotee hai to method. In sab kee charcha avashy honee chaahie aur isee baat ko dhyaan mein rakhate hue ham aage ke lectures mein is material ko cover karenge.

(Reference Time 24:04)

Ham aapako ek homework dena chaahate hain. Nirmaan udyog se kuchh vishisht keywords ko uthaen aur unaka gunavatta kee drshtikon se vishleshan karen ham sabhee ne nirmaan kaary se jude tamaam processes ko dekha hai unake utpaadon ko dekha hai welding, epoxy coated bars, grouts, concrete yah sab hamaare lie shabdon ke roop mein ya processes ke roop mein nae nahin hai. Reinforce concrete pipes se banee ek sewer line, RC nirmaan mein

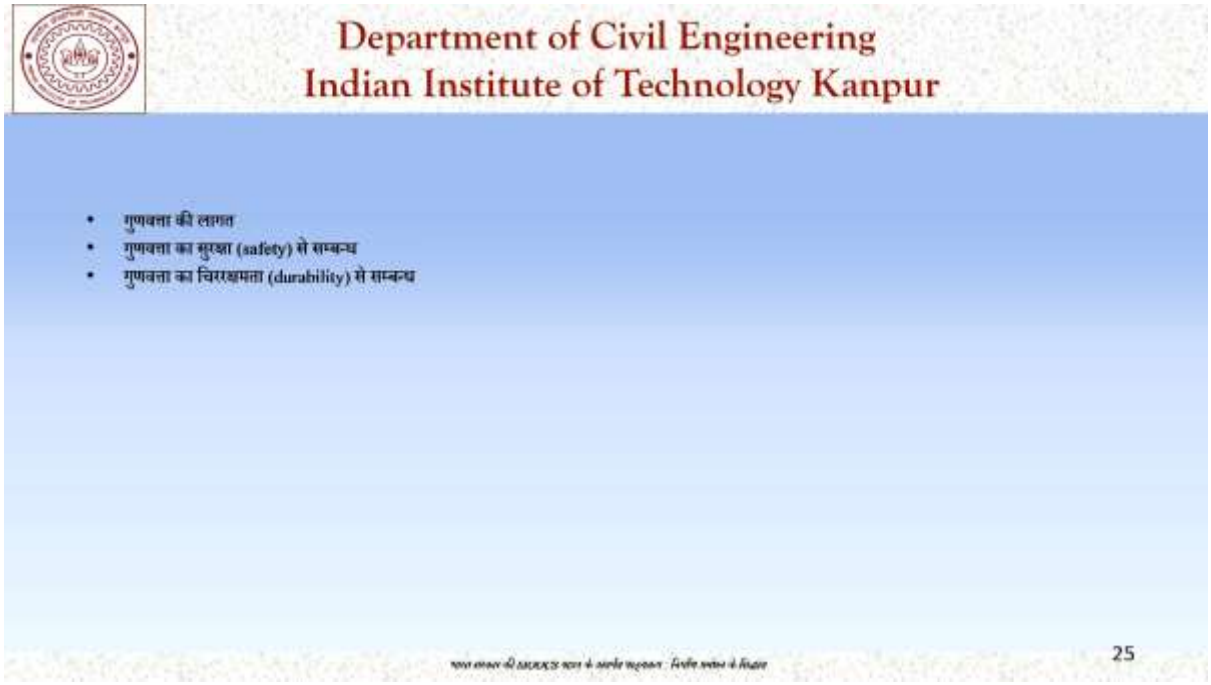
reinforcement ke lie couplers ka upayog ya precast products jaisa ki ham metro construction mein aksar dekhate hain piers ke oopar jo girders rakhe jaate hain vah ek tareeke se pre-cast product hai yah sab ham aksar aur lagabhag roj hee dekhate hain. Ham chaahate hain kee gunavatta ke drshtikon se inaka vishleshan aap karane kee koshish karen aur dhyaan rakhen ki ham quality of materials, components and systems jisakee abhee hamane charcha kee thee, saamagree, ghatakon aur pranaaliyon kee gunavatta ya utpaad kee gunavatta versus prakriya kee gunavatta. In do drshtikonon se ya in do approaches se in keywords ka vishleshan karen.

