CIVIL ENGINEERING DIVISION
Effective Waste management

- Introduction: We all know that wastage occurs in each and every process in our day to day life. Humans,animals and all living organisms expel organic wastages in day today life which has to be effectively removed,disposed, recycled into useful matters.
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- Enormous quantity of garbages are resulted by human activities in and around the environment.So in order to upkeep the living environment besides making revenue to maintain the system, it is found mandatory to do effective management of the day to day wastages viz: garbages,sewerage,hospital wastes, industrial wastes,building demolition wastes, Automobile workshop wastes, glass fibre and other polymer wastes,coir,jute,porcelains,PVC materials, glass containers,PVC mineral water bottles,rubber wastes,flyash etc. sugarcane bagasse wastes,palmyrah,coconut tree wastes etc also can be used which will be very much economical and echo friendly as well as in strength aspect.

- **We can see them below in detail below**

WASTE GLASS WOOL,GLASS,JUTE,COIR,COCONUT FIBRES IN MODERN DAYS

- The Glass wool materials mixed with polymers are used in the concrete mix or by U Jacketing or by fixing at the bottom of the beam components.The methodology is that the high fibre aspect ratio i.e length: diameter permits appreciable transfer of loads there by taking advantages of the excellent properties of the fibre with higher modulus of elasticity as well as the polymers used. The max %age of glasswool needed is 0.075only.

USES OF GLASS FIBRES and GLASS POWDER

- The sand content may be reduced considerably to achieve more durability and economy in laying RCC as well as PCC,as it is capable to take care of compression as well as tension.
- Glass powder in pulverised and ground form 2.36mm to 4.75 mm can be utilised in concrete as it has better silica content to replace sand .

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- The waste glass bottles,broken glass window pans and the waste pieces from the glass retailers may be made use of in the glass industry by recycling in order to reduce hazardous waste of such vulnerable materials. This recycled material will be verymuch useful in the construction industry.

- Agro waste(organic waste), Industrial waste(inorganic waste), Mining as well as mineral wastes ,non hazardous wastes viz:lime waste,glasswaste as mentioned above,ceramic wastes,broken marble waste,kiln dust etc and Hazardous wastes such as blasting materials,sludge from waste water,tannery waste water,wastes from ETPs and metalurgical wastes can be reused after recycling and sizable revenue can be realised..

QUARRY RUBBISH and DUST

- Quarry rubbish in irregular shape can be utilised for dumping low lying areas to prevent unnecessary blocking of traffic in urban areas. Available in enormous quantities will serve for Sub base of road formation.
- Quarry dust can be used by sieve analysis to allow the material passing between 2.36mm to 4.75 mm to replace sand according to the necessity.
- Very fine particles can be used in seal coat along with chips over the BT to get better strength and reduction of wear and tear of the road. This may be used in brick industry also as an additive to get better compressive strength.

USAGE OF STEEL SLAG

- The biproduct of steel industry namely steel slag is being utilised in cement industry for the recent past.
- Simillarly Rice husk ash,fly ash ,Palm oil fuel ash,bamboo,coconut fibres,vegetable fibres etc are used in making interlocking paver blocks thereby adding to 2.5% on weight basis according to the utility.
- The construction debris also are being utilised in laying external concrete works earmarked for rough use.The expenditure will be cheaper and better quality may be achieved and the waste of the materials also will be reduced to minimal.

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Sugarcane Bagasse Ash &Coir fibre

- Sugarcane Bagasse Ash is a biproduct of burning sugarcane bagasse and this can be used in concrete thereby replacing up to 30% cement by weight to increase the strength by 15% owing to its high amount of silica (SiO2).

Max coir fibre length 20mm -50mm with 1% quantity on weight basis with aspect ratio 80 is mixed in M30 concrete with addition of superplasticizer 1% by weight of cement as per BIS 10262 and it withstands better at slump cone test as well as good workability. The results are considerably better in compression as well as cylinder split tensile strength test and flexural test by UTM with the specimens placed between rollers spaced 250mm apart for specimens of curing period 7days,14days,28days etc..

COCONUT FIBRE and Sugarcane bagasse ash usage

- This is agricultural waste .In this case fibre quantity with only 3% by weight of cement will be efficient in the concrete mix to get better results in slump cone test and in compression as well as cylinder split tensile strength test and flexural test by UTM with the specimens placed between rollers spaced 250mm apart for specimens of curing period 7days,14days,28days etc. Coconut fibre and coir are used to manufacture furniture,sound proof acoustic sheets and fibre boards etc.
- It was observed that combined Sugarcane Bagasse Ash 10% of weight of cement mixed with coirfibre1.5% in the concrete, the compressive as well as the spliting tensile strength is getting increased to about 115%.