(Reference Time 25:22)



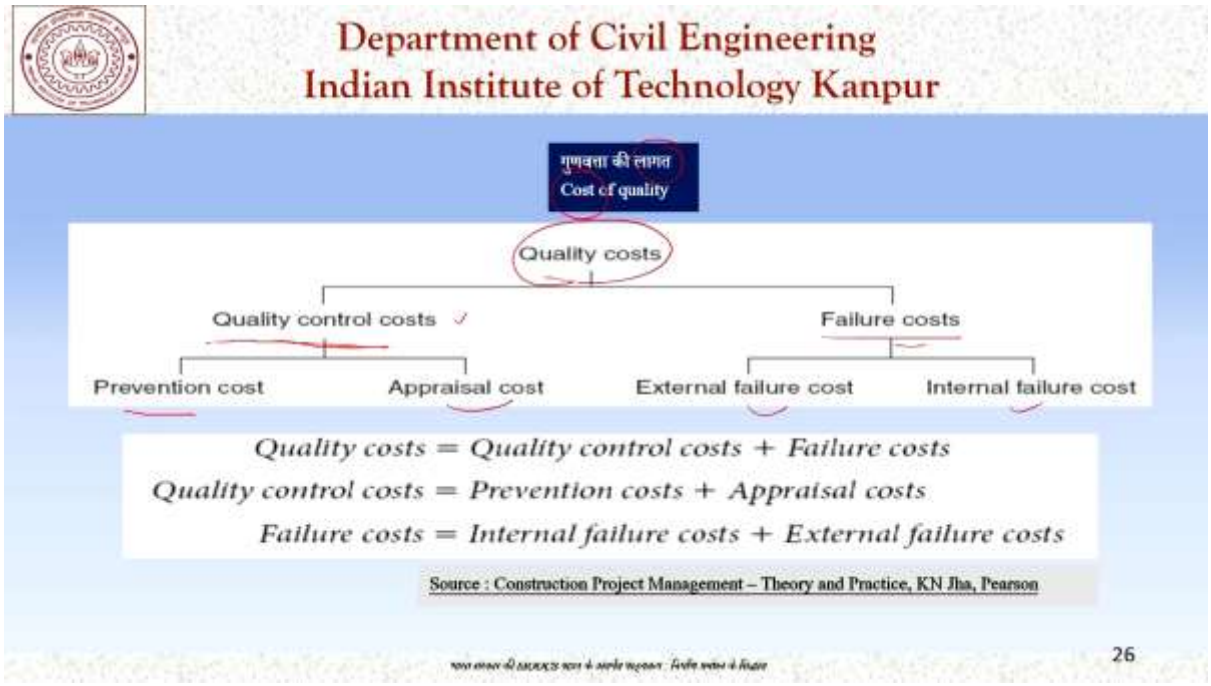
In sabhee mein se yah teen welding, epoxy coated bar aur concrete in teen kee charcha ham is module mein alag se karenge. In lectures ke alaava is module mein to shaayad sambhav ho lekin ham koshish karenge yah paathyakram samaapt hone se pahale kuchh vishesh baaton par alag se charcha avashy karen jaise concrete ke acceptance criteria par ya kisee bhee pariyojana ko kaaryaanvit karate samay quality plan kis prakaar banata hai aur schedule aadi ko kis prakaar se usamen samaaveshit kiya jaata hai. To aaj ke quality control in construction, is module ke introduction kee charcha samaapt karane se pahale main in baaton par ek sankshipt charcha karana chaahata hoon.

(Reference Time 26:13)



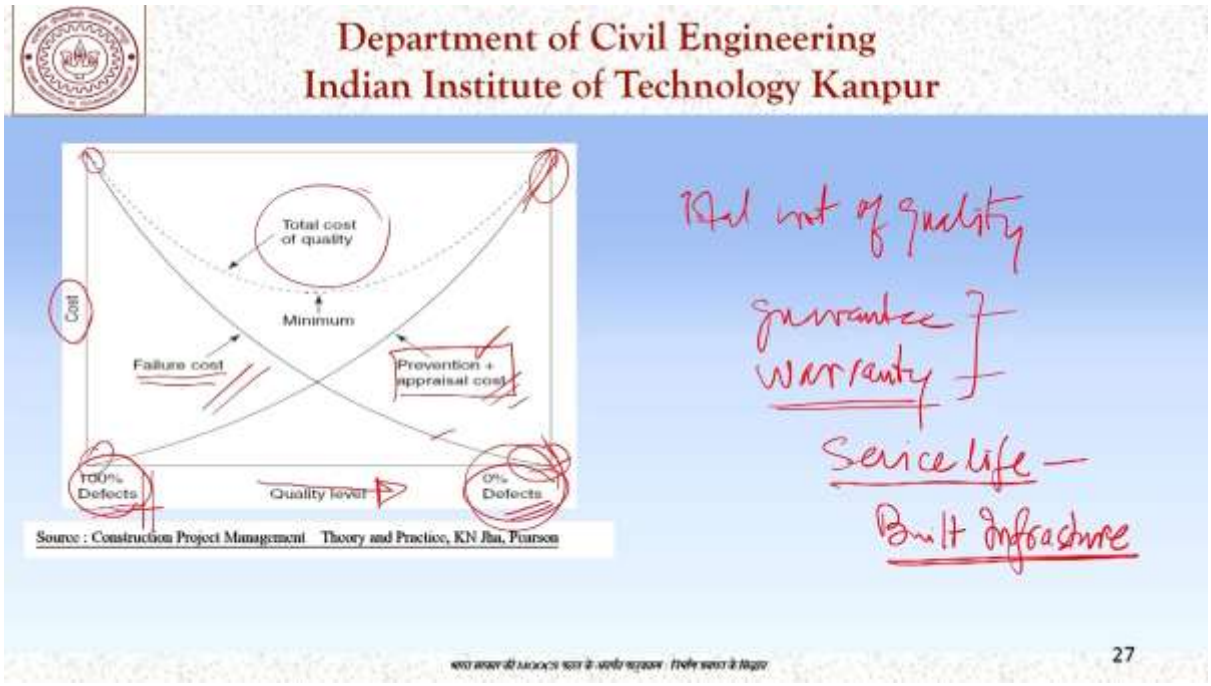
Gunavatta kee laagat, gunavatta ka suraksha ya safety se sambandh aur gunavatta ka chirarakshamata (durability) se sambandh.

(Reference Time 26:24)