RECYCLING OF WASTES

- The waste PVC bags,cups and scrap materials upto 60 micron thickness can be recycled to make PVC granules mixed with cement and can be used in laying water proof roads. If the scrap thickness exceeds, they can be used in the manufacturing process of new materials of the same category .The broken porcelain items and construction debris may be utilised in low cost concrete fabrication thereby breaking the clods and consolidating and providing road subbase etc. Greater economy will be achieved and the dumping of the wastes will get reduced considerably.
- Very mild hospital cotton waste and cloth materials should be incinerated under control.
- Waste Glass should be sent to recycling units and crumbled into powder and granules and made use of in concrete laying and as a result the shearstresses as well as in bending will be taken careof..

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MUNICIPAL WASTES

- Enormous quantities of garbage are being dumped by local bodies,which are being separated as Biodegradable and Non Biodegradable.The Non Biodegradable consists of mainly polythene carry bags tea cups and hospital wastes,debris,porcelains,broken tiles,glass bottles and pieces ,unserviceable rubber tyres and other PVC pipes,wires etc. Domestic Biodegradable materials can be made use of to make compost fertilisers. Each and every house shall have a compost fertilizer system.All the local bodies have to install Bio gas plants to ferment the organic wastes,vegetable waste and plants waste, sewerage and mixing with cowdung to produce Biogas which is useful for cooking purpose as well as to produce electricity in small scale sectors. Considerable revenue also can be generated in this process.
- Waste Plastic bags and tea cups should not be burnt as pyroxin poisonous with CO,CO2 will get emanated, hazardous to health of living organisms.They have to be recycled to form waterproof roads which will last for ever.
- **MANAGING RUBBER WASTES**
- Unserviceable rubber tyres shall be disintegrated there by sending to rubber industry,segregating the rubber and reinforcements for recycling.The rubber may be crushed into granules in the manufacturing process, heating by 700 deg celcius, molten rubber obtained and utilised to form rubber roads,applying in tac coats in the areas of heavy vehicular traffic and vulnerable to heavy rainfall so as to achieve better durability for ever.
- **AUTOMOBILE WASTES**
- Two wheeler workshops as well as Four wheeler workshops are discarding various spare parts which are unserviceable. These scraps have to be sent to the steel industry ,reconditioned or recycled to produce simillar parts. The electrical cable PVC components also have to be recycled.
- The engine oil and other unserviceable oils can be used in construction industry such as Damp proof course and in plastering in watertanks and to lay machine pressed tiles at rooftop and in canal lining works etc to replace water proofing compound.

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MEETING FUTURE DEMANDS OF RIVER SAND BY SUBSTITUTING WITH M SAND

It is suggested that M sand can be manufactured from the granite heavy blocks each weighing about 20-30 tonnes excavated by illegal mining from quarries and stored in waterbodies.The methodology is that they have to be broken disintegrated and segregated to the requirement of the construction materials viz:HBGS jelly, M sand complying to BIS 383 thereby arriving proper methodology and procuring machineries to suit the size of aggregates to comply with the future requirement. By doing this atleast two decades of sand requirement will be catered. All the quarries also can cater the needs of M sand so that the sand problem in entire world will get solved to the maximum extent.

- **CONCLUSION**

- WASTE MANAGEMENT of any materials is highly appreciable one in the interest of maintaining good ecology, economy and to make the atmosphere in a better manner with lesser hazard. Also the dumping of wastes will get reduced and green house effect will completely be avoided and to make our country a litter free one. Also julie flora growth which is a greater enemy for the environment and ecology, shall be terminated by latest agricultural methodology**. ANY waste can be reused, just like a coconut or Palmyrah tree which have NO WASTAGES.**

It is hereby humbly submitted in this paper as above so as to have effective waste management in the near by future as keeping the surroundings neat and tidy without garbages and making India country"SWACHHA BHAARAT" and ultimately benefitted to the entire world also.

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Source :Materials gathered from Engg colleges at Madurai ,Tamilnadu India as well as personal experiences and also from internet.

This paper can be edited according to your convenience.

Thanking you

Yours faithfully,

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