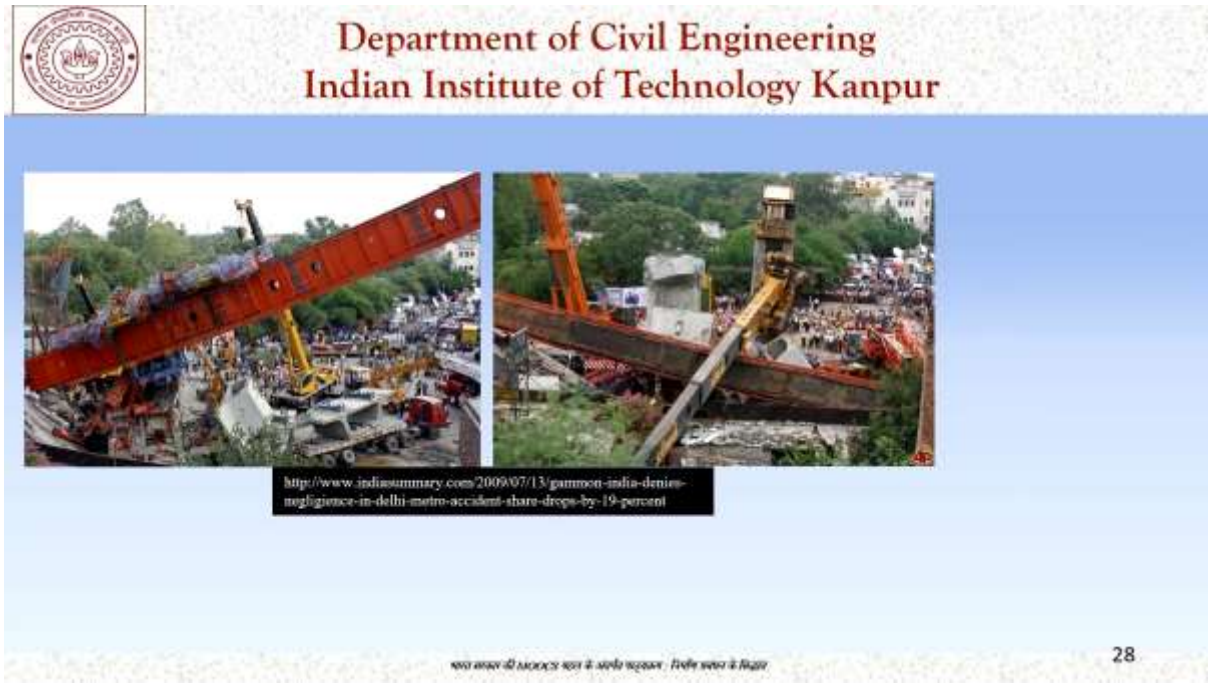
Jahaan tak gunavatta ka laagat se sambandh hai mainne pahale bhee kaha ki gunavatta sunishchit karane ke lie ek laagat ya cost involved hai, to gunavatta kee jo laagat hai usake do component mote taur par maane ja sakate hain ek hai quality control cost, yah ham inakar karate hain utpaad ko banaate samay aur usake saath hee hai failure cost ki yadi vah utpaad gunavatta ke maanakon par khara nahin utara to jo hamen laagat lagaanee padegee vah bhee to overall cost of quality ka ek part hogee. To ham quality control cost ko divide kar sakate hain prevention cost aur appraisal cost mein. Fair cost ko ham vibhaajit kar sakate hain external failure cost aur internal failure cost mein.

(Reference Time 27:14)



To ek chitr ke maadhyam se agar ham is concept ko dekhen to ek schematically yah socha ja sakata hai ki agar ham is access par bahut adhik defects aur bahut kam defects kee baat karen aur yahaan par ham baat karen cost kee y axis par hai cost. To ham failure cost agar dekhate hain to is roop mein jaegee arthaat bahut saare defect hone par failure cost bahut adhik hogee aur zero defect hone par failure cost jo ki utpaad ke gunavatta ke maanakon ko na poora karane kee cost hai vah lagabhag zero ho jaegee. Saath hee saath prevention end appraisal jo quality control cost hai vah yahaan par zero hai aur yah cost zero hai iseelie yahaan par bahut saaree defects aa rahe hain. Yah cost agar ham badha dete hain yahaan par dhyaan kendrit rakhate hain to ham zero defects utpaad bana sakate hain, jo hamaaree total cost of quality hai vah in dono cost ka sum hai arthaat yah failure cost aur quality control cost ko agar ham jodenge to ek is prakaar ka graph milega. Yah baat ab aapake vivek par main chhodana chaahata hoon ki failure cost kis prakaar se nirdhaarit hotee hai? Failure cost ka interpretation nirmaan kaaryon ke sandarbh mein kaise kiya jae aur kab tak kee cost failure cost maanee jaegee? Yadi ek bridge banata hai aur 2 saal baad toot jaata hai ya 2 saal baad usamen kuchh kamiyaan dikhaee padatee hain, to kya jo cost us vakt repair karane kee hogee vah us bridge kee original cost jodee jaanee chaahie ya nahin jodee jaanee chaahie. Is graph ke saath juda hai prashn guarantee ya warranty ka. In donon shabdon mein kya antar hai yah main aapake oopar chhod deta hoon lekin dhyaan rahe ki ham chhote-chhote products chaahe hamaara mobile phone ho, chaahe hamaara pen ho, camera ho usamen 15 hazaar ya 20 hazaar rupaye kharch karate hain aur yah chaahate hain ki ek service life ke dauraan usakee guarantee ho warranty ho aur jo manufacturer hai vah usako replace karen ya repair karen. To us tareeke ke concept hamaare built infrastructure jo ki nirmaan kaary se juda hamaara is poore paathyakram ka vishay hai usamen service life guarantee, warranty cost of failure, quality control cost in concepts ko kis prakaar se dekha jaana chaahie isaka koee readymade answer upalabdh nahin hai aur hamako ek vichaar hee karana hoga ham sab logon ko chaahe ham academicians ho, chaahe ham working professionals ho aur chaahe ham kisee bhee infrastructure ke users hon. Hamen is baat ka dhyaan rakhana hoga aur yah jaagarookata dheere-dheere aa hee rahee hai.

(Reference Time 30:29)

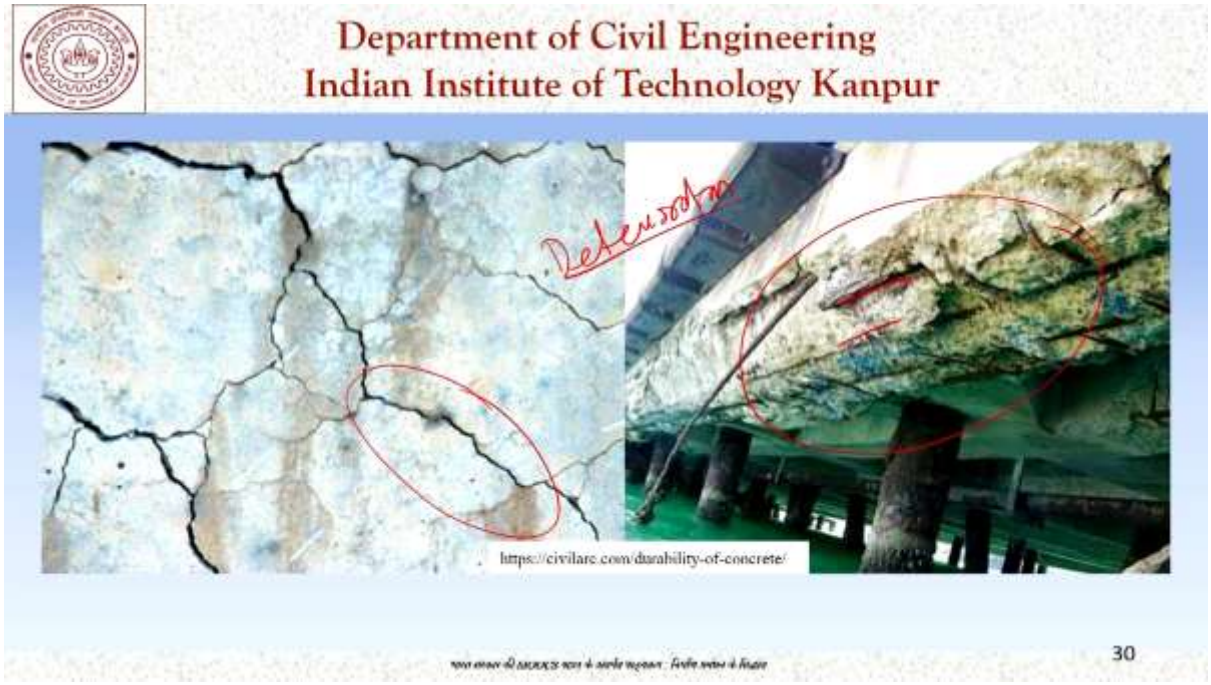


Charcha ko aage badhate hain aur ham dekhate hain yah chitr ya ye chitr.

(Reference Time 30:34)

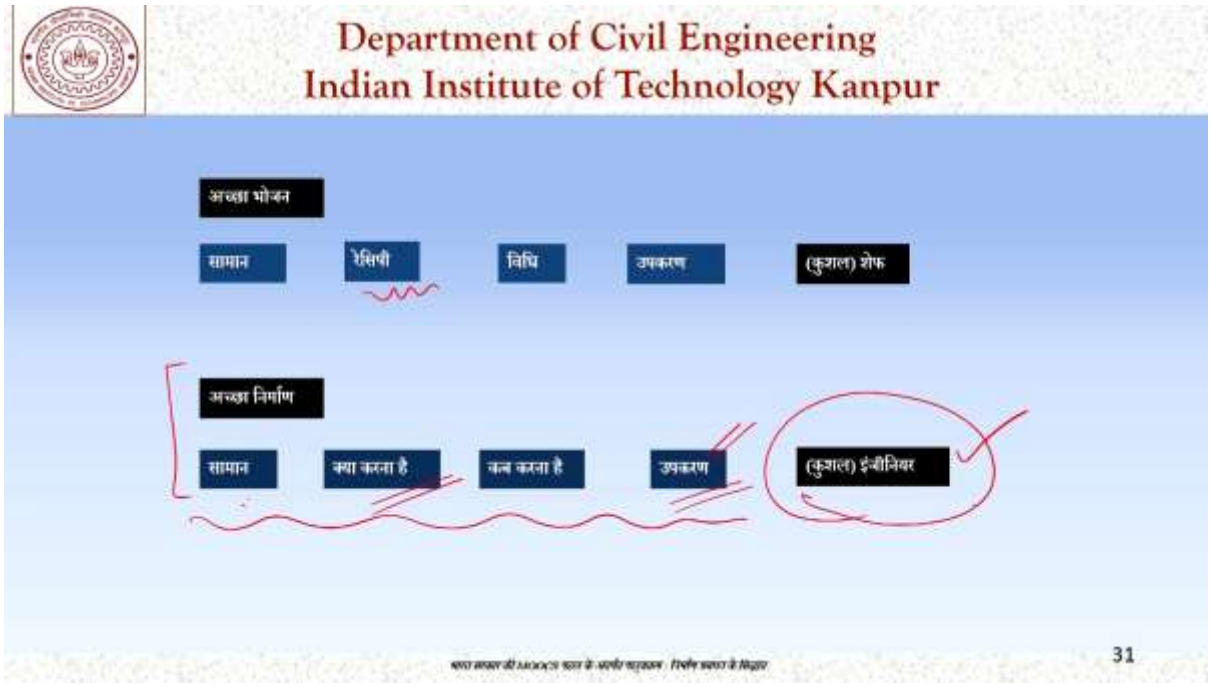
Ya chitr hai nirmaan ke dauraan durghatanaon kee. Safety during construction yah quality ka vishay hai ya nahin is par tamaam charcha ho sakatee hai. Ek systematic comprehensive understanding mein yah kahana ki ye quality control engineer ka kaam tha aur ye safety engineer ka kaam tha is prakaar se ek doosare ko jimmedaar thaharaana uchit nahin hai. Yah ek company ke andar yah ek professional matter hai aur hamen quality se related tamaam pahaluon par bahut hee gambheerata se vichaar karana chaahiye.

(Reference Time 31:19)



Aur teesara mudda jo ki quality se juda hua hai vah hai durability yaniki chirarakshan ka kaam. Ham is prakaar se concrete kee spalling, sariya ka is prakaar se baahar dikhaee padana ya is prakaar se structure mein cracking ho jaana. Jab yah cheejen dekhate hain to hamako yah lagana chaahie ki kya hamane jab yah structure bana tha tab gunavatta sunishchit kee thee aisa to nahin kis prakaar ka jo deterioration ham isamen dekh rahe hain vah us samay puar quality construction ka nateeja ho aur poor quality construction gunavatta ka ek bhaag hai aur puar quality construction na ho yah sunishchit karana gunavatta niyantran ka dhyey hai.

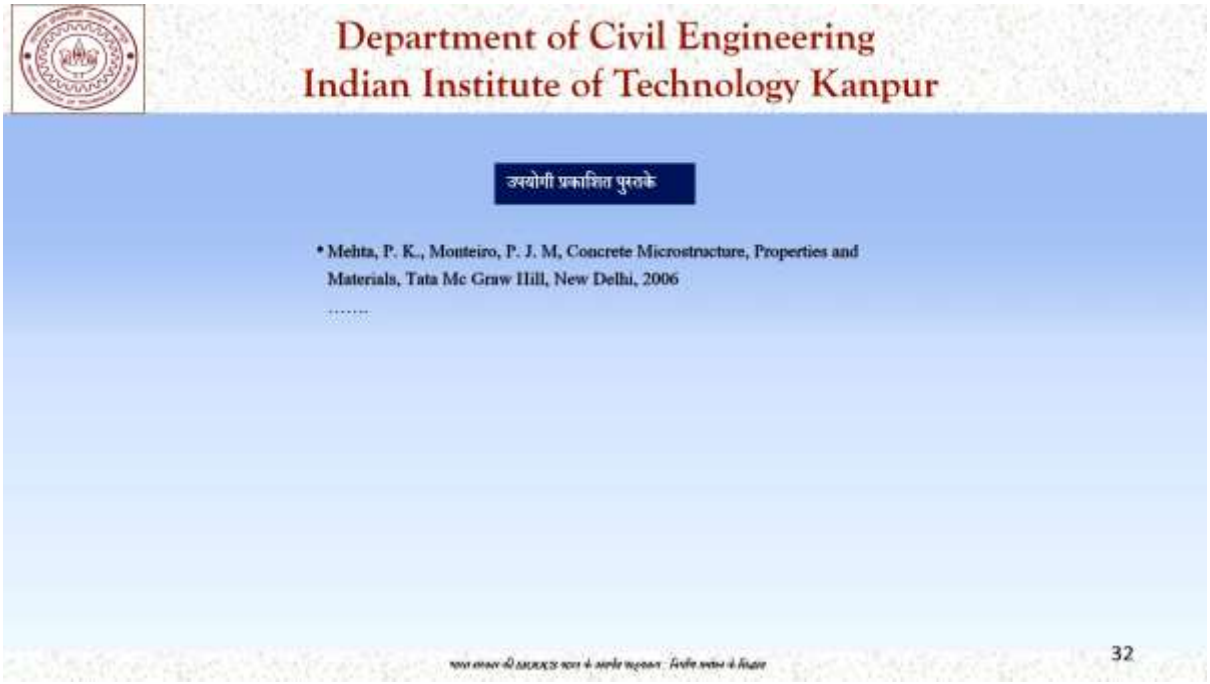
(Reference Time 32:18)



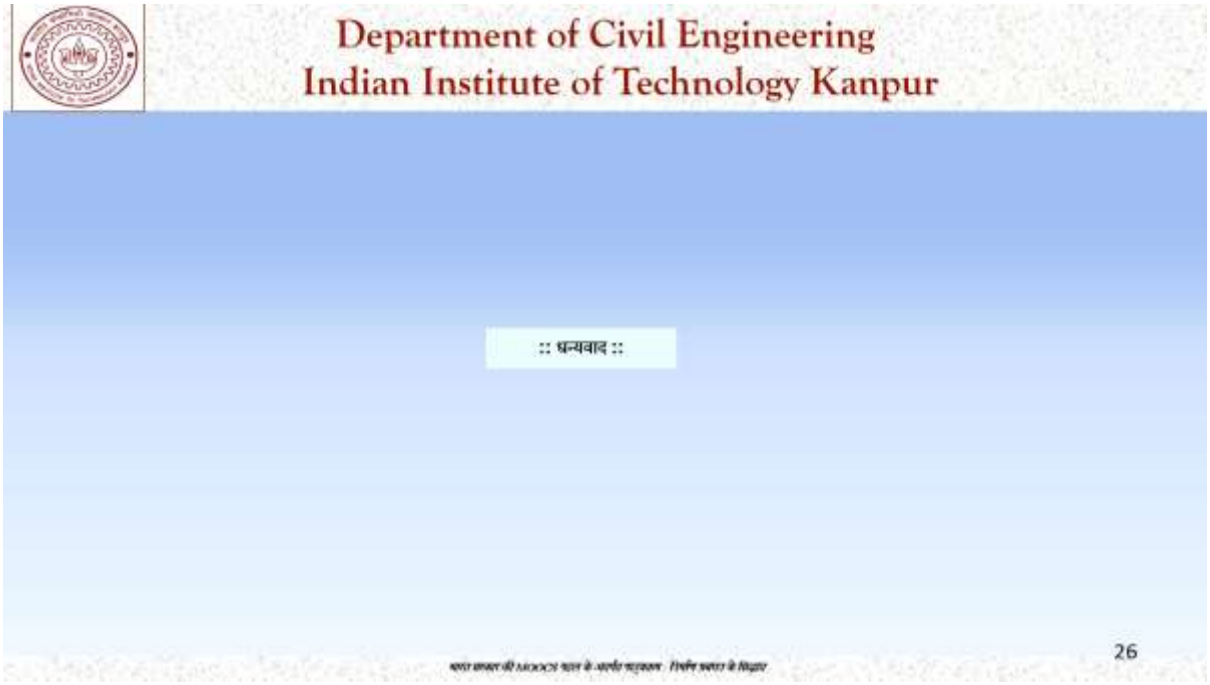
To gunavatta prabandhan ke is module kee introductory charcha yahaan par samaapt karane se pahale main aapako ek analysis dena chaahata hoon ki achchha bhojan banaane ke lie hamen kin baaton kee aavashyakata hotee hai; achchhee saamagree, achchhee recipe,

achchhee vidhi aur upakaran lekin kya in sabhee ke hone se achchha bhojan ban jaega. Main nahin samajhata ki achchhe bhojan ke lie achchha saamaan, recipe, vidhi aur upakaran hone maatr se achchha bhojan banaaya ja sakata hai. Usake lie ek kushal chef kee aavashyakata hotee hai. Isee prakaar achchhe nirmaan ke lie hamen saamaan achchha chaahie ro material hamako chaahie, hamako kya karana hai yah pata hona chaahie bahut hee spasht roop se. Agar hamaaree recipe clear nahin hai to bahut gambheer samasyaen ho sakatee hain. Isee prakaar hamen kya karana hai yah bahut hee spasht roop se pata hona chaahie, kab karana hai, kaise karana hai yah sab pata hona chaahie aur usake lie tamaam jo upakaran hamen chaahie vah hamaare paas hone chaahie, lekin in sabako milaane ke lie hamaare paas antatah ek kushal engineer hona chaahie. To gunavatta niyantran ek kushal engineer ke maadhyam se hee ho sakata hai. Achchha samaan hona, kya karana hai usakee jaanakaaree hona, kab karana hai, kaise karana hai aur usake lie sabhee upakaran hone maatr se gunavatta sunishchit nahin kee ja sakatee hai aur yah kaam quality engineer ya gunavatta nireekshak ka hee nahin nirmaan kaary se jude har vyakti ka hai chaahe vah material supplier ho, chaahe vah designer ho chaahe, vah bar vendor ho, carpenter ho koee bhee ho to isake saath ham apanee charcha samaapt karate hain.

(Reference Time 34:04)



Yahaan par kuchh upayogee pustak dee gaee hain jinase ki aapako is paathyakram mein cover kiye ja rahe material ko samajhane mein aasaanee hogee.



Dhanyavaad. Namaskaar..